EASTERN SIERRA RIPARIAN SONGBIRD CONSERVATION

2001 PROGRESS REPORT

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SUMMARY

We completed the fourth field season of the Eastern Sierra Riparian Songbird Conservation project in 2001. The project emphasized coverage of riparian habitats on Bureau of Land Management Bishop Field Office (BLM), Inyo and Humboldt-Toiyabe National Forest (INF & HTNF), Los Angeles Department of Water and Power, Mono Lake Tufa State Reserve, California Department of Fish and Game and Mono County lands along a 320 – kilometer stretch of the eastern Sierra Nevada. In total, we conducted 630 point counts and point count vegetation assessments, monitored six nest searching plots (finding a total of 508 nests for 44 species), ran 4 mist netting stations, and conducted area searches at two plots.

A total of 229 species have been observed since the project inception in 1998, and breeding status was determined for each. Breeding status of focal species for the California Partners in Flight Riparian and Coniferous Forest Bird Conservation Plans was submitted for inclusion in the most current distribution maps for those species.

We determined species richness and diversity for five new sites primarily in aspen habitats on BLM lands and at two high elevation sites adjacent to pack stations and campgrounds on INF lands. These new transects had relatively high breeding bird diversity and richness compared to other eastern Sierra transects. We determined relative abundance for the top ten most abundant breeding species at these new sites, as well as for the top five most abundant species at sights initiated prior to 2001.

We determined nest success for Yellow Warblers and Song Sparrows at Rush, Lee Vining, Mill and Wilson Creeks and found a significant difference between creeks. These species had highest nesting success at Lee Vining Creek, where nest success was also much higher in 2001 than in 2000. We also determined proportional nest success for INF sites where Warbling Vireos and Dusky Flycatchers experienced very poor nest success, with no nests succeeding at North Lake. Brown-headed Cowbirds were detected in significantly higher numbers at horse corrals at pack stations than at nearby riparian sites. Cowbird numbers also increased throughout the season, most notably after stock animals were first observed at the corrals (June 21 and 22), peaking in early July, and dropping again by the third week of July. Host species parasitism rates at riparian sites were similar within 0.15 and 4 km of the pack stations (48% and 55%, respectively). Eighty-eight percent of Warbling Vireo nests were parasitized at both sites combined. Among Mono Basin sites, host species at Wilson Creek had the highest rate of parasitism (67%).

Predation accounted for 67% and 40% of all nest failure at Mono Basin and INF sites respectively. Wilson Creek and North Lake had the highest number of potential mammalian predators detected throughout the songbird breeding season, and avian predators were most abundant on Mill and Wilson Creeks. Predation accounted for 42% and 33% of nest failure among parasitized Yellow Warbler and Song Sparrow nests at Mono Basin sites.

Two young (hatch year) birds banded at Lee Vining Creek in 2000 moved to Rush Creek to breed as adults in 2001. Thirty-three other individuals (of nine species) were banded as breeding adults in 2000 and were recaptured as breeders in 2001 at the creek of their initial capture.

BACKGROUND AND INTRODUCTION

2001 marked the fourth year of the Eastern Sierra Riparian Songbird Conservation Project (ESRSC). The Bureau of Land Management Bishop Field Office (BLM), Inyo National Forest (INF) and the Point Reyes Bird Observatory (PRBO) originally spearheaded the baseline songbird monitoring program in 1998. Additional partners at the time included California Department of Fish and Game (CDFG), Eastern Sierra Audubon Society (ESAS), Eastern Sierra Institute for Collaborative Education (ESICE) and the Mono Lake Committee (MLC). In subsequent years, additional partners included Los Angeles Department of Water and Power (LADWP), Mono Lake Tufa State Reserve (MLTSR), Mono County, consulting firms (McBain and Trush and Ecosystem Sciences) other researchers (Cornell University), and educators in the region.

Much of the work conducted in 2001 was a continuation of a subset of the work begun in 1998. Each year since the inception of the project, however, we have added additional study sites, new partners, and focused more intensively on specific findings from the previous years. The story of Yellow Warblers in the Mono Basin provides an example of this process: After 2 years of extensive point counts in the Mono Basin, we documented one of the highest breeding densities of Yellow Warblers recorded in California. Yellow Warblers are declining in the state and have been identified as at California State Species of Special Concern (CDFG and PRBO 2001). Although this species is well-studied throughout North America, little information regarding productivity, nesting success influences, over- winter survival, habitat associations, or other factors that may be limiting Yellow Warbler populations exists for the state.

These data gaps were documented for Yellow Warblers and thirteen other species (riparian focal species) in the Riparian Bird Conservation Plan (the plan, RHJV 2000). Developed to guide conservation policy and action on behalf of riparian habitats and California's landbirds, the plan seeks to document the most current breeding distributions for the 14 riparian focal species (Appendix 1), and provides habitat management, protection and restoration and monitoring recommendations. Integral to the plan is the concept that by managing for a host of riparian associated landbird species, other species (birds and otherwise) will benefit. Additionally important to the plan is the adaptive management planning process, wherein landbirds are purported as an ideal organism for monitoring environmental changes, and effects or successes of management or restoration practices.

In 2000, we began to more intensively investigate the Mono Basin riparian communities where the abundant Yellow Warblers and several other species were breeding. By investigating productivity, survival, habitat, predation, and parasitism effects on nesting success, we seek to better understand the factors affecting riparian landbirds in the eastern Sierra Nevada bioregion. We are testing recommendations provided in the plan, while investigating the recovery of these creeks as they undergo passive restoration after decades of water diversions. Through collaborative partnerships, we are providing this information to local managers, planners and conservation organizations; and by feeding the information back into the Riparian Bird Conservation Plan we are providing this information to regional and statewide efforts.

This document reports the results of the 2001 field season. Herein, we provide summary results for:

- the fourth year of point count results for a subset of sites we initially established in 1998 on BLM, INF, LADWP, CDFG, MLTSR and Mono County lands
- the first year of point count results for sites we established on BLM lands in 2001 to further investigate songbirds in aspen riparian habitats, and to monitor possible effects of changes in sheep grazing intensity
- the second year of nest searching and mist netting data at two restoration sites and two sites proposed for changes in water allocation and management in the Mono Basin on BLM, INF, LADWP, and Mono County lands
- the first year of nest searching and point count data at two high elevation meadow riparian sites on INF lands that we established to investigate the effects of pack stations and campgrounds on adjacent riparian breeding landbirds
- the first year of Brown-headed Cowbird and predator summaries at the six nest searching locations
- the second round of vegetation assessments for all new and a subset of old point count locations

METHODS

Project Time Scale

The original project was conducted 1998-2000 and is described in Heath et al. (2001). Efforts in the Mono Basin were intensified in 2000, with the initiation of nest searching plots and mist netting stations. In 2001, point counts and habitat assessments at a representative subset of the original 1998-2000 study area were continued. Efforts at the intensive Mono Basin sites were continued as well, with the intention to continue work here as a part of a long term monitoring program for the Sierra Nevada Bioregion. Additionally, new point count stations were established on BLM and INF lands, as were nest searching plots on INF lands. Point count transects were also established on HTNF lands and these results are presented in Heath and Ballard (2002).

Study area

The study area in 2001 encompassed riparian habitats of the Owens River, Mono Basin and East and West Walker River Watersheds of Inyo and Mono Counties. A host of federal, state, county and city agencies manage study site lands including the BLM, INF, HTNF, LADWP, CDFG, MLTSR and Mono County. Thirty-four separate creeks and three sections along the Owens River and West Walker River were studied, totaling approximately 170 stream-km or 1,700 ha of riparian habitat, ranging in elevation from 1135m to 2900m (Figure 1, Table 1).

Figure 1. Eastern Sierra Riparian Songbird Conservation project study area, 2001. Numbered sites correspond with Table 1.

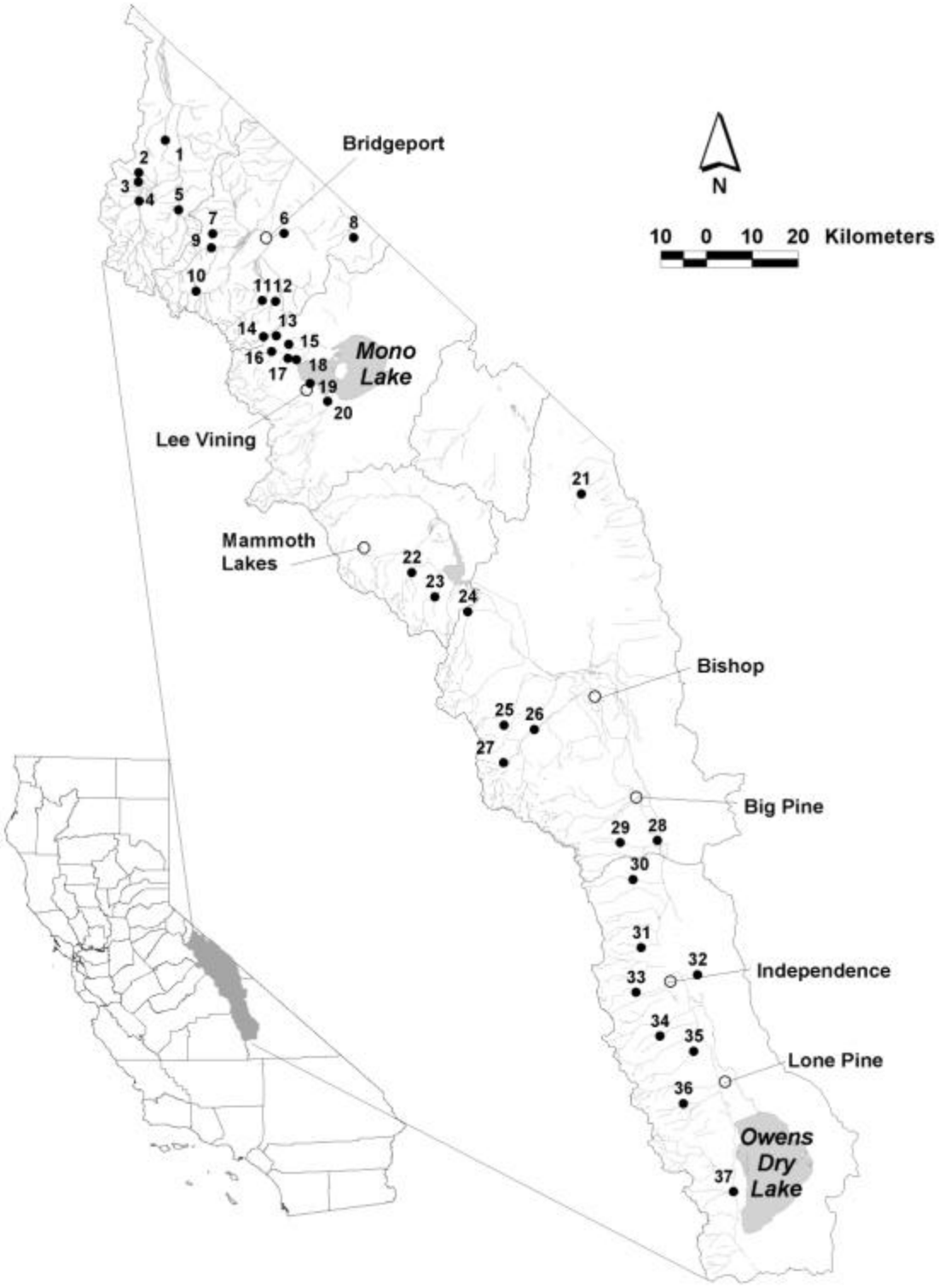


Table 1. Songbird census techniques conducted at each study site, eastern Sierra Nevada, 2001. Sites listed from north to south and key numbers correspond with numbered dots in Figure 1. Underlined methods are those initiated in 2001. Italicized sites are those established on HTNF lands in 2001 and are summarized in Heath and Ballard (2002). Some of the sites on Green Creek were established in 1998.

STUDY SITE	**Key to Fig. 1**	**CENSUS TECHNIQUES** point count	area search	nest monitor	spot map	mist net	habitat & vegetation assessments
Mill Creek – North	1	✕					✕
Silver Creek	2	✕					✕
Wolf Creek	3	✕					✕
Upper West Walker River	4	✕					✕
Little Walker	5	✕					✕
Clark Canyon	6	✕					✕
By-Day Creek	7	✕					✕
Atastra Creek	8	✕					✕
Buckeye Creek	9	✕					✕
Robinson Creek	10	✕					✕
Green Creek	11	✕,✕					✕,✕
Dog Creek	12	✕					✕
Jordan Gulch	13	✕					✕
Virginia Creek	14	✕					✕
Wilson Creek	15	✕		✕	✕	✕	✕
Mill Creek – South	16	✕		✕	✕	✕	✕
Dechambeau Creek	17	✕					✕
Thompson Ranch	18	✕	✕				✕
Lee Vining Creek	19	✕	✕	✕	✕	✕	✕
Rush Creek	20	✕		✕	✕	✕	✕
Marble Creek	21	✕					✕
Convict Creek	22	✕					✕
McGee Creek	23	✕					✕
Rock Creek – Upper	24	✕		✕	✕		✕
Buttermilk Country	25	✕					✕
Bishop Creek	26	✕					✕
North Lake	27	✕		✕	✕		✕
Owens River - Tinemaha	28	✕					✕
Birch Creek	29	✕					✕
Taboose Creek	30	✕					✕
Thibaut Creek	31	✕					✕
Owens River - Mazourka	32	✕					✕
Independence Creek	33	✕					✕
Bairs Creek	34	✕					✕
Hogback Creek - Lower	35	✕					✕
Tuttle Creek	36	✕					✕
Ash Creek	37	✕					✕

Point Count Censuses

We conducted point count censuses at 28 of the original 1998-2000 transects in addition to 17 new transects, totaling 630 independent point count stations on 45 transects. We conducted 5-

minute 50m fixed-radius point counts following standards recommended by Ralph et al. (1993, 1995). We conducted all counts during the peak breeding season, June 1 to July 13, 2001.

New transects were added to obtain better coverage of aspen habitats on BLM lands, coverage of riparian habitats adjacent to pack stations and campgrounds on INF lands, and broad coverage of riparian habitats on HTNF lands. BLM, INF and HTNF biologists selected the new study streams. PRBO biologists chose starting points on these streams that would contain the total survey transect within land management boundaries to the extent possible and be accessible for early morning census starts. Further points were established randomly at 250m intervals along the riparian corridor, regardless of changes in riparian type, elevation, or geomorphology. We established 15 points on each creek, except for Green Creek - upper (14 points), Jordan Springs (14), and North Lake (5 points). Where width of riparian vegetation allowed, the 50m census-radius was placed entirely within riparian vegetation. In some cases, we established points on the edges of narrow riparian strips, therefore including adjacent sagebrush, meadow and conifer habitats.

All new stations were censused three times and old stations two times during the 2001 field season by biologists familiar with the songs and calls of the birds in the area, and trained in distance estimation. To minimize observer bias when logistically feasible, a different observer conducted each of the two or three censuses. Additionally, when possible, points were censused in order from 1 to 15 for one or two censuses and in the opposite direction (from 15 to 1) for one census in order to minimize the effects of time of day on detection rates. Censuses were conducted from within 30 minutes after local sunrise until approximately 3 hours later, and were not conducted in excessively windy or rainy conditions. All birds detected within a 50 m radius of the census station were recorded separately from those greater than 50 m and we noted whether detections were inside or outside of the riparian vegetation. Detections were categorized as song, call or visual. We also recorded all observations of breeding behavior.

In conditions where the creek was too loud for bird detections, observers stepped slightly away from the creek, but continued to census the 50 m radius circle with the original point as center. We recorded all mammalian and reptilian predator species detected during the 5-minute counts. Because cowbirds are known to travel several kilometers from feeding sites to breeding locations in the eastern Sierra (Rothstein et al. 1984), it is difficult to distinguish between individuals that may be present at several points. We therefore counted all cowbirds seen (within the census times) as an index of cowbird presence.

A list of transects, transect codes and dates of censuses for all sites, route maps, and GPS coordinates and transect descriptions for new sites are presented in Appendix 2. GPS coordinates for 1998-2000 sites are presented in Heath et al. 2001, and transect descriptions for 1998-2000 sites are available online at www.prbo.org, and in Heath and Ballard 1999a, 1999b. This information for HTNF sites is in Heath and Ballard (2002).

Nest Monitoring

Nest searching began in early May and lasted until breeding activity declined in late July. We monitored two nest searching plots at each of the four Mono Basin sites (Lee Vining Creek, Rush Creek, Wilson Creek and Mill Creek) that were initiated in 2000. Additionally in 2001, we

established and monitored one plot at each of two high elevation sites on INF lands 1 adjacent to a pack station (North Lake) and another adjacent to a campground and 4 km from a pack station (Upper Rock Creek). See Appendix 3 for plot sizes and effort summaries and Appendix 4 for general site locations.

PRBO biologists conducted all nest monitoring, following specific guidelines in Martin and Geupel (1993) and BBIRD protocol (Martin et al. 1997). Special care was taken to minimize human induced predation probability and disturbance to the adults and nest site. Nests of all species were located at all stages (construction, egg laying, incubation, and nestling). Nest outcomes were determined by checking nests every 1 - 4 days until completion. Parasitism by Brown-headed Cowbirds and types of nest predators were determined when possible. Mirror poles and Microcams™ on extension poles were used to check the contents of high nests when possible.

All data from nest monitoring were recorded and entered in a format compatible with the BBIRD program of the Fish and Wildlife Service Cooperative Unit at the University of Montana (Martin et al. 1997). Basic measurements of the nest and nest substrate were also recorded after outcome was determined. See Martin et al. (1997) for a complete list of data variables.

Spot Mapping

PRBO biologists conducted spot mapping at each nest plot. The same biologist mapped all territorial individuals during each visit to her/his nest plot (see Nest Monitoring section), following guidelines discussed in Ralph et al. (1993) and International Bird Census Committee recommendations (IBCC 1970). At the end of the field season, daily spot maps were combined into single territory maps for each breeding species at each nest plot. Locations of transient species were noted to document their presence on the plots.

Constant Effort Mist Netting

Mono Basin mist netting stations at Rush Creek, Lee Vining Creek, Mill Creek and Wilson Creek, established in 2000, were continued in 2001. Stations' netting procedures conformed to the guidelines described in Ralph et al. (1993). In summary, 10 mist nets were operated at each station once every ten day period, 11 times between May 1 and August 15 (see Appendix 5 for census dates and GPS coordinates of net lanes and Appendix 4 for maps of netting locations). Nets were unfurled 15 minutes after local sunrise, checked every 30 to 45 minutes (more often in hot weather) and were operated for five hours. Birds captured were removed from the net and processed nearby. Each bird captured (except game birds) received a USFWS band for permanent identification and to enable estimates of survival from subsequent recapture rates. Age, sex, wing length, breeding condition, weight, skull ossification, flight feather wear, molt, and fat score of each bird were recorded as described by Pyle (1997) prior to releasing the bird. Nets and poles were taken down immediately after netting concluded. USFWS-permitted PRBO biologists conducted all banding.

All mist netting data has been submitted to the MAPS program of the Institute for Bird Populations (DeSante and O'Grady 2000) and the Bird Banding Lab (BBL, Patuxent, MD).

Area Searches

Three area search plots were censused at each of 2 sites. Each was censused 3 times throughout the breeding season. In summary, each plot was censused for 20 minutes during the morning hours, and all birds detected within the plot and type of detection (song, visual, or call) was recorded (see Ambrose 1989, Ralph et al. 1993). Breeding behaviors were also recorded. Plot locations, numbers and census dates are in Appendix 6.

Brown-headed Cowbird Point Counts and Tallies

From early June through July, we conducted paired, 5 minute, 50m fixed-radius cowbird censuses at the same point on each of ten nest searching sub plots – the first census conducted soon after sunrise and the second conducted between 11:00 and 15:00. At Rock Creek and North Lake, these counts were also conducted at pack stations 4.5 km and 0.15 km from the nest searching plots respectively. Protocol for all counts followed standardized point count procedure (described above), with the exception that only cowbird sightings were recorded and censuses were conducted on a weekly basis. In addition, we kept daily tallies of cowbird encounters at each of ten nest searching sub plots, differentiating cowbird gender and age, when possible, and recording starting and ending times for the daily tallies.

Predator Area Searches and Tallies

We conducted predator area searches at Big Meadow Campground, adjacent to the Rock Creek nest plot. One area search was conducted each month between May and August within the boundaries of the campground. Protocol followed standard area search procedure (described above) with the exception that only non-avian potential predator taxa (mammals, reptiles) were recorded. In addition, we kept daily tallies of predator encounters at each of ten nest searching sub plots, differentiating species when possible, and recording starting and ending times for the daily tallies.

Point Count Vegetation Assessment

We conducted vegetation assessments at each of 626 point count stations in 2001. Using the Relevé method described by Ralph et al. (1993), we estimated percent cover by height category for every species of plant located within 50 m of point count stations. Height categories were "herb" (0 - .5 m), "shrub" (.5 - 5 m) and "tree" (> 5 m). We also estimated the width of the riparian zone at the point (riparian width), and the size of aspen patches (estimating the width and perpendicular width of each patch that encompassed the point) where aspen was present. We determined elevations at each point using 7.5' USGS topographical maps. We used our vegetation measurements and guidance provided by Sawyer and Keeler-Wolf (1995) to assign dominant habitat series (habitat types) to each point. See Appendix 7 for list of variables.

Nest Vegetation Assessment

We conducted nest vegetation assessments at all nest locations in 2001. Soon after the nesting attempt terminated, we measured the nest substrate and surrounding vegetation patch of each nest. A slightly modified version of the BBIRD method for vegetation measurements was used (Martin et al. 1997), which included variables for forb cover and average forb height by species. The basic units for vegetation sampling were a 5-meter radius plot (for shrubs, forbs and ground cover) and an 11.3-meter radius plot (for trees) centered on the nest. For a detailed description of measurements and estimations used see Martin et al. (1997).

Nest Plot Vegetation Assessment

For each of six nest plot sites, 30 non-nest points were chosen randomly across the plot's area using ArcView (version 3.2a, ESRI 2000). Points were located in the field with Garmin Global Positioning System (GPS II+) receivers, and vegetation assessments were completed, parallel in protocol to the nest vegetation assessments. In addition, we conducted a point-centered quarter assessment (Mueller-Dombois and Ellenberg 1974) as described by Martin et al. (1997), at each non-nest point.

Breeding Status

Breeding status was determined for all species encountered at all study sites between May 1 and August 15, 2001. We used observations recorded before, during, and after all censuses and during project set up and vegetation assessments. Species were ranked by site, using the following four criteria of the Riparian Habitat Joint Venture breeding scale, modified from breeding bird atlas criteria (see Shuford 1993 or http://www.prbo.org/calpif/plans.html.)

0 No evidence of breeding: Species not detected during breeding season, or captured only on migration (with high fat scores).
2 Possible breeding: Species encountered singing or acting territorial only once during the breeding season (in suitable habitat).
3 Probable breeding: Singing individual encountered on 2 or more different days of standardized censuses (at least one week apart); territorial behavior noted more than once at the same location; pair observed in courtship behavior; female with brood patch (males with cloacal protuberances not used as evidence of breeding locally).
1 Confirmed breeding: distraction display; nest building (except woodpeckers and wrens); nesting material or fecal sack being carried by adult; captured female with eggs in oviduct; dependent juveniles with adults; juvenile with no skull ossification before 1 August; active territory observed on at least three days of spot mapping (at least one week apart); active nest observed.

Weather Data

Weather data including wind speed and direction, temperature, cloud cover and type and rain were recorded three times during each banding session during all years. High and low temperatures, and time interval between temperature readings were recorded at each of six nest plot sites.

Geographic Data

Location information was collected at all point count stations using a Garmin Global Positioning System (GPS II+) receiver. Positions were recorded in Decimal Degrees, NAD83 datum. All coordinates and estimated accuracy (figure of merit; FOM) were recorded. FOM of these points ranges from 0 to 10 meters. Point count, nest plot, and mist netting locations and associated vegetation and bird data have been converted to Geographic Information System (GIS) coverages in ArcView 3.2 (ESRI 2000) for use in some of the analyses presented below. All maps are represented in UTM (Universal Transverse Mercator) coordinates, Zone 11, NAD83 datum.

Project Journal

A project journal was kept on a daily basis. Daily activity of all personnel was recorded in addition to a list of all birds detected at both on and off site locations. This journal is archived at the Palomarin field station of PRBO, Marin County, CA.

Statistical Analysis and Definitions

Species Richness and Species Diversity

We summarized species diversity and species richness for breeding species detected during point counts at BLM and INF sites initiated in 2001. We excluded all non-breeding migrant species. We further limited the breeding species to those that we felt were best counted with the point count protocol. Thus we removed non-territorial species, and species whose territories are typically so large that we could not assure independence of individual observations among points. Nocturnal species were also excluded. Excluded species included Clark's Nutcrackers, Common Ravens, Common Poorwills, California Gulls, Turkey Vultures, and all nighthawks, swallows, ducks, shorebirds, and raptors.

We summarized data by transect. Total transect indices are the cumulative species richness or species diversity for each transect. New BLM and INF transects contained 15 points each (with the exception of Jordan Springs - 14 points and North Lake – 5 points). Therefore, total transect indices are comparable to each other, and to other transects with similar numbers of points.

We also summarized data by point and by point per transect. We summarized species richness, diversity and abundance for each point individually for by-point summaries, and then took the mean of these for each transect for by-point per transect summaries. By-point per transect summaries are comparable with other similarly summarized transects with greater or fewer numbers of points.

Species diversity: We calculated breeding species diversity for each point count station and each transect using all detections within 50m summed over three visits. We used the transformed Shannon-Wiener index of biological diversity (MacArthur 1965, Krebs 1989). This index of diversity is usually highly correlated with bird species richness, but also takes the number of individuals of each species into account. Higher scores on the Shannon-Wiener index indicate higher species richness and more balanced numbers of individuals of each species added.

Species richness: We calculated the number of breeding species for each point count station and each transect, using all detections within 50m summed over three visits.

Species abundance

We calculated abundance as the mean number individuals by point by transect, averaged over three visits, using all detections within 50m. We did this for the ten most abundant breeding species at 7 BLM and INF sites initiated in 2001. We also calculated abundance for the 5 most abundant breeding species for 28 sites initiated in 1998 or 1999. For these sites, which were only visited twice in 2001, we calculated the mean number of individuals by point by transect, averaged over two visits, using all detections within 50m. Because few species are 100% detectable, such calculations probably underestimate absolute density. Therefore results should be considered a minimum estimate of abundance.

Estimates of nest success

Nest calculations were limited to nests with known outcome, which were observed with at least one egg or young. Nest success was calculated using two methods: Mayfield (1975), as recommended by Johnson (1979), and Proportion Successful (Martin 1992). The Mayfield method calculates the probability of nest success based on the daily survival rate of the given sample of nests. The method corrects for the fact that nests in any sample are likely to be found at various stages in the nest cycle. Proportion Successful is the percentage of successful nests out of all nests for that species. A successful nest is defined as a nest that fledges at least one host young. We compared nest success between plots and years using the program CONTRAST (Hines and Sauer 1989).

Brown-headed Cowbird presence

For comparisons between the mean number of cowbirds detected at pack stations versus the number of cowbirds detected at riparian sites, and morning cowbird detections versus afternoon detections, we averaged cowbird detections by each site over the number of weekly visits for each site. We used all adult cowbird detections <50m & > 50m. For summaries of trends in cowbird numbers through the course of the season at pack station sites, we summed morning and afternoon cowbird point counts for each of nine weeks they were conducted. For summaries of the number of cowbirds detected per hour between four Mono Basin sites and Rock Creek and North Lake, we summed the total number of cowbird tallies throughout the course of the season for each site, and divided by the number of hours that tallies were kept for each site.

Predator presence

For summaries of the number of potential predators detected per hour at the six nest searching plots, we summed the total number of mammal, squirrel, chipmunk and snake tallies throughout

the course of the season for each site, and divided by the number of hours that tallies were kept, for each site.

Personnel

PRBO: All aspects of field work, project design and set-up were conducted by staff biologist and project director Sacha Heath, staff biologist Grant Ballard, field supervisor Chris McCreedy, and field biologists Noah Hamm, Andrew Jobes, Heidi Kirk, Quresh Latif, Kristie Nelson, Mike Palladini, Mark Pollack, and Sue Prentice, and with guidance from Terrestrial Program Director, Geoffrey Geupel and Population Ecologist, Nadav Nur.
BLM: Wildlife Biologist Joy Fatooh assisted in selecting study sites and conducting point counts and vegetation assessments.
USFS: Inyo National Forest Biologist Gary Milano and Humboldt Toiuyabe National Forest Biologist Gerrit Buma assisted in selecting study sites.
ESICE: Adam Abramson, Natalie Ceperley, Lisa Garner, Kathy Gerst, and Matt Goehring conducted nest plot vegetation assessments.
MLC: Staff members Bartsche Miller and Lisa Cutting conducted area search censuses.
MLTSR: Staff member Dave Marquart conducted area searches.

RESULTS AND DISCUSSION

Bird species composition, distribution and breeding status

We determined breeding status for 229 species encountered at 46 locations over the entire study area and ranked using the RHJV breeding scale (Appendix 8). Results from HTNF sites were presented in Heath and Ballard (2002).

Current breeding status of the 14 riparian focal species was submitted for inclusion in the CPIF statewide database and Version 1.0 of the Riparian Bird Conservation Plan (RHJV 2000). Breeding statuses of focal species for the Coniferous Forest Bird Conservation Plan were also submitted. Distribution maps for the Bird Conservation plans are periodically updated to incorporate the most current data. The next versions will incorporate data derived from the 2001 field season, including new sites added on BLM and INF lands. See http://www.prbo.org/calpif/plans.html for the most current California distribution maps for all CPIF riparian and coniferous focal species.

Sensitive and focal species and species of special concern

20 species detected on eastern Sierra sites are considered sensitive or of concern and 14 species are riparian, coniferous, grassland or oak woodland focal species (Table 2). Focal species (such as those for riparian, coniferous forest, oak woodland and grassland bird conservation plans) are not necessarily sensitive or of concern, but are listed under the assumption that if a landscape is managed to meet the focal species' needs, other species will benefit (Lambeck 1997, RHJV 2000, CPIF 2000a, CPIF 2000b, Watson et al. 2001).

Table 2. Sensitive and focal species detected as possible, probable or confirmed breeders during, before, or after standard censuses at eastern Sierra study sites, 1998-2001. See Appendix 8 for breeding status by site.

Common name	Latin name	DFG CSSC	ST	SE	FSC	USFS	USFWS MNBMC	CDF	PIF WL	Aud. WL	RHJV RFS	CPIF CFS	CPIF GFS
Redhead	*Athya americana*	2nd											
Sora	*Porzana carolina*	3rd											
Greater Sage Grouse	*Centrocercus urophasianus*	2nd								X			
Northern Harrier	*Circus cyaneus*	2nd											X
Northern Goshawk	*Accipiter gentilis*				X	X	X	X					
Swainson's Hawk	*Buteo swainsoni*		X								X		
Prairie Falcon	*Falco mexicanus*	3rd								X			
Osprey	*Pandion haliaetus*							X					
Long-eared Owl	*Asio otus*	2nd											
Belted Kingfisher	*Ceryle alcyon*	3rd											
Olive-sided Flycatcher	*Contopus cooperi*	2nd					X			X		X	
Willow Flycatcher	*Empidonax traillii*			X		X					X		
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	2nd											
Western Meadowlark	*Sturnella neglecta*												X
Savannah Sparrow	*Passerculus sandwichensis*												X
Brewer's Sparrow	*Spizella breweri*						X		X				
Black-chinned Sparrow	*Spizella atrogularis*	2nd							X	X			
Oregon Junco	*Junco hyemalis thurberi*											X	
Song Sparrow	*Melospiza melodia*										X		
Fox Sparrow	*Passerella iliaca*											X	
Black-headed Grosbeak	*Pheucticus melanocephalus*										X		
Blue Grosbeak	*Guiraca caerulea*										X		
Western Tanager	*Piranga ludoviciana*											X	

- table continued -

Table 2 – continued. Sensitive and focal species detected as possible, probable or confirmed breeders during, before, or after standard censuses at eastern Sierra study sites, 1998-2001. See Appendix 8 for breeding status by site.

Common name	Latin name	DFG CSSC	ST	SE	FSC	USFS	USFWS MNBMC	CDF	PIF WL	Aud. WL	RHJV RFS	CPIF CFS	CPIF GFS
Loggerhead Shrike	*Lanius ludovicianus*				X		X			X			
Warbling Vireo	*Vireo gilvus*										X		
Yellow Warbler	*Dendroica petechia*	2nd									X		
MacGillivray's Warbler	*Oporornis tolmei*											X	
Common Yellowthroat	*Geothlypis trichas*										X		
Yellow-breasted Chat	*Icteria virens*	3rd									X		
Wilson's Warbler	*Wilsonia pusilla*										X		
LeConte's Thrasher	*Taxostoma lecontei*								X	X			
Brown Creeper	*Certhia americana*											X	
Red-breasted Nuthatch	*Sitta canadensis*											X	
Swainson's Thrush	*Catharus ustulatus*	2nd									X		

CDFG CSSC = California Department of Fish and Game Species of Special Concern draft list, 2001 and priority #; ST = state threatened; SE = state endangered; FT = federally threatened; FSC = federal special concern; USFS = USDA Forest Service Pacific Southwest Region Sensitive Species; USFWS MNBMC = Fish and Wildlife Service, Migratory Nongame Birds of Management Concern; CDF = California Department of Forestry and Fire Protection: The Board of Forestry sensitive species; PIF WL =Partners in Flight WatchList; Aud. WL = California Audubon WatchList; RHJV RFS = Riparian Habitat Joint Venture riparian focal species; CPIF CFS and CPIF GFS = California Partners in Flight coniferous forest and grassland focal species. (DFG 1999, CPIF 2000a, CPIF 2000b, CDFG and PRBO 2001)

Breeding Bird Survey results, interpreted for the Avian Conservation Plan for the Sierra Nevada Bioregion, suggests that several species detected on eastern Sierra study sites are experiencing significant Sierra Nevada – wide population declines. These include Mourning Dove, Belted Kingfisher, Acorn Woodpecker, Olive-sided Flycatcher, Western Wood-Pewee, Steller's Jay, Mountain Chickadee, American Robin, Green-tailed Towhee, Chipping Sparrow, White-crowned Sparrow, Dark-eyed Junco, Brown-headed Cowbird, Cassin's Finch and Lesser Goldfinch. Anna's Hummingbirds, Cassin's Vireo, Tree Swallow and Red Crossbills show significantly increasing Sierra Nevada – wide trends (Siegel and DeSante 1999).

Species diversity and richness

We summarized species diversity and richness for breeding species detected at BLM and INF sites initiated in 2001 (Table 3). Total transect breeding species diversity and richness was generally high. North Lake, with only 5 points, also demonstrated high mean species diversity

Table 3. Species diversity and richness by transect, mean by point per transect and standard error of the mean, for **breeding species** detected within 50m during fixed-radius point counts summed over 3 visits at BLM and INF sites initiated in 2001.

	Species Diversity			Species Richness		
Station	Total transect	Mean by point	SE	Total transect	Mean by point	SE
Atastra Creek	18.09	6.61	0.73	27	7.60	0.89
Virgina Creek - middle	14.41	6.29	0.51	31	7.53	0.61
Virginia Creek - lower	16.34	6.83	0.57	29	8.40	0.68
Dog Creek	18.13	6.04	0.71	29	6.87	0.82
Jordon Springs	17.41	5.76	0.66	29	6.71	0.77
Rock Creek - upper	17.57	6.38	0.58	29	7.33	0.69
North Lake	13.52	7.62	0.60	18	9.40	0.40

and richness. Breeding species diversity at these sites were within the same range of HTNF sites and some upper Owens River watershed and Mono Basin sites, and are higher than at Owens Valley alluvial fan sites (Heath et al. 2001, Heath and Ballard 2002). BLM sites initiated

primarily in aspen groves in 2001 (Atastra, Virginia, Dog and Jordan) demonstrate higher bird diversity and richness than most other BLM sites censused since 1998 (Heath et al. 2001). Results for sites initiated on HTNF lands in 2001 were presented in Heath and Ballard (2002).

We conducted area searches at Thompson Ranch, Mono Basin in 2001 (Table 4). Twenty-nine species were detected over three visits, an average of 69.3 individuals of all species were observed on each visit and species diversity was 16.6. See Appendix 8 for a list of all species detected, and their breeding status. Because of the differences in methodology, these bird indices should not be compared directly with those derived from point counts. However, because area searches will be conducted at Thompson Ranch for several years, we will compare year-to-year results, and bird responses to habitat changes.

Table 4. Total individuals, species richness and Shannon-Weiner index of diversity for all species detected within 60 minutes on 3, 2ha area search plots, summed over three visits at Thompson Ranch, Mono Basin, 2001.

Total individuals	Species Richness	Species Diversity
208	29	16.6

Species abundance

Twenty different species represented the ten most abundant species among new BLM and INF sites initiated in 2001 (Table 5). Yellow Warbler abundance at Virginia Creek middle was exceptionally high.

Table 5. Mean abundance[1] of each site's ten most abundant breeding species detected at BLM and INF sites initiated in 2001.

Species	BLM sites					INF sites	
	Atastra Creek	Virginia lower	Virginia middle	Dog Creek	Jordan Gulch	Rock upper	North Lake
Red-shafted Flicker	0.36	--	0.13	--	0.21	--	--
Western Wood-Pewee	--	0.27	0.22	0.29	0.14	0.42	0.33
Dusky Flycatcher	0.24	--	--	--	--	--	0.73
Steller's Jay	--	--	--	0.13	--	0.24	--
Red-winged Blackbird	--	--	--	--	--	--	0.80
Bullock's Oriole	--	0.36	--	0.13	0.19	--	--
Brewer's Blackbird	--	0.60	0.64	0.22	--	0.38	0.20
Cassin's Finch	0.22	--	0.24	--	0.14	--	--
Mtn. White-crowned Sparrow	--	--	0.13	--	--	--	0.20
Brewer's Sparrow	--	--	--	--	0.21	--	--
Oregon Junco	0.38	--	--	--	--	0.22	--
Song Sparrow	0.27	0.56	0.31	0.42	0.21	--	0.33
Fox Sparrow	0.27	--	--	--	--	0.20	0.33
Spotted Towhee	--	0.56	--	0.71	--	--	--
Green-tailed Towhee	0.38	0.27	--	0.22	0.71	0.29	--
Warbling Vireo	0.56	0.22	0.22	--	--	0.56	0.93
Yellow Warbler	--	0.71	1.36	0.42	0.17	--	0.73
MacGillivray's Warbler	--	--	--	--	0.14	--	--
House Wren	0.62	1.16	0.31	0.33	0.74	0.18	0.33
American Robin	0.47	0.51	0.58	0.16	--	0.62	0.67

[1] To calculate number of individuals detected per hectare, multiply abundance by 1.27. To calculate number of individuals detected across the entire transect (averaged over three visits), multiply abundance by number of points (see Appendix 2). Because few species are 100% detectable, such calculations probably underestimate absolute density. Therefore results should be considered a minimum estimate of abundance.

Thirty-three species account for the top five most abundant breeding species among 16 Owens River and Hammil Valley watershed sites (Table 6). Spotted Towhees and Lazuli Buntings were the most common – each present as one of the five most abundant species at 11 and 9 sites respectively. Lower Hogback Creek was unique among these sites, with 0.50 Phainopeplas detected per point. Common Yellowthroats were only present as breeders at Owens River transects, where they were among the most abundant species.

Table 6. Mean abundance[1] of each site's five most abundant breeding species detected at Owens River and Hammil Valley watershed sites.

Species	Owens Valley alluvial fan									Owens River		Upper Owens River watershed				Hammil Valley
	ASHC	TUTT	HOGL	BAIR	INDE	THIB	TABO	BIRL	BIRU	ORMC	ORTI	BISH	BUTT	MCGE	CONV	MARB
California Quail	--	0.10	--	--	--	0.10	--	--	--	--	--	--	--	--	--	--
Black-chinned Hummingbird	0.17	--	--	--	--	--	0.03	--	--	--	--	--	--	--	--	--
Ash-throated Flycatcher	--	--	--	--	--	--	--	--	--	0.37	--	--	--	--	--	--
Black Phoebe	0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Western Wood-Pewee	--	--	--	--	0.23	--	--	--	--	--	--	0.38	--	--	0.50	--
Steller's Jay	--	--	--	0.07	--	--	--	--	--	--	--	--	--	--	--	--
Western Scrub-Jay	--	--	--	0.27	--	--	--	--	--	--	--	--	--	--	--	--
Red-winged Blackbird	--	--	--	--	--	--	--	--	--	--	0.50	--	--	--	--	--
Bullock's Oriole	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.71	--
Brewer's Blackbird	--	--	--	0.07	--	--	--	--	--	--	--	--	--	0.63	1.00	--
Cassin's Finch	--	--	--	--	--	--	--	--	--	--	--	0.12	--	--	--	--
Brewer's Sparrow	--	--	--	0.07	--	0.13	0.03	--	--	--	--	--	--	--	--	--
Black-throated Sparrow	0.28	--	--	0.07	--	0.43	--	--	--	--	--	--	--	--	--	0.19
Sage Sparrow	--	--	0.23	0.27	--	--	0.16	--	--	--	--	--	--	--	--	0.24
Song Sparrow	--	--	--	--	--	--	--	--	--	--	0.75	--	0.31	--	--	--
Spotted Towhee	--	0.30	0.63	0.53	0.33	0.60	0.26	0.11	0.90	0.23	--	0.46	--	--	--	0.83
Green-tailed Towhee	--	--	--	--	--	--	--	--	--	--	--	--	0.38	--	--	--
Black-headed Grosbeak	--	--	--	--	0.10	--	--	--	0.05	--	--	--	--	--	--	0.21
Blue Grosbeak	--	0.03	0.23	--	--	--	0.08	--	--	--	--	--	--	--	--	--
Indigo Bunting	--	--	--	--	--	--	--	0.06	--	--	--	--	--	--	--	--
Lazuli Bunting	0.39	0.23	--	0.07	0.10	--	0.05	0.28	0.50	--	--	0.46	0.69	--	--	--
Western Tanager	--	--	--	--	0.13	--	--	--	--	--	--	0.31	--	--	--	--
Phainopepla	--	--	0.50	--	--	--	--	--	--	--	--	--	--	--	--	--
Warbling Vireo	--	--	--	--	--	--	--	--	0.05	--	--	--	0.31	0.40	0.42	--
Orange-crowned Warbler	--	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Yellow Warbler	--	--	--	--	--	--	--	--	--	--	--	--	0.38	0.70	1.29	--
Common Yellowthroat	--	--	--	--	--	--	--	--	--	0.13	0.69	--	--	--	--	--
Rock Wren	--	0.03	--	--	--	--	--	0.17	0.05	--	--	--	--	--	--	--
Bewick's Wren	--	--	1.00	--	--	0.10	--	--	0.10	0.93	0.56	--	--	--	--	--
House Wren	--	--	--	--	0.13	--	--	--	--	--	--	--	--	0.40	--	--
Bushtit	0.17	--	--	--	--	0.27	--	0.11	--	--	--	--	--	--	--	0.24
Blue-gray Gnatcatcher	--	--	--	--	--	--	--	--	--	0.30	0.63	--	--	--	--	--
American Robin	--	--	--	--	0.10	--	--	--	--	--	--	0.12	0.44	0.33	--	--

[1] To calculate number of individuals detected per hectare, multiply abundance by 1.27. To calculate number of individuals detected across the entire transect (averaged over two visits), multiply abundance by number of points (see Appendix 2). Because few species are 100% detectable, such calculations probably underestimate absolute density. Therefore results should be considered a minimum estimate of abundance.

Sixteen species were among the five most abundant at Mono Basin and West Walker River watershed sites (Table 7). Yellow Warbler abundance at lower Rush Creek appears to be lower than in past years (1.00 vs.1.59 individuals detected per point, Heath et al. 2001), although spot mapping estimates of territory numbers indicated very high densities in 2001.

Table 7. Mean abundance[1] of each site's five most abundant breeding species detected at Mono Lake and East Walker River watershed sites.

Species	Rush Creek		Lee Vining			Mill Creek		Wilson Creek		Decham-beau Creek	Green Creek	Clark Canyon
	lower	upper	lower	middle	upper	lower	Upper	lower	upper			
Western Wood-Pewee	--	--	--	1.00	0.73	--	0.33	--	--	--	--	--
Steller's Jay	--	--	--	0.91	--	--	--	--	--	--	--	--
Pinyon Jay	--	--	--	--	--	--	--	--	--	--	--	1.15
Red-winged Blackbird	0.57	--	0.38	--	0.35	0.33	--	--	--	--	--	--
Bullock's Oriole	--	--	--	--	--	0.19	--	--	--	0.80	--	--
Brewer's Blackbird	0.47	1.26	0.27	--	0.88	0.62	--	0.14	0.31	0.80	0.67	1.85
Song Sparrow	0.17	0.41	0.42	--	--	--	0.23	0.22	0.75	--	--	0.45
Spotted Towhee	0.23	--	0.23	--	--	0.33	--	0.47	0.58	0.80	--	0.60
Green-tailed Towhee	--	--	--	--	--	--	--	0.39	0.36	--	--	--
Black-headed Grosbeak	--	--	--	--	--	--	--	--	--	--	--	0.40
Warbling Vireo	--	0.56	--	0.41	--	--	0.50	--	--	0.70	0.63	--
Yellow Warbler	1.00	0.65	0.77	--	0.42	0.24	0.40	0.22	0.47	--	0.70	--
House Wren	--	--	--	--	0.35	--	0.37	--	--	1.10	0.80	--
Brown Creeper	--	--	--	--	--	--	0.23	--	--	--	--	--
Mountain Chickadee	--	--	--	0.64	--	--	--	--	--	--	--	--
American Robin	--	0.53	--	0.55	0.54	--	--	--	--	--	0.63	0.75

[1] To calculate number of individuals detected per hectare, multiply abundance by 1.27. To calculate number of individuals detected across the entire transect (averaged over two visits), multiply abundance by number of points (see Appendix 2). Because few species are 100% detectable, such calculations probably underestimate absolute density. Therefore results should be considered a minimum estimate of abundance.

We removed Pinyon Jays from breeding species analysis for most sites because they are generally a flexible species that breed whenever and wherever pinyon seeds are available (Askins 2000). However, we retained Pinyon Jays in the analysis for Clark Canyon, where they are among the most abundant species, because we believe they may have bred there in 2001.

Species abundance for HTNF sites of the East and West Walker River watershed sites were presented in Heath and Ballard (2002).

Jepson Climate Zones and Sawyer Keeler-Wolf riparian habitat types

We conducted vegetation assessments at 626 point count locations, repeating several that had been done in 1998 at sites initiated during that time, and assessing for the first time several points that were initiated in 2001.

For future analysis of bird habitat relationships, we grouped point count transects into the appropriate Jepson Climate Zones (JCZ) (Hickman 1993). Of the sites characterized in 2001, 12 lower elevation sites fall into JCZ 11, which is characterized as high desert climate with hot, windy summers, longer growing seasons, and harsh temperature variations. Thirty-three higher

elevation sites fall into JCZ 2-3, which is characterized by 150 to 160 d growing seasons and regular frost (Appendix 9, Hickman 1993). We felt this grouping was necessary because comparing sites from a large area including an 1800m elevation gradient and several watersheds may have little biological meaning or application to local land managers (Meents et. al 1983, Heath and Ballard *in review*).

We assigned nine Sawyer and Keeler-Wolf (1995) riparian habitat types to 165 point count stations within JCZ 11, and 12 habitat types to 461 points in JCZ2-3 (Table 8). Water Birch, Willow Shrub and Black Willow tree characterized the most points in JCZ 11, and Aspen and Willow Shrub characterized the most points in JCZ 2-3.

Table 8. Sawyer Keeler-Wolf riparian habitat types for 165 point count stations in Jepson Climate Zone 11, 461 point count stations in Jepson Climate Zone 2-3, and percent points characterized by each type at all eastern Sierra riparian sites (including HTNF sites), 2001.

sites within Jepson Climate Zone 11		sites within Jepson Climate Zone 2-3	
Sawyer Keeler-Wolf habitat types	percent points	Sawyer Keeler-Wolf habitat types	percent points
Water Birch	35	Aspen	38
Willow Shrub	29	Black Cottonwood	9
Black Willow Tree	18	Willow Shrub	40
Fremont Cottonwood	5	Lodgepole Pine	7
Black Cottonwood	4	Water Birch	4
Black Oak	4	Jeffrey Pine	1
Bullrush	2	Herbaceous Meadow	1
Russian Olive	2	White Fir	<1
Goldenbush	< 1	Alder	<1
		Lombardii Poplar	<1
		Domestic landscaping	<1
		Wild Rose	<1

Sites categorized as Goldenbush, Lodgepole and Jeffrey Pine, White Fir or Herbaceous Meadow were those that had very little or no riparian vegetation present within 50m. Continuous stands of pine, fir or sagebrush scrub or continuous flats of herbaceous meadow that grew right to the creek or river's edge characterized these sites. One-to-two habitat types may have been determined for each point if the 50m radius point encompassed both riparian and upland habitats, but only riparian types are presented here. Non-native species Russian olive (*Elaeagnus angustifolia*), Lombardii poplar (*Populus nigra*) and vegetation associated with domestic plantings dominated the vegetation at a few points, and there are no official Sawyer Keeler-Wolf habitat types for these situations. Non-native species did occur at other points, but were not dominant and therefore did not characterize the habitat as a whole.

Sites that we categorized as Willow Shrub in both climate zones are made up of several Sawyer Keeler-Wolf (SKW) willow habitat types (Table 9). Generally, SKW define Mixed Willow habitat types as those composed of willow species found at lower elevations, Montane Wetland Shrub habitat types as those composed of willow species that occur at higher elevations, and individual willow species habitat types (eg. Narrowleaf, Arroyo, Geyer's) as those in which a single species dominates. They also provide elevation cutoffs for the habitat types (Sawyer and Keeler-Wolf 1995). Although these categories were mostly appropriate, we also found much

overlap in willow species composition among our sites of different elevations. For this reason, we grouped willow shrub species into a general Willow Shrub habitat type, and divided them by JCZ. In general, we found arroyo (*Salix lasiolepis*) and black willow (*S. goodingii*) only at JCZ 11 sites, and Geyer's (*S. geyeriana*), shiny (*S. lucida*), Eastwood's (*S. easwoodiae*) and Mono willow (*S. planifolia*) only at JCX 2-3 sites. We considered Black Willow Tree (which consisted of full grown trees over 5m and 8cm DBH and only occurred on the Owens River and lower Hogback Creek) as a separate habitat type from Willow Shrub (Table 8).

Table 9. Sawyer Keeler-Wolf Willow habitat types present among point count stations characterized as Willow Shrub habitat type, Jepson Climate Zone 11 and 2-3.

Jepson Climate Zone 11		Jepson Climate Zone 2-3	
Sawyer Keeler-Wolf Willow habitat types	percent of total Willow Shrub points	Sawyer Keeler-Wolf Willow habitat types	percent of total Willow Shrub points
Mixed Willow (mix of arroyo, narrowleaf, yellow, red or black)	67	Montane Wetland Shrub (mix of narrowleaf, yellow, shiny, red, Mono, Eastwood's or Geyer's)	91
Arroyo Willow	25	Narrowleaf Willow	5
Narrowleaf Willow	6	Yellow Willow	2
Yellow Willow	2	Geyer's Willow	1

Nest success

Mayfield estimates of nest success for Yellow Warbler and Song Sparrows at Mono Basin sites

We determined Mayfield nest success for Yellow Warblers and Song Sparrows at creeks with reasonable sample sizes (Table 10). Nest success for Yellow Warblers and Song Sparrows was significantly different among creeks ($?^2 = 14.74$, df = 2, $P < 0.001$; $?^2 = 5.83$, df = 2, $P = 0.05$).

Table 10. Mayfield estimates of nest success for Yellow Warbler and Song Sparrow nests observed with at least one egg and with known outcome at Rush, Lee Vining, Mill and Wilson Creeks, 2001. Daily nest survival and standard error, and total nest survival.

	Number of nests	Daily nest survival	SE	Total nest survival
Yellow Warbler				
Rush Creek	92	0.94	0.01	0.25
Lee Vining Creek	25	0.98	0.01	0.60
Mill Creek	13	0.88	0.03	0.04
Song Sparrow				
Rush Creek	17	0.93	0.02	0.17
Lee Vining Creek	11	0.98	0.01	0.67
Wilson Creek	12	0.95	0.02	0.30

Yellow Warbler nest success was surprisingly high at Lee Vining Creek this year (we define average nest success as 0.30), and significantly higher than at either Rush Creek or Mill Creek ($?^2 = 8.00$, df=1, $P < .01$; $?^2 = 50.00$, df = 1, $P < 0.01$). Interestingly, Yellow Warblers had much lower nest success at Lee Vining Creek in 2000 (0.93 daily, SE 0.01, 0.16 total), but nearly the same nest success at Rush Creek in 2000 (0.95 daily, SE 0.01, 0.24 total).

The Song Sparrow story mirrors that of the Yellow Warbler: nest success at Lee Vining Creek was high, and significantly higher than at Rush Creek in 2001 ($?^2 = 5$, df = 1, $P = 0.03$), and was much lower in 2000 (daily 0.94, SE 0.02, total 0.21). Song Sparrow nest success was nearly the same in 2001 as it was in 2000 at Rush Creek (daily = 0.94, SE = 0.02, total = 0.18), and was not significantly different between years at Wilson Creek ($?^2 = 0.13$, df = 1, $P = 0.72$; 2000 by-creek results, PRBO data).

Factors that may have influenced these fluctuations in nest success include for example, predator or cowbird density changes at Lee Vining Creek between years. It is unlikely that vegetation changed dramatically enough between years to provide better nest concealment, and therefore better nest success in 2001. Further, the type of nesting substrate that Yellow Warblers and Song Sparrows used in 2000 did not change dramatically in 2001. More in-depth analyses of these results are beyond the scope of this report, but will be investigated with additional years of nest success data.

Proportional nest success for all species by nest category and creek at Mono Basin and higher elevation INF sites

We found 395 nests for 33 species at Mill, Wilson, Rush and Lee Vining creeks in the Mono Basin, and 113 nests for 22 species at INF higher elevation sites - upper Rock Creek and North Lake - in 2001. We used 351 Mono Basin nests and 99 INF nests, for which we determined outcomes and observed with at least one egg or young, for calculations of proportional nest success (Table 11 and Table 12).

Comparing proportional nest success rates to the more accurate Mayfield rates presented above (Table 10) demonstrates as much as 15 – 29% difference in total success between methods, which is standard (e.g. Martin 1992). However, with this in mind, proportional rates of nesting success can also be useful as they allow for smaller sample sizes and provide glimpses into the breeding ecology of a wider host of species present on the study plots.

We found 2 Willow Flycatcher nests on Rush Creek in 2001 (Table 11). Although a few possible breeding observations have been documented in the Mono Basin over the last 3 decades (Harris et al. 1987, Gaines 1992), no nests have ever been documented. Even more interestingly, extensive surveys of Rush Creek in the early 1990's documented no Willow Flycatchers present, and the species was surmised as extirpated from the creek (Jones and Stokes 1993), even though the species was considered "common" in the Mono Lake area in the early and mid 1900's (Grinnell and Miller 1944). Both nests were successful, with no parasitism. Details of the nesting habitat for this State Endangered species are presented in McCreedy and Heath (*in prep*).

In addition to the sixteen open-cup nesting songbird species, we also found nesting ducks (Mallard, Gadwall, Green-winged Teal) on Rush, Lee Vining, Mill and Wilson. We also found several nesting Spotted Sandpiper pairs on Lee Vining and Rush, whose nests were mostly successful. As was expected, cavity and dome nesters were more successful than open cup nesters, as they are relatively less exposed to predators and parasitism (Martin and Li 1992).

Table 11. Total number of nests observed with at least one egg or young and known outcome, and proportion successful at Mono Basin sites, 2001: Rush Creek, Lee Vining Creek, Mill Creek, Wilson Creek and all sites combined.

Species	Nest Type[1]	Rush Creek		Lee Vining Creek		Mill Creek		Wilson Creek		All sites combined	
		# nests	proportion successful	# nests	proportion successful	# nests	proportion successful	# nests	proportion successful	# nests	proportion successful
Mallard	A	3	0.67	2	0.00	4	0.00			9	0.22
Gadwall	A							1	1.00	1	1.00
American Green-winged Teal	A	1	1.00	1	0.00					2	0.50
Spotted Sandpiper	A	4	0.75	9	0.78					13	0.77
Mourning Dove	A	1	1.00							1	1.00
American Kestrel	B			1	1.00	3	1.00			4	1.00
Hairy Woodpecker	B					1	0.00			1	0.00
Red-shafted Flicker	B	3	0.67	1	1.00	6	0.50	1	0.00	11	0.55
Western Wood-Pewee	A					1	1.00			1	1.00
Willow Flycatcher	A	2	1.00							2	1.00
American Magpie	C	2	1.00			3	1.00	8	0.88	13	0.92
Steller's Jay	A			1	0.00					1	0.00
European Starling	B			2	1.00	5	0.80			7	0.86
Red-winged Blackbird	A	8	0.63	8	0.38			2	1.00	18	0.56
Western Meadowlark	C							1	1.00	1	1.00
Bullock's Oriole	C			2	1.00	2	1.00			4	1.00
Brewer's Blackbird	A	4	1.00	13	0.31	14	0.36			31	0.42
Cassin's Finch	A					1	0.00			1	0.00
Brewer's Sparrow	A	1	1.00	3	0.67			1	1.00	5	0.80
Song Sparrow	A	17	0.41	11	0.82	2	0.50	12	0.42	42	0.52
Spotted Towhee	A	5	0.60	1	1.00	7	0.43			13	0.54
Green-tailed Towhee	A			3	0.33	1	0.00			4	0.25
Black-headed Grosbeak	A	2	0.50							2	0.50
Lazuli Bunting	A			1	0.00	1	0.00			2	0.00
Cliff Swallow	B							4	1.00	4	1.00
Yellow Warbler	A	92	0.41	25	0.68	13	0.08	3	0.33	133	0.43
Bewick's Wren	B					1	1.00			1	1.00
House Wren	B			1	0.00	3	0.67			4	0.50
Juniper Titmouse	B					1	1.00			1	1.00
Bushtit	C					1	1.00			1	1.00
Blue-gray Gnatcatcher	A					1	1.00			1	1.00
American Robin	A	4	0.50	3	0.33	10	0.70			17	0.59
TOTAL TYPE A NESTS		144	0.49	81	0.56	55	0.35	19	0.53	299	0.48
TOTAL TYPE B NESTS		3	0.67	5	0.80	20	0.70	5	0.80	33	0.73
TOTAL TYPE C NESTS		2	1.00	2	1.00	6	1.00	9	0.89	19	0.95
TOTAL ALL NESTS		149	0.50	88	0.58	81	0.48	33	0.67	351	0.53

[1] Nest Types: A = open cup, scrape, saucer or platform; B = cavity, crevice or burrow; C = pendulum, sphere, or dome

Overall open cup nest success was 72% at Rock Creek and 57% at North Lake (Table 12). Cavity and crevice nest success was 64% at both sites. Yellow Warbler nest success at both of these high elevation meadow riparian sites was high (71%), as was American Robin (74%), Western Wood-Pewee (71%), Cassin's Finch (83%) and Brewer's Blackbird (69%). Conversely, proportional success for Dusky Flycatchers and Warbling Vireos was very low overall, with no nests succeeding at North Lake for either species.

Table 12. Total number of nests observed with at least one egg or young and known outcome, and proportion successful at Rock Creek and North Lake, INF, 2001.

Species	Nest Type[1]	Rock Creek		North Lake		Both sites combined	
		# nests	proportion successful	# nests	proportion successful	# nests	proportion successful
Green-winged Teal	A	--	--	1	1.00	1	1.00
Blue Grouse	A	1	1.00	--	--	1	1.00
Red-breasted Sapsucker	B	3	0.00	2	1.00	5	0.40
Red-shafted Flicker	B	1	1.00	1	1.00	2	1.00
Dusky Flycatcher	A	1	1.00	6	0.00	7	0.14
Western Wood-Pewee	A	3	1.00	4	0.50	7	0.71
Red-winged Blackbird	A	--	--	3	0.67	3	0.67
Brewer's Blackbird	A	4	0.50	9	0.78	13	0.69
Cassin's Finch	A	2	0.50	4	1.00	6	0.83
Mountain White-crowned Sparrow	A	--	--	1	1.00	1	1.00
Oregon Junco	A	2	0.50	--	--	2	0.50
Song Sparrow	A	2	1.00	2	0.00	4	0.50
Lincoln's Sparrow	A	1	0.00	--	--	1	0.00
Violet-green Swallow	B	3	0.67	--	--	3	0.67
Warbling Vireo	A	3	0.67	3	0.00	6	0.33
Yellow Warbler	A	2	0.50	5	0.80	7	0.71
House Wren	B	5	0.80	3	0.67	8	0.75
Brown Creeper	B	1	1.00	--	--	1	1.00
Mountain Chickadee	B	1	1.00	--	--	1	1.00
American Robin	A	8	0.88	11	0.64	19	0.74
Mountain Bluebird	B	--	--	1	0.00	1	0.00
TOTAL TYPE A NESTS		29	0.72	42	0.57	71	0.63
TOTAL TYPE B NESTS		14	0.64	14	0.64	28	0.64
TOTAL ALL NESTS		43	0.70	56	0.59	99	0.64

[1] Nest Types: A = open cup, scrape, saucer or platform; B = cavity, crevice or burrow

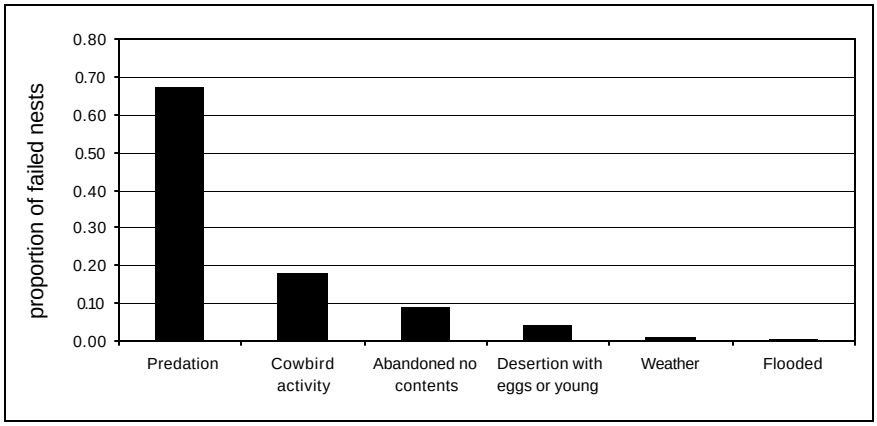
Sample sizes at these two sites were low. In 2001, we will focus our efforts on open cup nesting birds of a few focal species, in order to better discern nesting success, Brown-headed Cowbird parasitism and the causes of nest failure.

Factors influencing nest success

Nest mortality

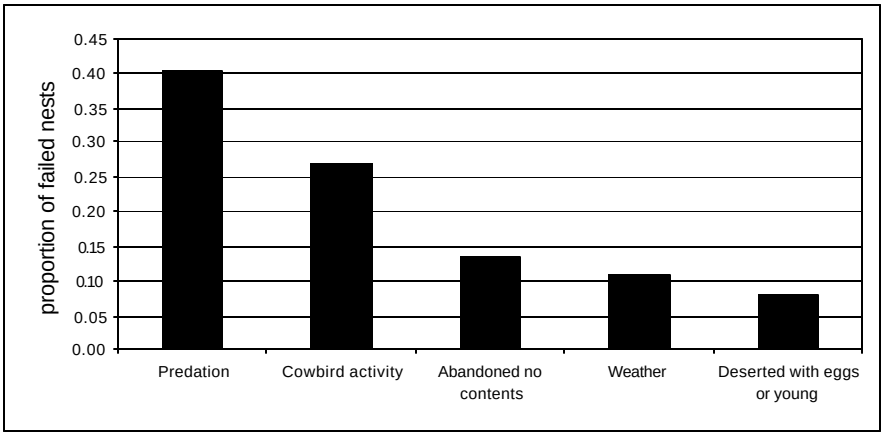
Six nest mortality factors were identified for open cup nesters at all Mono Basin nest plots in 2001: predation, cowbird activity (failure due to parasitism), abandonment prior to egg laying, desertion of nest with eggs or young, weather (rain and wind) and flooding. Predation by mammalian, avian or reptilian nest predators accounted for 67% of all nest failure among Mono Basin sites. Cowbird activity accounted for less than 20% of all nest failure.

Figure 2. Mortality factors of 180 failed open cup nests at Mono Basin sites, 2001.



With the exception of flooding, the same mortality factors were identified for Rock Creek and North Lake nests (Figure 3). Predation accounted for 40% of nest failure, which is lower than at other eastern Sierra sites and lower than a nationwide analysis of causes of nest failure (77%, Martin 1992). Cowbird parasitism and weather (27% and 11% respectively) accounted for higher rates of nest failure than at other eastern Sierra sites. Weather impacts were mostly attributed to a period of several days with cold rain in early July that caused the failure of 4 nests.

Figure 3. Mortality factors of 37 failed open cup nests at Rock Creek and North Lake sites, 2001.



Mammalian, reptilian and avian nest predators

Several potential mammalian and reptilian nest predators were detected throughout the breeding season at all sites. These included at Mono Basin sites: least chipmunk (*Tamias minimus*), golden-mantled ground squirrel (*Spermophilus lateralis*), California ground squirrel (*Spermophilus beechyi*), long-tailed weasel (*Mustela frenata*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), gopher snake (*Pituophis* melanoleucus), common garter snake (*Thamnophis spp.*) and western rattlesnake (*Crotalus viridis*). At Rock Creek and North Lake, we encountered California ground squirrels, lesser chipmunks, golden-mantled ground squirrels, coyotes, raccoons (*Procyon lotor*), and Chickarees (*Tamiasciurus douglasii*). We detected the most mammals per hour at Wilson Creek and North Lake (Table 13). Both Wilson Creek and North Lake have open grassy areas that provide habitat for ground squirrels and snakes.

Table 13. Mean Chipmunk species, Squirrel species, Total mammal, and Snake detections per hour at all sites. Based on daily tallies of all mammals and snakes observed on nest plots during early morning-early afternoon hours throughout the songbird breeding season, 2001.

	Chipmunk / hr	SE	Squirrel / hr	SE	Total Mammal / hr	SE	Snake / hr	SE
Rush Creek	0.14	0.04	0.01	0.01	0.16	0.04	0.01	0.01
Lee Vining Creek	0.20	0.03	0.10	0.03	0.30	0.05	0.02	0.01
Mill Creek	0.21	0.04	0.13	0.04	0.34	0.05	0.01	0.01
Wilson Creek	0.74	0.13	0.27	0.06	1.01	0.16	0.03	0.01
Rock Creek	0.12	0.04	0.19	0.04	0.32	0.08	0.00	0.00
North Lake	0.22	0.05	0.92	0.15	1.20	0.22	0.00	0.00

Potential avian predators included those that held a territory on the nest plots (Table 14), and others that frequented the plots including: Common Ravens, Red-tailed Hawks, Great-horned Owls, California Gulls, Clark's Nutcracker, and an occasional Prairie Falcon. House Wrens are considered potential predators because they have been documented to poke holes in eggs of other songbird species (e.g. Miller and Thompson 2000).

Table 14. Number of potential avian predator territories for each nest plot, based on daily spot mapping, 2001.

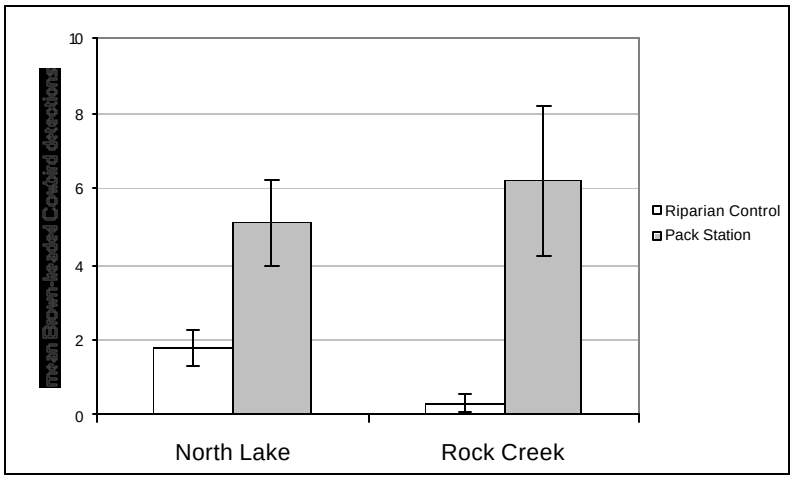
	American Kestrel	American Magpie	House Wren	Steller's Jay	Belted Kingfisher	Total territories
Rush	~	4	2	~	1	7
Lee Vining	1	1	1	1	1	5
Mill	4	5	5	1	1	16
Wilson	1	10 +Colony	~	~	2	12
Rock Creek	~	~	5	1	~	6
North Lake	~	~	4	~	~	4

Several predation events were observed: On Lee Vining Creek, we found a garter snake in a Brewer's Blackbird nest eating a just-hatched Brewer's Blackbird nestling, and an adult Mallard female with her head removed. On Wilson Creek, we observed down feathers at the entrance of a rattlesnake hole, coyote footprints around a depredated Green-winged Teal nest, and a Belted Kingfisher with a large item in its bill as it was being chased by agitated Cliff Swallows. At Mill Creek, we observed an American Magpie stashing a duck egg in a pile of lawn clippings (in Mono City), and an American Robin banded at Mill Creek was killed by a Mono City house cat (as was a Green-tailed Towhee in 2000). California Gulls were observed eating an adult Violet-green Swallow (P. Wrege, pers. comm.), and were mobbed by Brewer's Blackbirds while flying low over the blackbird's nests. At North Lake, a Common Raven was observed flying over the nest plot with an American Robin egg in its bill. At Rock Creek, cars hit and killed two House Wrens and one Red-breasted Sapsucker.

Brown-headed Cowbirds

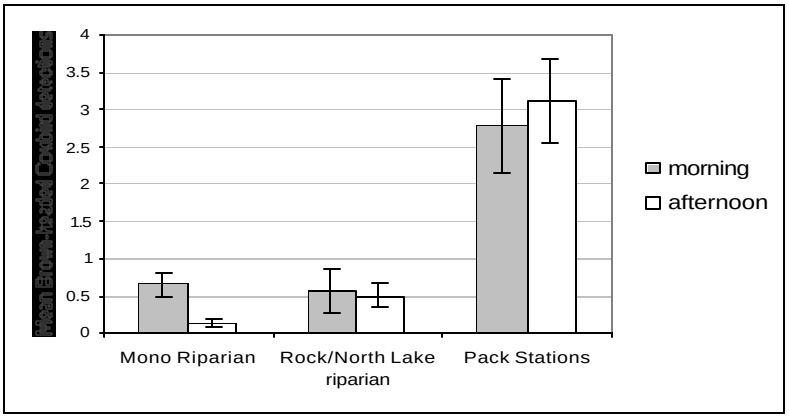
Rothstein et al. (1980, 1984) provided evidence that Brown-headed Cowbirds detected in the morning at forested or riparian breeding areas traveled 2.1 – 4.0 km to congregate at horse corrals, campground, roads and bird feeders for afternoon foraging. Our data from horse corrals at pack station sites, and nearby riparian areas at North Lake and Rock Creek corroborate some of these results (Figure 4). At both North Lake and Rock Creek, there were more Brown-headed Cowbirds at horse corrals than in riparian habitats 0.15 km and 4.5 km away respectively.

Figure 4. Mean numbers of Brown-headed Cowbird detections at riparian areas and horse corrals at pack stations near North Lake and Rock Creek, INF, 2001. Based on nine weekly, 5 minute, morning and afternoon point counts at paired riparian and pack station sites.



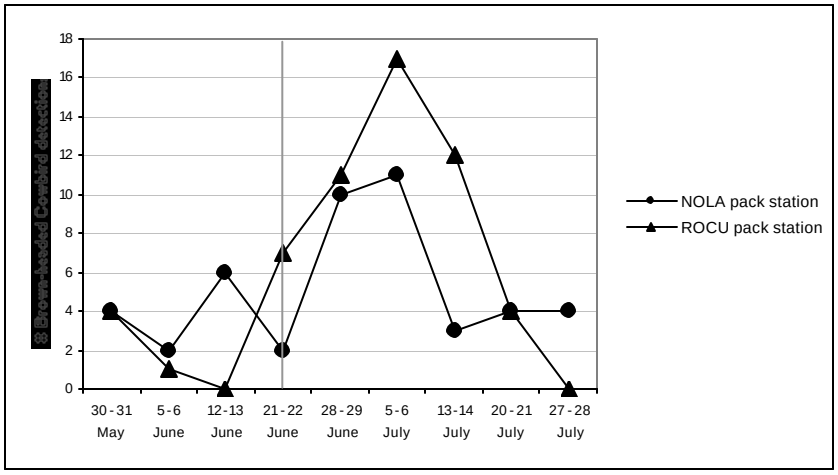
We found no difference in cowbird numbers between morning versus afternoon cowbird counts at either the horse corrals or at the riparian sites at North Lake or Rock Creek, but we did find differences at Mono Basin sites (Figure 5). The diurnal pattern at Mono Basin sites -which corroborates the pattern described by Rothstein et al. (1984) - may be influenced by longer traveling distances between foraging areas and riparian breeding areas in the Mono Basin.

Figure 5. Morning versus late morning/afternoon mean adult Brown-headed Cowbird detections at Mono Basin riparian sites, Rock Creek and North Lake riparian sites, and Rock Creek and North Lake pack station sites, 2001. Based on weekly, 5 minute, morning and afternoon point counts at riparian and pack station sites.



We found an increase in Brown-headed Cowbirds at horse corrals over the course of the season (Figure 6). Cowbird detections increased at horse corrals after June 21 and June 22 (the same dates that pack animals were first observed at the corrals), to reach maximum counts on July 5 and 6. The peak of the songbird breeding season (based on date of first egg laid) was last two weeks of May / first two weeks of June at North Lake and Rock Creek riparian sites (Figure 15), nearly 1.5 months earlier than the cowbird peak.

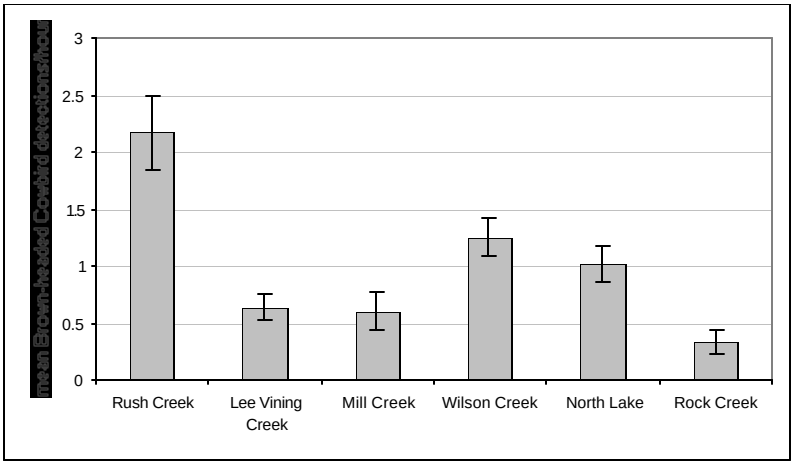
Figure 6. Number and timing of adult Brown-headed Cowbird detections at horse corrals at pack stations near North Lake and Rock Creek, INF, 2001. Based on nine weekly, 5 minute, morning and afternoon point counts at pack station sites. Vertical line indicates the date that pack animals were first observed at horse corrals.



Besides Rush Creek, where cowbirds demonstrated patterns similar to those in Figure 6, Mono Basin sites showed no trend in cowbird detections throughout the season.

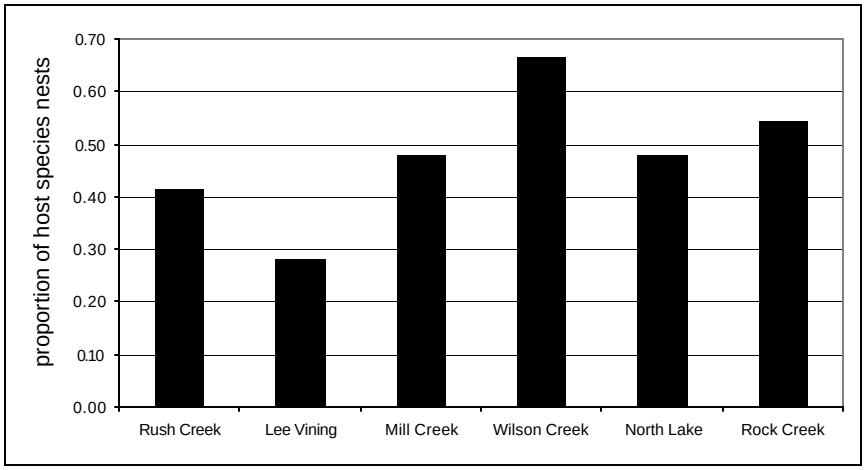
Rush Creek had the most cowbirds detected per hour throughout the season. Wilson Creek had higher detections than either Lee Vining or Mill Creek. More cowbirds were detected at North Lake than at Rock Creek (Figure 7). Heath et al. (2001) demonstrated that Brown-headed Cowbird abundance was highly correlated with the abundance of Yellow Warbler, a predominant host species in the eastern Sierra. Because Yellow Warbler populations at Rush Creek are among the highest in the state, it is not surprising that cowbirds are also plentiful here. The short grass and presence of sheep at Wilson Creek (which provide foraging areas for cowbirds) possibly explains the high detections of cowbirds there, despite the low densities of host species.

Figure 7. Mean Brown-headed Cowbird detections per hour by site, 2001. Based on daily tallies of cowbirds at nest searching plots throughout the morning-early afternoon hours.



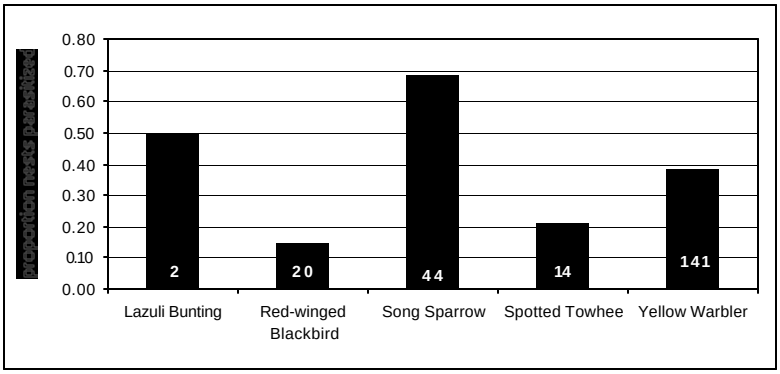
Brown-headed Cowbird parasitism accounted for 18% of all nest failure at Mono Basin sites and 27% of all nest failure at North Lake and Rock Creek. Between 28% and 67% of all host species nests that were observed with at least one egg or young were parasitized at each creek (Figure 8). Wilson Creek had the highest rates of parasitism, while Lee Vining had the lowest.

Figure 8. Proportion of host species nests' parasitized at each creek, 2001. Host species defined as species in which parasitism was observed, by site. Only nests observed with at least one egg or young were used.



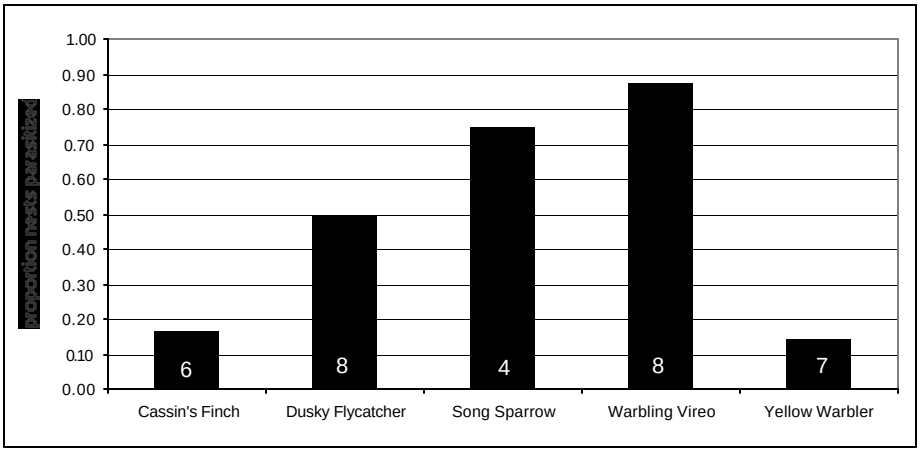
At Mono Basin sites, Lazuli Buntings, Red-winged Blackbirds, Song Sparrows, Spotted Towhees and Yellow Warblers were observed host species (Figure 9). Parasitism rates for Song Sparrows were high (69%) and lower for Yellow Warblers (39%) than last year (52%, Heath et al. 2001).

Figure 9. Parasitism rates for 5 host species at Mono Basin sites, 2001. Nest numbers shown on bars. Only nests observed with one egg or young used.



Among INF high elevation sites, Cassin's Finches, Dusky Flycatchers, Song Sparrows, Warbling Vireos and Yellow Warblers were observed host species (Figure 10). With the use of Microcam™ lenses and poles or tree climbing, we were able to acquire accurate estimates of Warbling Vireo parasitism, and it was very high (88%).

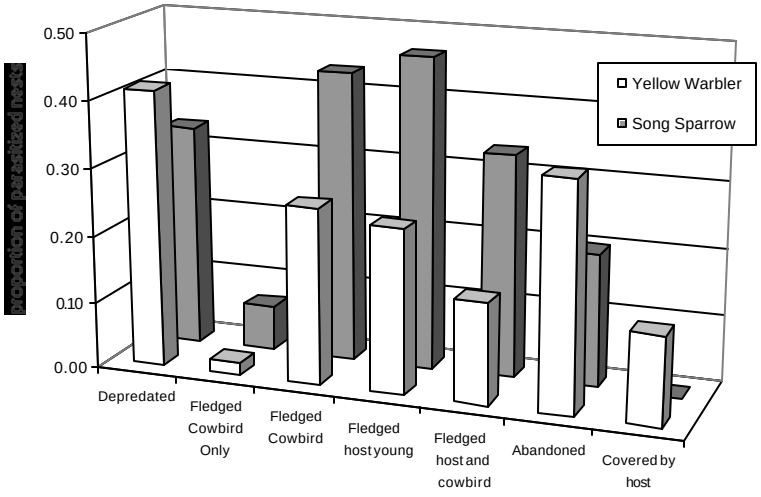
Figure 10. Parasitism rates for 5 host species at INF high elevation sites, 2001. Nest numbers shown on bars. Only nests observed with one egg or young used.



Depredation accounted for 42% of Yellow Warbler and 33% of Song Sparrow parasitized nests (Figure 11). Brown-headed Cowbirds successfully fledged from 26% of Yellow Warbler and 43% of Song Sparrow nests, but only 2% and 7% of these species' nests respectively, fledged

only cowbirds. Thirteen percent of Yellow Warbler and 14% of Song Sparrow nests fledged their own young, despite parasitism. Yellow Warblers rebuilt new nests, covering cowbird eggs, in 13% of their parasitized nests.

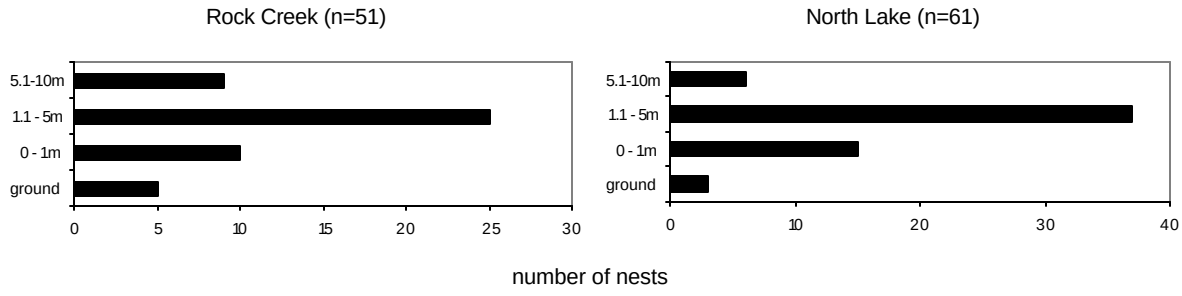
Figure 11. Outcome of parasitized Yellow Warbler and Song Sparrow nests at Mono Basin sites, 2001.



Nest site selection – Rock Creek and North Lake

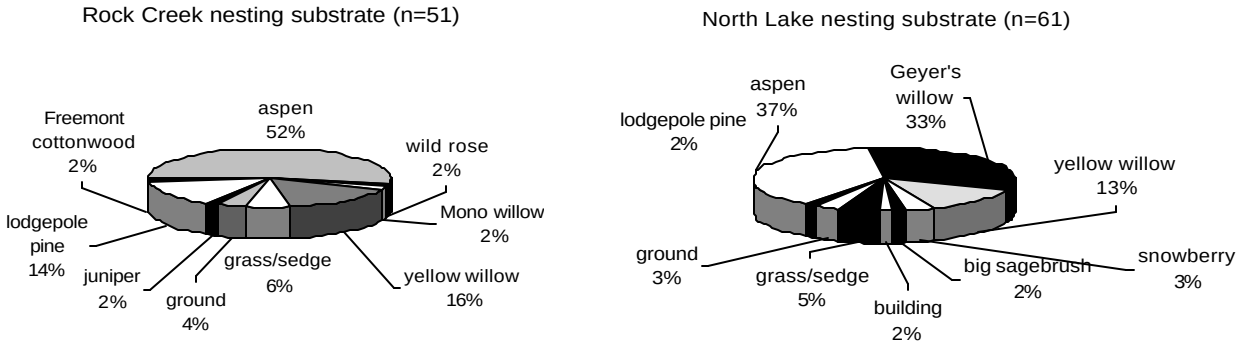
Most nests were located within 5 meters of the ground at Rock Creek and North Lake (Figure 12). Fifteen to 20% of nests were located within 1 meter of the ground, while another 5 to 10% were located above 5 meters, demonstrating the importance of multiple vegetation layers for breeding birds at these study sites.

Figure 12. Nest height categories for all nests found at Rock Creek and North Lake, 2001. n = number nests used at each site.



Birds at Rock Creek and North Lake utilized the ground, grasses and sedges, shrub species such as willow (*Salix* spp.) and snowberry (*Symphoricarpos* spp.), and tree species such as aspen (*Populus tremuloides*) and lodgepole pine (*Pinus contorta*) for nesting substrate (Figure 13).

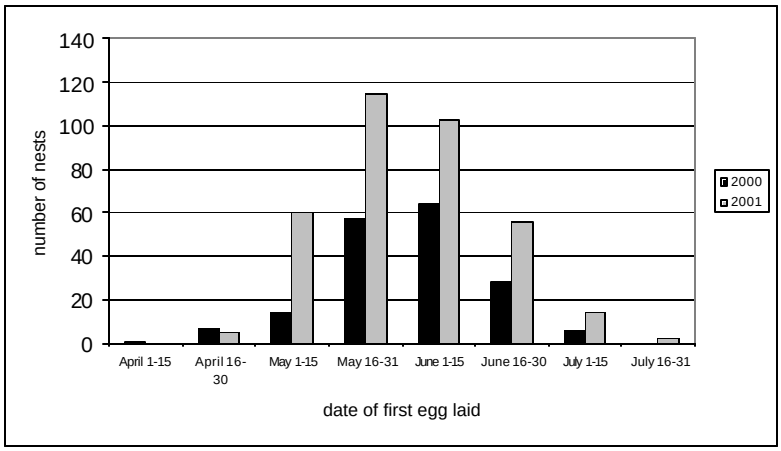
Figure 13. Nesting substrate utilized by all bird species at Rock Creek and North Lake, 2001. n= number of nests used at each site.



Nest timing

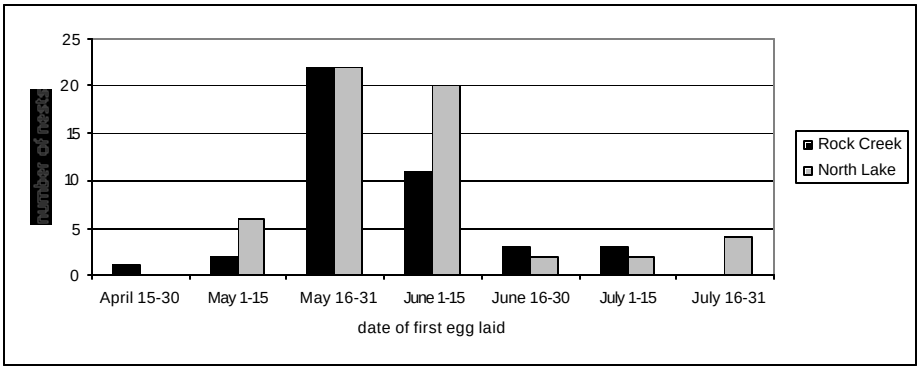
The peak of egg initiation for birds in riparian habitats of the Mono Basin in 2001 was mid-May through June (Figure 14), and was similar to timing in 2000.

Figure 14. Date of first egg laid for Mono Basin sites, 2000 and 2001.



The peak of egg initiation at Rock Creek and North Lake was also the second week of May and early June, although egg initiation appeared more confined to this time period than at Mono sites, with little tapering on either end (Figure 15). The shorter season is probably due to the high elevations of these nest plots.

Figure 15. Date of first egg laid for Rock Creek and North Lake, 2001.



The earliest clutch completion date was for the Blue Grouse at Rock Creek, on April 29. The latest clutch completion date was that of the Dusky Flycatcher on July 17 at Rock Creek (Table 15).

Table 15. Mean date of clutch completion dates for all species at Rock Creek and North Lake, 2001.

		Clutch Completion Dates		
Species	nests	Mean	Earliest	Latest
Rock Creek				
Blue Grouse	1	April 29	29-Apr	29-Apr
Mountain Chickadee	1	May 21	21-May	21-May
Brewer's Blackbird	4	May 22	19-May	31-May
Oregon Junco	2	May 26	20-May	2-Jun
Song Sparrow	2	May 26	25-May	28-May
American Robin	8	May 31	16-May	29-Jun
Red-breasted Sapsucker	3	June 2	25-May	11-Jun
Warbling Vireo	3	June 3	31-May	8-Jun
House Wren	5	June 5	28-May	28-Jun
Violet-green Swallow	3	June 7	1-Jun	15-Jun
Yellow Warbler	2	June 7	3-Jun	12-Jun
Brown Creeper	1	June 8	8-Jun	8-Jun
Western Wood-pewee	3	June 9	5-Jun	12-Jun
Red-shafted Flicker	1	June 11	11-Jun	11-Jun
Cassin's Finch	2	July 9	5-Jul	15-Jul
Dusky Flycatcher	1	July 15	15-Jul	15-Jul
North Lake				
Red-shafted Flicker	1	May 17	17-May	17-May
American Robin	11	May 24	12-May	26-Jun
Brewer's Blackbird	9	May 25	16-May	12-Jun
Mountain White-crowned Sparrow	1	May 28	28-May	28-May
Red-winged Blackbird	3	May 28	28-May	31-May
Red-breasted Sapsucker	2	May 31	31-May	1-Jun
Yellow Warbler	5	June 10	2-Jun	16-Jun
Cassin's Finch	4	June 12	9-Jun	15-Jun
House Wren	3	June 14	27-May	19-Jul
Song Sparrow	2	June 16	22-May	12-Jul
Dusky Flycatcher	6	June 19	8-Jun	16-Jul
Western Wood-Pewee	4	June 20	7-Jun	18-Jul
Mountain Bluebird	1	June 7	7-Jun	7-Jun
American Green-winged Teal	1	June 8	8-Jun	8-Jun
Warbling Vireo	3	July 7	10-Jun	30-Jul

Site fidelity, dispersal and recruitment

Thirty-six individuals of 9 species that were originally banded in 2000 were recaptured in mist nets in 2001 at Mono Lake sites (Table 16). All but three individuals were recaught at the creek of their original capture, and all but 2 were banded originally as adult birds. One adult Song Sparrow was banded as a breeder at Wilson Creek in 2000, and was recaptured as a breeder on Mill Creek in 2001.

Table 16. Total individuals banded in 2000 and recaught in 2001 by location and species. Results of constant effort mist netting at Mono Basin sites.

Species	Wilson Creek	Mill Creek	Lee Vining Creek	Rush Creek	Total
Hairy Woodpecker	--	1	--	--	1
Red-shafted Flicker	--	--	1	--	1
Bullock's Oriole	--	1	1	--	2
Savannah Sparrow	--	--	--	4	4
Song Sparrow	1	1	--	2	4
Green-tailed Towhee	--	--	1	1	2
Black-headed Grosbeak	--	--	--	1	1
Yellow Warbler	1	1	4	11	17
American Robin	--	2	1	1	4
Total	2	6	8	20	36

The two individuals that were banded as hatching year birds in 2000 (1 Yellow Warbler and 1 Song Sparrow) were recaught at creeks different from their original banding, indicating dispersal and recruitment of breeders between creeks. Both were banded as young at Lee Vining Creek in 2000 and returned to breed in 2001 at Rush Creek (Table 17). Tracking of juvenile movement of this kind is rare in songbirds.

Table 17. Individuals that were recaught at creeks different from their original capture at Mono Basin sites, 2001.

species	originally banded in 2000	Age	recaptured in 2001 as breeder
Song Sparrow	Wilson	AHY	Mill
Song Sparrow	Lee Vining	HY	Rush
Yellow Warbler	Lee Vining	HY	Rush

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Appendix 1.California Partners in Flight Riparian Habitat Joint Venture 14 riparian focal species.

The Riparian Habitat Joint Venture selected fourteen riparian focal species whose needs, when considered in the design and management of a landscape, will presumably encompass the requirements of other species (Lambeck 1997, RHJV 2000). The Riparian Bird Conservation Plan, based on species accounts written for each of the 14 focal species, has been developed to guide conservation policy and action on behalf of riparian habitats and California's landbirds. The plan includes recommendations for conservation action, restoration, habitat/landscape management, monitoring/research, and policy (RHJV 2000).

Appendix 1 – Table a. California Partners in Flight Riparian Habitat Joint Venture 14 Riparian Focal Species.

Common Name	Latin Name
Swainson's Hawk	*Buteo swainsoni*
Yellow-billed Cuckoo	*Coccyzus americanus*
Willow Flycatcher	*Empidonax traillii*
Warbling Vireo	*Vireo gilvus*
Bell's Vireo	*Vireo bellii*
Bank Swallow	*Riparia riparia*
Swainson's Thrush	*Catharsus ustulatus*
Yellow Warbler	*Dendroica petechia*
Common Yellowthroat	*Geothlypis trichas*
Wilson's Warbler	*Wilsonia pusilla*
Yellow-breasted Chat	*Icteria virens*
Black-headed Grosbeak	*Pheucticus melanocephalus*
Blue Grosbeak	*Guiraca caerulea*
Song Sparrow	*Melospiza melodia*

Appendix 2. Point count transects, 4-letter codes, number of points, census dates, GPS locations and descriptions, site maps for point counts conducted in 2001.

Appendix 2 – Table a. Point count transects, 4-letter codes, number of points, and census dates in 2001.

Site	Code	# points	Visit 1	Visit 2	Visit 3
Ash Creek	ASHC	9	June 2	June 17	--
Atastra Creek	ATAS	15	June 9	June 23	July 7
Bairs Creek - South Fork	BAIR	15	June 3	June 17	--
Birch Creek - Lower	BIRL	9	June 4	June 18	--
Birch Creek - Upper	BIRU	10	June 4	June 18	--
Bishop Creek	BISH	13	June 5	June 19	--
Buckeye Creek	BUCK	15	June 15	June 27	July 10
Buttermilk Country	BUTT	8	June 5	June 19	--
By-Day Creek	BYDA	15	June 7	June 21	July 9
Clark Canyon	CLAR	10	June 10	June 25	--
Convict Creek	CONV	12	June 6	June 20	--
Dechambeau Creek	DECH	5	June 3	June 20	--
Dog Creek	DOGC	15	June 8	June 23	July 4
Green Creek - Lower	GREE	15	June 2	June 17	--
Green Creek - Upper	GREU	14	June 2	June 16	June 30
Hogback Creek - Lower	HOGL	15	June 3	June 17	--
Independence Creek	INDE	15	June 3	June 19	--
Jordan Springs	JORD	14	June 6	June 24	July 8
Lee Vining Creek - Lower	LEEL	15	June 8	June 26	--
Lee Vining Creek - Middle	LEEM	11	June 9	July 10	--
Lee Vining Creek - Upper	LEEU	13	June 8	June 23	--
Little Walker	LIWA	15	June 5	June 19	July 9
Marble Creek	MARB	21	June 2	June 27	--
McGee Creek	MCGE	15	June 6	June 20	--
Mill Creek - Lower	MILL	21	June 10	June 26	--
Mill Creek - Upper	MILU	15	June 10	June 29	--
Mill Creek – near Walker	LLIM	15	June 6	June 20	July 3
North Lake	NOLA	5	June 12	June 27	July 13
Owens River - N. of Mazourka Canyon	ORMC	15	June 3	June 17	--
Owens River - N. of Tinemaha	ORTI	8	June 4	June 18	--
Robinson Creek	ROBC	15	June 3	June 17	July 1
Rock Creek - Upper	ROCU	15	June 12	June 27	July 13
Rush Creek - Lower	RUSL	15	June 7	June 24	--
Rush Creek - Upper	RUSU	17	June 7	June 21	--
Silver Creek	SILV	15	June 7	June 21	July 4
Taboose Creek	TABO	19	June 4	June 18	--
Thibaut Creek	THIB	15	June 4	June 19	--
Tuttle Creek	TUTT	15	June 2	June 17	--
Upper West Walker River	UWWR	15	June 8	June 22	July 5
Virginia Creek - Upper	VIRG	15	June 4	June 18	July 2
Virginia Creek – Middle	VIRM	15	June 8	June 22	July 8
Virginia Creek – Lower	VIRL	15	June 4	June 18	July 2
Wilson Creek - Lower	WILL	18	June 11	June 27	--
Wilson Creek - Upper	WILU	18	June 10	June 25	--
Wolf Creek	WOLF	15	June 7	June 21	July 4
45 Transects		630 points		107 census days	

Appendix 2 – Table b. GPS locations of point count stations on BLM and INF lands initiated in 2001.

station	site	lat	lon	station	site	lat	lon	station	site	lat	lon
ATAS	1	38.246439	-119.026662	JORD	1	38.06509	-119.183271	VIRM	1	38.089149	-119.188968
ATAS	2	38.247399	-119.024211	JORD	2	38.06355	-119.181216	VIRM	2	38.091069	-119.187428
ATAS	3	38.249293	-119.022676	JORD	3	38.061608	-119.179688	VIRM	3	38.093011	-119.185953
ATAS	4	38.251471	-119.022435	JORD	4	38.059672	-119.178057	VIRM	4	38.095044	-119.184854
ATAS	5	38.253644	-119.021856	JORD	5	38.059881	-119.180905	VIRM	5	38.097346	-119.184371
ATAS	6	38.255489	-119.020311	JORD	6	38.059591	-119.183711	VIRM	6	38.099594	-119.183609
ATAS	7	38.256835	-119.018042	JORD	7	38.059854	-119.186559	VIRM	7	38.101273	-119.181748
ATAS	8	38.257661	-119.01544	JORD	8	38.061377	-119.188673	VIRM	8	38.103451	-119.180873
ATAS	9	38.259196	-119.013299	JORD	9	38.063046	-119.190706	VIRM	9	38.105612	-119.18024
ATAS	10	38.261105	-119.011717	JORD	10	38.063722	-119.193437	VIRM	10	38.107823	-119.180074
ATAS	11	38.263337	-119.012049	JORD	11	38.063695	-119.196253	VIRM	11	38.109958	-119.180873
ATAS	12	38.265531	-119.012666	JORD	12	38.063486	-119.199005	VIRM	12	38.111996	-119.18222
ATAS	13	38.267258	-119.014539	JORD	13	38.065497	-119.200335	VIRM	13	38.113933	-119.183588
ATAS	14	38.268669	-119.01684	JORD	14	38.067327	-119.201548	VIRM	14	38.116164	-119.183802
ATAS	15	38.27037	-119.018734					VIRM	15	38.118337	-119.184349
DOGC	1	38.124731	-119.212797	ROCU	1	37.507662	-118.713793	VIRL	1	38.165962	-119.194257
DOGC	2	38.126249	-119.210748	ROCU	2	37.509931	-118.713734	VIRL	2	38.164031	-119.192787
DOGC	3	38.127623	-119.208714	ROCU	3	37.512179	-118.71331	VIRL	3	38.162191	-119.191248
DOGC	4	38.128964	-119.206435	ROCU	4	37.514443	-118.712946	VIRL	4	38.160147	-119.190282
DOGC	5	38.130632	-119.204804	ROCU	5	37.516733	-118.713214	VIRL	5	38.158012	-119.189789
DOGC	6	38.132086	-119.202712	ROCU	6	37.518949	-118.712956	VIRL	6	38.155861	-119.18973
DOGC	7	38.133899	-119.201145	ROCU	7	37.520666	-118.710955	VIRL	7	38.153661	-119.190449
DOGC	8	38.135471	-119.199101	ROCU	8	37.522902	-118.711631	VIRL	8	38.151446	-119.190245
DOGC	9	38.137134	-119.197138	ROCU	9	37.525102	-118.711647	VIRL	9	38.149338	-119.189703
DOGC	10	38.13914	-119.195464	ROCU	10	37.52728	-118.711031	VIRL	10	38.147251	-119.188807
DOGC	11	38.141291	-119.194778	ROCU	11	37.529286	-118.709947	VIRL	11	38.145202	-119.187825
DOGC	12	38.143491	-119.194177	ROCU	12	37.531056	-118.708354	VIRL	12	38.143024	-119.187208
DOGC	13	38.14577	-119.194365	ROCU	13	37.533175	-118.707495	VIRL	13	38.140883	-119.186597
DOGC	14	38.147932	-119.195046	ROCU	14	37.534903	-118.705736	VIRL	14	38.138684	-119.185803
DOGC	15	38.150164	-119.195373	ROCU	15	37.536995	-118.704872	VIRL	15	38.136517	-119.185143
NOLA	1	37.228251	-118.620249	NOLA	3	37.230198	-118.61556	NOLA	5	37.23096	-118.612154
NOLA	2	37.229801	-118.618269	NOLA	4	37.231223	-118.617625				

STATION: Atastra creek (ATAS) **INTERVAL BETWEEN POINTS**: 250m via GPS
TOTAL # POINTS: 15 **POINT MARKER:** Orange Flagging & metal tag

ACCESS: 4wd and fairly good clearance probably needed. Head to Bodie. Go North (or left) on Gieger Grade Rd (I saw no label). It is the only substantial road and heads out from the park. Continue until it levels out. Opposite road to Bodie mtn (also unlabled) is a livestock exclosure. Turn right on very ill-defined subtle road just beyond exclosure. BEWARE OF THE HUGE HOLE IN THE ROAD JUST PAST THIS 1st EXCLOSURE, DRIVE AROUND IT (I.E. IN THE SAGEBRUSH). Pass 2 more exclosures. Follow road until top of hill/saddle, and drive as far as you can and park (road disappears).

Point #1: Walk downhill (north) on vanishing roadbed (there were some quadrunner tracks) into Aspens for ≈200m. Aspen canopy then opens up, and there are lots of Ribes around (you can see the hills and Aspen grove to the west). Walk uphill into Aspen grove ≈50m to Point 1. I tied a small piece of orange flag on edge of opening where you should go in. Point on leaning Aspen (of course) at edge near where Aspens become really short (west end of bigger Aspens). GPS will be very handy.
Point 2: Return back to opening with Ribes. Continue down "trail". Pass a boulder on the right, then follow (right) quite well-defined cow trail that goes through center of riparian, near a dry drainage. After ≈200m cow trail veers to right of drainage, stay by drainage. Pass log across drainage, and several Aspen snags on right. Point in Aspen sapling in drainage just past log. GPS may be essential here too.
Point 3: Continue down little drainage until you hit a larger drainage with big rocks in it that runs left-right. Go left and follow bigger one. A well-defined cow trail is on east side of drainage – use it. Pass a patch o' dead Aspens. After ≈190m cow trail brings you to an open area of Ribes and Sage, surrounded by Aspens (Aspens on right look rather sickly). Point in northern-most Ribes, ≈8m past 2 boulders, with a 3rd ≈8m to right.
Point 4: Follow cow trail onwards. It'll take you through an even bigger area of open Sage, and then veer left back into Aspens. Point in Aspen sapling where cow trail and drainage (nearly) meet. There's a multiple-trunked Aspen snag ≈5m away.
Point 5: Cowtrail fades a bit. Go west, cross dry drainage, and go into big lovely meadow with little creek running down center. Follow it downstream. Creek becomes rather incised and choked with fallen logs, etc. Soon a 2nd creek arm comes close in on right. Point on Aspen where 2 creek arms are ≈8m apart, ≈9-10m downstream of fallen log across west arm.
Point 6: Keep to right of creek arm on cow trail for easier walking. Pass area where Aspens temporarily end and are replaces by big fluffy Willows and several Aspen snags ahead. Point in Aspen sapling (there are 3 in a row) in stand of dead (and live) Aspens. There are many fallen logs around.
Point 7: GPS will be very handy to essential, #7 is in a very dense tangle. Continue on cowtrail on right side of drainage/riparian. Pass an open grassy area with some Willows and a creek arm comes in from right. Point ≈50m north of grassy area with many large, fallen logs. To north (towards Point) – closer to creek and down – becomes dense with Ribes, Aspens, and logs. Point in small grassy opening near ≈6 snags in Ribes, Aspen and log mess, and next to a seep going to creek. Just past Point a steep cowtrail goes to creek and crosses into Sage. If you decide to access Point from north side of creek (where all the Sage is), it is by clump of dead Aspen across from a Juniper.
Point 8: Cross creek up to trail on Sage edge on left (north) side of creek. Pass a neat outcropping of lavaish, pillar-like rocks up on left. There are a few more lumps of rocky outcroppings, with 3 Junipers in front. Point is ≈6-7m downstream of last Juniper, on a young Aspen on riparian edge.
Point 9: Onward down cow trail. You'll go into and out of Aspen and Sage. At ≈200m hillside on left flattens out (with 2 big Juniper snags), and a big patch of Aspen and Sage appear on right. Cross creek (right) and open Sage area surrounded by Aspen. Point on young Aspen on NE edge of Sage area. There are small Aspen snags in front of and behind Point.
Point 10: Go downstream, past riparian. Point in small Juniper growing on creek side, with a boulder right under it, ≈100m from riparian.
Point 11: Onward. Point on NE side of creek, low on a Sage (still no riparian around), across from a couple of old steel pipes.
Point 12: On another low Sage bush. There's a rocky outcropping at northern base of hill on left that's ≈120m to southwest of Point. Point is also across from a tall round Juniper.
Point 13: Further down some Willows appear. Point is on south (left) side of creek, opposite a medium-sized tan/orange rocky outcropping uphill on right (N). A big lava rocky outcrop atop ridge to north just comes into view. Point on a lone Ribes on south side of creek.
Point 14: Continue down cowtrail/roadbed on right in Sage. Creek gets very incised. Soon rocky ridge atop hillside on right comes into full view. Rocks are in 3 major lumps. Point is ≈ between 2nd and 3rd ones on right side of creek in Bitterbrush. Directly across from Point is a big stick pile (dead bushes).
Point 15: Back to old roadbed/cowtrail for walking ease. Just past 3rd rocky pile up there on right, drop to creek (notice really cool huge monolithic red rock a ways ahead of you!). Point on a young Willow, a cowtrail goes to creek by Point. ≈40m downstream of Point and up on hill side to left are 2 big whitish, lichen covered boulders.

STATION: Dog Creek (DOGC) **INTERVAL BETWEEN POINTS**: 250m via GPS
TOTAL # POINTS: 15 **POINT MARKER:** Orange Flagging & metal tag

ACCESS: 4WD needed. From 395 take Green Creek Rd. which heads West of 395 a few miles south of Bridgeport. Stay on Green Creek road for a couple miles or so. It'll take you around Sage and Pinyon up towards a ridge. Then you will come to a major fork in the road with a brown sign advertising that going left takes you to the Virginia creek area. Go left towards Virginia Creek area. Then after ≈1.0 miles you will come to an unmarked dirt road heading off to left (it is also the 1st left turn you'll come to, past a lone juniper). Turn left on it.
Stay right at the first (3-way) junction that you come to that's under the powerlines, so you continue to follow the powerlines. At next fork in road you come to, go left, back to powerlines, over a small dry rocky creek wash. Eventually you'll drop down and away from powerlines, and head towards creek. Go right at fork in front of creek (there is/was a small white sign here). Drive ≈0.9 miles and park at open campspotish area.

Point #1: Walk up road ≈100m to an opening in veg by creek on left. There are 3 trees next to each other: one on left is leaning over and dead, middle one is half-dead and straight, right one is live (they make a fan shape). Point on east side of creek across from these trees.
Point #2: Return back to road and walk downstream. At ≈200m there is a lone, pillar-like lava rock on west side of road, and a leaning Aspen snag to east. Walk into riparian here. Cross creek by a fallen log and a little waterfall by a nettle patch. Point on an Aspen in an attractive horsetail and grassy patch on central island, across from a lava rock piling to east.
Point #3: Return to road for faster walking. Road goes up, then back near creek where Aspens are temporarily absent and replaced with round Willows, and pass a scraggly snag. Drop back to creek here. Point on west side of creek in a Willow tucked close to a small hill of Sage (somewhat obscured from road), and across from a stand of ½ dead Aspens growing in Sage to east.
Point #4: Back to road again. Pass a lovely tall stand of mature Aspens to east, and a smaller stand to west with a Jefferey Pine. Come to a more open part of creek where there's mostly Willows, just upstream of 3 Aspen snags. Point on Willow on west side of creek ≈10m north of 2 Aspen saplings and a rocky pile.
Point #5: Back to road. Pass a wooden post with a can on top by road. Pass an opening in veg where it becomes mostly Willows. Just past this Willow patch is a patch of dead Aspens. Road veers up and to right. Go into riparian here. Cross west arm of creek. Point on an Aspen sapling with dead and live Aspens around. There's Rose and Nettle to the north and west, and rocky pile to south.
Point #6: Road goes up and quickly returns to creek. Here Aspens dominate east side of creek and Willows the west side. There are multiple creek braids. At ≈200m (≈35m downstream of lone Pine tree) is a small grassy opening with Willows on west "island" created by a creek braid. There is a thick round Willow on NW side of grassy area. 20m past this Willow drop in to Point. Point on Willow with a rocky patch to west, and across from a somewhat prominent half-live half-dead Aspen to east.
Point # 7: Pass an Aspen snag and go thru a dense Aspen patch. At 250m from last Point is an Aspen patch with 3 snags in it. Point is ≈10m east of snags on a round Willow, just upstream of an open rocky area. It's easiest to hook around Aspen to get there.
Point 8: Continue on road. ≈75m upstream of powerlines, head into riparian. Cross west creek braid and an open grassy area with dead stick and rock piles. Go a little north to tall grass and creek braid. Point on shorter Willow beneath an overhanging dead Willow branch to north, and east of a muddy "slough" with taller grass, and across from last patch of dense Aspens to east.
Point 9: Onwards down road, and pass bridge (stay on Left), and go down "trail" on west side. ≈240m come to open area (hammered!) with patchy grass. A big rock piling is uphill to west. Cross creek. Point in Willow directly across from big rock outcropping, just east of a mount of Sage.
Point 10: Continue downstream, probably best to stick +- in middle. Pass dead Aspens. Soon veg opens up, a few scrawny Willows. There are 3 rocky outcroppings on western hillside, and a lone Pine snag stands +- across from the 3rd. Point between 2nd and 3rd rocky outcrop, on a small lone snag in open.
Point 11: Onwards downstream. Soon you'll see 2 lone Lodgepole Pines in riparian. Point between them (closer, ≈11m SE of north one), on Willow on east side of creek arm by a partly dilapidated Bitterbrush and rock pile.
Point 12: Onward ho! There's a sheep trail on east side of creek by Sage. On east side of creek is a scraggly Pine, and a Pine snag ≈55m ahead. Point ≈50m west of snag, on west side of creek. Go thru tangle of Geyer's Willows and come to a patch of dead Bitterbrush. Point on Willow at north end of dead bitterbrush clump by a small nettle patch.
Point 13: Continue down sheep trail on eastern Sage edge. Soon you'll see some Pines. ≈60m east of 2nd Pine is a small oval island. Point in a Shiny Willow with a Geyer's and a Yellow Willow behind it. A white sign atop hill to west is also in line with Point.
Point 14: NO TAG, ONLY FLAG. Creek becomes a lovely meandering bubbling brook. Continue thru several mini meadows. Point on a Geyer's Willow on east side of creek. A patch of Aspens are clearly visible from Point ≈75m downstream. Point is also across from a big boulder on east hillside that has a +- 3 parted top making a little indented cave.
Point 15: NO TAG, JUST FLAG. Pass an Aspen patch, and habitat becomes quite thrashed. ≈275m from last Point is an obvious man made rock wall in Sage, west of riparian ≈40m. It even has a rock wren living in it. Across and downstream of wall is a lone Pine. Point ≈35m upstream (SE) of rock wall by creek edge.

STATION: Jordon Gulch (JORD **INTERVAL BETWEEN POINTS**: 250m via GPS
TOTAL # POINTS: *15* **POINT MARKER***:* Orange Flagging & metal tag

NOTES: This transect goes through 2 canyons: 5 points in North canyon and 10 points going up South canyon. I started at top of North canyon, point counted my way down to road, then headed back up 2nd canyon, making a V-shaped point count.
ACCESS: North on 395 from Mono City. You will pass Power House Road on your left, take the next unmarked left turn. There is no sign or name for this road. The turn is hard to see because the gravel road dips down sharply and disappears from sight. Once you are on this track road take any option to veer right and head toward the Aspen-lined canyon to the NW. Park in the pullout in front of the power pole (you should come to it before you get to the point where the creek flows over the road).

Point # 1: Walk all the way up to top of North canyon. You can start on road but then head along southern edge of riparian until you reach end of Aspen and Willows. Head North to top of Willow stand and go into riparian at grove of Aspen. Point on a ?? bush/tree on edge of riparian behind Willows, adjacent to Aspen.
Point #2: Head downslope, following gulch on North bank. You will have to make your way through Sage and fallen Aspen trees. Go higher on hill for easier walking. You will pass a grove of dead Aspen, then go around some Willows. At 250m, head down into gulch. In this spot there are many fallen, dead Aspen. Go into riparian 20m, bearing 210 degrees. Point on small (3" DBH) Aspen on edge of meadow.
Point #3: Go straight down through meadow. Make your way through Willows, staying to left. At 160m exit riparian to right and follow edge downslope. Stop to look at the orchids in the meadow! At 250 m there is a 4m high Juniper. Enter riparian just below Juniper. Point on small Aspen next to a fallen dead tree that points to creek. Look for swallow box that has been ripped off tree by a bear (bear claw marks in Aspen).
Point #4: Head back out to Sage and continue down out of canyon. Pick up road and go towards parking area. Point on Willow (above Roses) on North side of Willow patch that is on E side of road. On June 9, 2001 creek was flowing into road right in front of Point.
Point #5: Now head up 2nd canyon (to South of the canyon you just did). Follow creek from road, staying on right side of creek. Walk through Sage on side of bank. 250m is directly across from 1st small Juniper that is out in Sagebrush. Point on Willow by creek. You should be able to see 2 larger Junipers ≈20 m in front of you.
Point #6: Continue up canyon. Aspen grove begins at 220m. At 250m you will come to a rock in faint path. Point on Willow straight down from rock. Do point from rock.
Point #7: Keep on truckin'. Pass Aspen orchard and edge of creek will turn to Willows. Point on upstream side of 1st Willow patch.
Point #8: Move along…follow Willows and creek. Pass a wispy Juniper. Point on X-mas tree ≈10m downstream from Aspen.
Point #9: Head up and around Aspens. At 230m there are 2 large (tree-sized) Willows out in grass. Go nearer to creek. Enter Aspen grove between 2 large Junipers. Point on Aspen in middle of grove (behind northern large Juniper).
Point #10: Skirt up through meadow to right. Enter riparian via Jeffery Pine. Head upstream via meadow (right side). After ≈10m head right and exit riparian for easier walking. Walk along side of slope and you'll come to a wall of Aspen at 170m. Go through Aspen where they are smallest and shortest. Keep to hillside. At 250m there will be a lone Juniper on hill above you. Head down into canyon at this point. Climb down rock pile/slide, angling upstream. Point on fallen Aspen.
Point #11: Keep going up! Go up to rockslide and walk among rocks, staying above riparian. You will go through rock piles, fallen trees and sage scrub. At 200m you will come to a large rock-slide that extends in front of you. Head closer to creek. At 250m there is a rocky crag above you and a large boulder with a dead Aspen leaning over it. Point on an Aspen below boulder.
Point #12: Pick your way over boulders and shale going upstream. At 200m your reach a beautiful meadow! Go up into meadow and Point is on tall lone Willow.
Point #13: Go back to Point 12. Hike up gulch to Aspen grove, staying to right. Cross 2-track road. At 250m (≈10m past road) turn into Aspen grove. Cross another dirt road and go ≈10m into Aspens bearing 240 degrees. Point on a double-trunked Aspen.
Point #14: Keep going… stay on edge of Aspens. At 240m there is a lone Juniper to your right. Head into Aspens directly across from Juniper and Point is on 5-trunked Aspen clump ≈7

STATION: North Lake (NOLA)
FLAG MARKING POINT: Orange Flagging and Metal Tag
INTERVALS BETWEEN POINTS: 250m GPS distances (as a crow flies)
TOTAL # POINTS: 5

NOTES: Do Point 4 first, then 1, 2, 3, & 5. With this first exception, points run upstream to downstream.
ACCESS: Take West Line Road (168) west out of Bishop. After ≈14 miles, you will come to a junction, continue forward toward Lake Sabrina and North Lake. ≈3.5 miles further on, take right turn to North Lake, following a dirt road with a few switchbacks. After passing lake on your right, take next right turn to trailhead parking on North side of lake, near pack station corral.

Point 4: Walk east along road toward bathrooms. At bathrooms, head uphill into Aspen grove. Point ≈70m upslope from bathroom on 1' DBH Aspen, right next to another Aspen of same DBH. There is a slight game trail just upslope from Point, marking boundary between large aspen grove where Point is, and a group of younger Aspens upslope. Flag on upslope side of tree.
Point 1: Walk back down through Aspens, and retrace your steps, passing where you parked and back out to junction of North Lake Road and pack station road. At gate on south side of road, opposite junction, walk south into Willows toward a tall stake with an orange sign on top (snow survey stake). Point on Willow right next to stake.
Point 2: Walk back out onto North Lake Road and follow it east. A large Lodgepole Pine is on left side of road as it begins to curve right (south). At this point, walk north through Aspens for 50m at 327 magnetic degrees. Cross slight Big Sage covered mound. Point on other side of this mound, on Willow in small stand of 1 Aspen, 1 Lodgepole, and 1 small Willow.
Point 3: Continue east along road until you reach a culvert and a tan plastic snow stake on north side of road. Go into Willows and grassy wet meadow. Point on Willow in line with culvert, just downstream from small oxbow.
Point #5: Continue east along road, passing lake on your left. Road curves south, and ≈100m past lake you'll see a "10mph/ PED XING" sign. Take small trail across road from sign east to creek. Point in Willow near creek ≈20m downstream along fisherfolk trail. 4 Pines line bank across creek from Point.

STATION: Rock Creek Upper (ROCU) **INTERVALS BETWEEN POINTS:** 250m via GPS
TOTAL # POINTS: 15 **POINT MARKER:** Orange Flagging & metal tag

NOTES: Creek generally runs north-south on this section. Points 4 & 7-15 are on west side of creek. 1-3, 5 & 6 on east side.
ACCESS: At Tom's Place (≈23 miles N of Bishop), turn SW outhwest onto Rock Creek Road. In ≈4 miles, you will pass Iris Campground and then Big Meadow Campground. ≈500m past entrance to Big Meadow Campground, there will be a pull-out on either side of road. Park here.

Point 1: West from where you park, there is an open field of Sagebrush, bordered by Willows on north end. Walk downstream and ≈50m in from Sage edge, walking around east side of Willows through grass. Point on 1st Lodgepole Pine that you come to. Far edge of SE Aspen patch is 50m away from Point.
Point 2: Continue downstream along east edge of Willows. At 250m, you will be at a narrow "stringer" of Willows with a group of ≈7 small Lodgepole Pines in middle of Willows. Go into Willows here. Point is at 2 similarly sized Lodgepoles, slightly upstream from campground bathroom.
Point 3: Walk downstream along Willows and then follow campground road. When road draws away from Willows, follow Willow edge again. Go west through gap in Willows when you are in line with green gate for campground road. Point on Willow 10m west into gap, next to another Willow and a Lodgepole Pine.
Point 4: Walk west into campground and look for very large tree crossing creek. Cross over and continue downstream, walking along creek edge. You will reach a boulder field that covers creek, water running underneath boulders. On down-creek end of this boulder field, go into Aspens ~ ?m. Point on Aspen next to a 1.5m long black boulder.
Point 5: Cross creek at boulders and continue downstream. Walk down into Iris Campground. Point between entrance to site 6 and creek, 10m from creek, on a Mountain Mahogany and in line with No Parking sign.
Point 6: Head downstream through campground. Point on Water Birch next to creek and 4m from a boulder with *Ribes* and *Artemisia* growing all around it.
Point 7: Head out to road, and cross bridge and creek, on road. Point on Water Birch on riparian/white boulder edge, on south edge of long patch of white boulders.
Point 8: Head into Aspen Campground. Point on a Water Birch on edge of creek, 35m downstream from campground bathroom.
Point 9: At 240m you will pass an orange snow stake on right side of road and a 10m Juniper on left side of road. Head toward creek here. Point 10m from road and 8m from creek on a 6" DBH Aspen with a curve in trunk at 2m. Do Point from road because it is too loud, but keep Point as center.
Point 10: Pass a lone Lodgepole Pine on right side of road at Aspen edge. Drop down to creek here. Point on 12cm DBH Aspen, 25m from creek and 2m downstream from a 4m long gray boulder.
Point 11: 10m past a green snow stake with red top on right side of road and 50m before reaching a dead-end paved pull-out on left side of road, head down toward creek. Point ≈15m from road and 30m from creek. Point on 2m 1" DBH Aspen next to a stump with pointy sliver pointing up toward the sky.
Point 12: At 150m and 35MPH sign leave road and walk along Sage/riparian edge. Point on Mountain Mahogany ≈15m from creek. A fallen snag with top sawed off points to Point.
Point 13: Continue down road until you reach an electricity gauging station on a wooden post on left side of road. Head to creek here. Point on 6m Pinon Pine next to 3 large white granite boulders ≈5m from Water Birch riparian edge.
Point 14: ≈15m before a pullout on right side of road, head toward creek. Point on largest of a group of ≈11 Lodgepole Pines right on edge of creek. Upslope from Lodgepoles is a group of Aspens listing toward road. Do Point upslope, keeping Point as center.
Point 15: When you reach beginning of a pullout on right side of road, head straight to creek. Point is on an old ½ dead Aspen with many cavities and some live growth toward top.

STATION: Virginia Creek – Middle (VIRM) **INTERVAL BETWEEN POINTS**: 250m via GPS
TOTAL # POINTS: 15 **POINT MARKER:** Orange Flagging & metal tag

NOTES: Compass/GPS basically essential for this transect because creek has several fingers around lower points, and forest is somewhat homogenous. Because a GPS was used to set up this transect, distances are *linear* from Points, and *not* paced. Points run downstream. You will get your feet wet on this one.
ACCESS: Drive north from Lee Vining on 395 to Conway Summit. Turn left on Virginia Creek Road. Less than 0.5 miles up Virginia Creek Road there is a large paved pullout on the right with a sign at its westernmost end saying "Jordan Basin". Park in pullout.

Point #1: Starting at 5th metal stake from east end of pullout, head 110m @ 334B to Point. You will cross a small barbed wire fence and a small channel. Continue downhill and cross a 2nd channel… you can hear main creek from here. Point is 60cm up in 1.1m tall Trembling Aspen ≈5m upstream of a large fallen snag that crosses creek. Do Point ≈5m away from creek for better hearing.
Point #2 (250m @ 17B**):** Walk downstream, crossing creek at some point (I crossed over a log at 70m. Creek is shallow, so you can cross anywhere if you don't mind getting your feet wet.). At 130m creek splits into several fingers… stay left (N). At 210m is an open area with a barbed wire fence and a small campsite. Cross creek here and continue downstream ≈40m. Point is head height in 1" dbh Trembling Aspen ≈4m away from creek near a pile of fallen dead wood.
Point #3 (250m @ 15B**):** Continue downstream, keeping stream ≈10m to your left. You should meet up with a narrow dry creekbed. Follow this "downstream"; it meets main channel at 110m. At 140m creek forks… stay right (≈S). At 180m you'll reach a more open area with lots of Horsetail and lots of dead Trembling Aspen (standing and fallen), and there is an open sunny area ≈20m to your right. Continue downstream and pass a 40cm dbh Lodgepole Pine at 230m. Point is head height in twinned Trembling Aspens, one 1"dbh, the other 1.5", ≈1.5m east of creek and ≈1.5m south of large fallen log with lots of branches that crosses creek.
Point #4 (250m @ 8B**):** Go to large open pasture northeast of Point #3. Walk downstream along forest-field edge. Point is on a 2.5m tall Lodgepole Pine 2m east of creek. The largest of several towers on hill to the east is visible at 124B from Point.
Point #5 (260m @ 354B**):** Continue downstream along forest-field edge. At 250m you will reach a large fallen snag that points out into the field. Head 40m due west from tip of this snag to Point, which is head height on twinned 2"dbh Trembling Aspens ≈5m east of creek. 6-8 10m tall Pines line opposite bank to north of Point.
Point #6 (260m @ 0B**):** Go back to tip of snag at forest-field edge and continue downstream. A beaver pond may be visible to your left at 80m. Pass a widely-spaced group of ≈6 Pines and go to a 3m tall round Willow (tallest tower @143B from Willow). Go 20 west from Willow to Point, which is on a 5" dbh Trembling Aspen growing out of middle of creek, ≈5m west of a 9m tall many-branched Pine snag.
Point #7 (250m @ 26B**):** Return to pasture and continue downstream. At ≈200m you will reach a barbed wire fence and at 210m creek meets with another creek draining from the west. Cross barbed wire fence at 3rd stick post downstream of large (6" diam.) post. Follow natural gap in Willows ≈15m ≈northeast to Point, which is on a 2.5m Willow in a small open grassy area ≈2m west of a 2' wide stream channel.
Point #8 (250m @ 2B**):** Follow small channel by Point #7 downstream … it meets main creek at 50m. Cross main channel and continue downstream. At 190m you'll reach an area with lots of beaver-felled logs that cross creek, and at 230m you'll reach a beaver lodge. Cross creek at beaver lodge, climb over an old beaver dam, and cross creek again to an small (5 x 5m) open grassy area contained by a tight 'S' in creek. Point is on a 2m Willow on creek edge at northeast edge of this opening.
Point #9 (250m @ 357B**):** Continue downstream. Area opens up. Pass 3 large many-branched Trembling Aspen snags on your left at 230m and a large (75-80cm dbh) living Trembling Aspen at 240m. Point is on a 1.7m Willow ≈8m northeast of this Aspen. A solitary boulder near a larger clump of boulders is visible near hilltop at 46B from Point.
Point #10 (250m @ 348B**):** Continue downstream. It's easiest to walk along west side of Willows that line creek adjacent to a large open grassy area with some Sage. At ≈100m you'll see a tall (6m) Lodgepole Pine on east side of creek… walk towards it. Point is on a small (75cm tall) Willow that overhangs creek's west bank, across creek from this Pine. A large (1m diam.) flat orange rock is ≈2.5m downstream of Point.
Point #11 (250m @ 328B**):** Continue downstream, heading for a solitary tall Trembling Aspen. You will lose sight of it as you weave through the Willows, but it will reappear… keep it as your beacon. Pass a small stand of tall Trembling Aspens on your left at 200m. Cross creek at some point. You will reach the solitary Trembling Aspen on east side of creek at 230m. Point is in a 2.25m Willow 20m downstream of the Trembling Aspen by a pile of 3 pieces of cut dead wood. The tip of a dead log that crosses creek points to the Point tree.
Point #12 (260m @ 317B**):** Continue downstream. You will see a faint 2-track paralleling creek after ≈40m… follow it downstream. You'll pass an old cabin at 75m, and reach a junction of 3 roads at 140m. Take west road (closest to creek) and continue through Aspen stand into an open area. Point flag should be visible to the left ≈7m from road ≈50m downstream of the last and largest Trembling Aspen along road (tip of largest Trembling Aspen is 149B and tip of left of 2 mountain peaks is 220B from point in road where you go to creek). Point is on a 2m Willow.

Virginia Middle Continued

Point #13 (250m @ 316B): Continue downstream along 2-track to a 90B left turn followed by a 90B right turn after 10m. At 2nd turn, walk through Sage to Willows at 249B. Pass through a gap between 2 Willows into a large (10 x 15m) open grassy area. Point is on a Willow ≈2m from creek immediately US of a 4m tall, 4m wide Willow at northwest end of opening. Stand back 5-6m from creek to do count.

Point #14 (250m @ 340B): Return to 2-track and continue downstream. At 250m a red boulder is visible at 305B and a pile of white fallen trees at 282B. Walk towards fallen trees to reach Point, which is on north side of 3m tall Willow ≈5m south of 90B bend in creek. The red boulder is visible at 307B from Point.

Point #15 (250m @ 333B): Return to 2-track and continue downstream. At 240m you will reach a small erosional gully that crosses road. Willows are quite close to road here. Head down toward creek at this gully, skirting to left (≈S) side of Willows. When you're almost at creek, look right and you should see Point and a sharp mountain peak. Point on west side of Willow ≈8m east of creek. Red boulder at 282B and sharp mountain peak at 326B from Point.

STATION: Virginia Creek Lower (VIRL) **INTERVAL BETWEEN POINTS**: 250m via GPS
TOTAL # POINTS: 15 **POINT MARKER:** Orange Flagging & metal tag

NOTES: The starting point (PT 1) is near the confluence of Virginia Creek (Eastern creek) and Dog Creek (Western creek). Be sure to take the Eastern creek, which is Virginia. Points run from downstream (PT 1) to upstream (PT 15). All points on East side of creek except for point 14.

ACCESS: **Bottom (PT 1):** Drive ~ 6 miles north of Conway Summit on 395, there will be a pullout for an historical marker on the west side of 395 (if you reach the east turnoff to Bodie State Park, you have gone too far). At the historical marker pullout, there will be a dirt road that heads south and then west toward the junction of Virginia and Dog Creek. Park near the creek, at a loop and dispersed campsite. **TOP (PT 15):** ~3.3 miles north of Conway Summit sign, look for dirt road just before the guard rail begins on the west side of 395. Just following the road and the guard rail (@ ~ 3.5 miles is a pullout on the west side of 395). Drive a ways down the dirt road, park where safe and convenient, and scamper down the hillside to Point # 15.

Point 1: ~ 100m from upstream-most dispersed campsite. You will pass a small meadow to the east and over a small ridge that runs parallel to the creek. Point is 1/3 upstream along at a flat area right along the creek, on a small Coyote Willow.

Point 2: Continue upstream, and meet up with dirt road that follows the creek. Once you reach the end of the road, walk down along the willows past a group of aspens at the edge of the riparian and a lone aspen about 10m from the riparian. ~10m past this lone aspen is a small grass depression. Point is on a rose bush at the base of a thick cluster of yellow willow in this grassy depression.

Point 3: Continue upstream along creek. Point is at the edge of the willows on a small rose bush. On the opposite side of the creek from the point is a group of scattered large boulders. Point is in line with the boulder closest to the creek on the upstream edge of the group and on the east side of the creek, in line with a small Pinon Pine near the ridge top and a small pile of rocks about 15m upslope. The point is also ~ 40m downstream from a Juniper.

Point 4: Continue upstream. The point is on the first large aspen tree at the edge of the riparian, near 3 smaller aspens and a sapling.

Point 5: Continuing upstream, pass an aspen grove and walk right along the edge of the creek. To the east, look for a cluster of 7 live aspens and several snags. Point is on an artemisia directly opposite the last aspen on the little ridge at the edge of creek.

Point 6: Continue upstream until you reach another dirt road. ~ 60m after the dirt road begins, look for a beaver pond to the west. Point is on an aspen sapling on the western side of the beaver pond, near its downstream end. The sapling is at the end of a 10m log (almost perpendicular to the road) and is surrounded by a grove of taller trees.

Point 7: Continue upstream along the road until you reach a temporary encampment (or a dispersed campsite) along the creek side and a footbridge crossing the creek at the upstream end of the camp. Cross the footbridge (if it is still there) and continue walking through aspens and over a bunch of beaver-cut logs to an aspen at the downstream end of a small clearing. The point is on this 4m aspen, ~ 20m from the creek.

Point 8: Continue upstream along the road until you come to a bunch of exposed bedrock on the hill to the east and a cluster of small aspens along the eastside of the road. ~ 20m upstream from this cluster is another lone aspen growing right along the eastern edge of the road. Go into the riparian here for 25m at 263 degree (magnetic). (If you walk up the road another 10m and look into riparian, you should see the flagging). The point is on a Shiny Willow surrounded by logs and snags.

Point 9: Continue upstream along the road. You will pass a section of mostly low willows. At the point where the aspens begin again, there will be a 15m snag at the edge of the riparian. Point is on a shiny willow ~15m toward the stream from this snag.

Point 10: Continue upstream. The point is on a lone willow at the edge of an open gravel bar in the middle of the creek. The gravel bar contains exposed pebbles and is surrounded by sparse willow and mullein.

Point 11: Continue along the sage edge until you come to a cluster of rocks uphill from you and ~25m away. At this point in the riparian, there will be a small grove of aspens and a stand of low willows upstream from the grove. Look for a cleared passage into a clearing with scattered willow and sage and aspen logs. Point is on a shiny willow at the ? edge of the clearing about 10m from the creek.

Point 12: Continue along upstream like a happy camper. About 50m past a large rock outcrop to the east you will come to a tall grove of live aspens with a snag in the center on the other side of the creek and at the edge of the sage. In the streambed, you will find mostly scattered willows and sandbars. Cross the 1st creek channel and walk toward tall aspen grove. Point is on the west side of the channel on a willow ~8m from the channel.

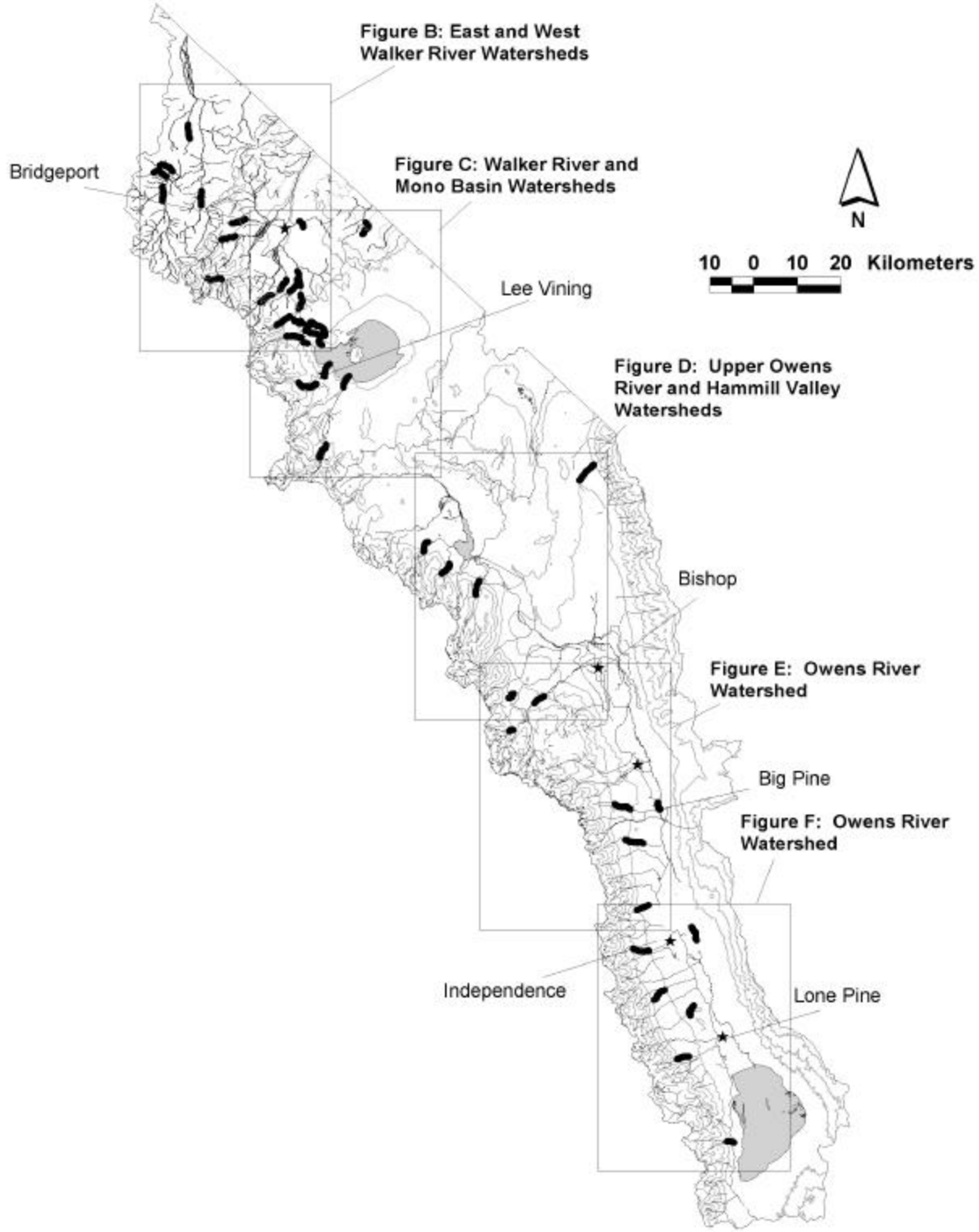
Point 13: Continue upstream, again meeting up with the road. Pass a campsite and follow an old road covered with thick herbaceous cover and grass. After the road begins to rise away from the creek elevation, you will pass 2 small boulders about 20m apart, on the west edge of the road. After the 2nd boulder, look for a stand of aspen snags in the middle of the creek. Point is on a willow at the edge of the snags and ~8m from the road.

Point 14: Continue along sagebrush/riparian edge. Nearing 250m, look for a small cluster of slanted rocks with orange and gray streaks of lichen, in the sage a few meters upstream from the creek and aspens. Head into the riparian and cross the creek at this point. The point is in a small clearing upstream from a 90 degree bend in the creek channel. About 40m upstream from the point, you should see a large outcrop on the west side of the creek.

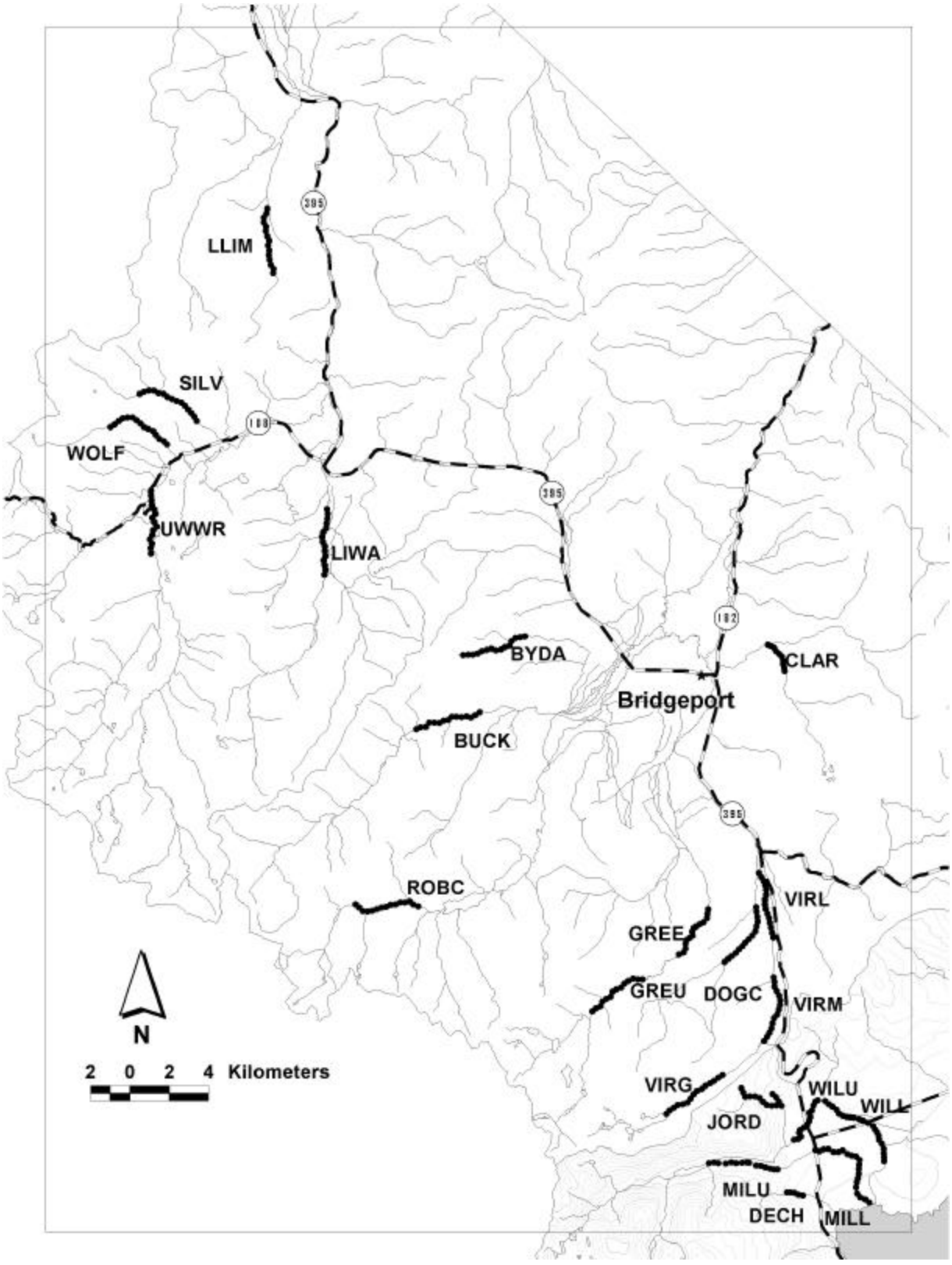
Point 15: Continue along like a barbaloot in a barbaloot suit until you pass a huge rock outcrop just below 395 to the east. 30m past this outcrop, you will come to 2 piles of aspen snags pointing uphill. On the aspen edge, also at this point, look for a 15m snag with orange peeling bark. Go down into riparian here toward a 1.5m brown volcanic rock surrounded by rose. Point is 20m upstream from the rock on a 2m yellow willow in the middle of a field of beaver-cut snags.

Scramble up the hill to 395 to meet your ride, grab your bike, or to walk on down the road to your car.

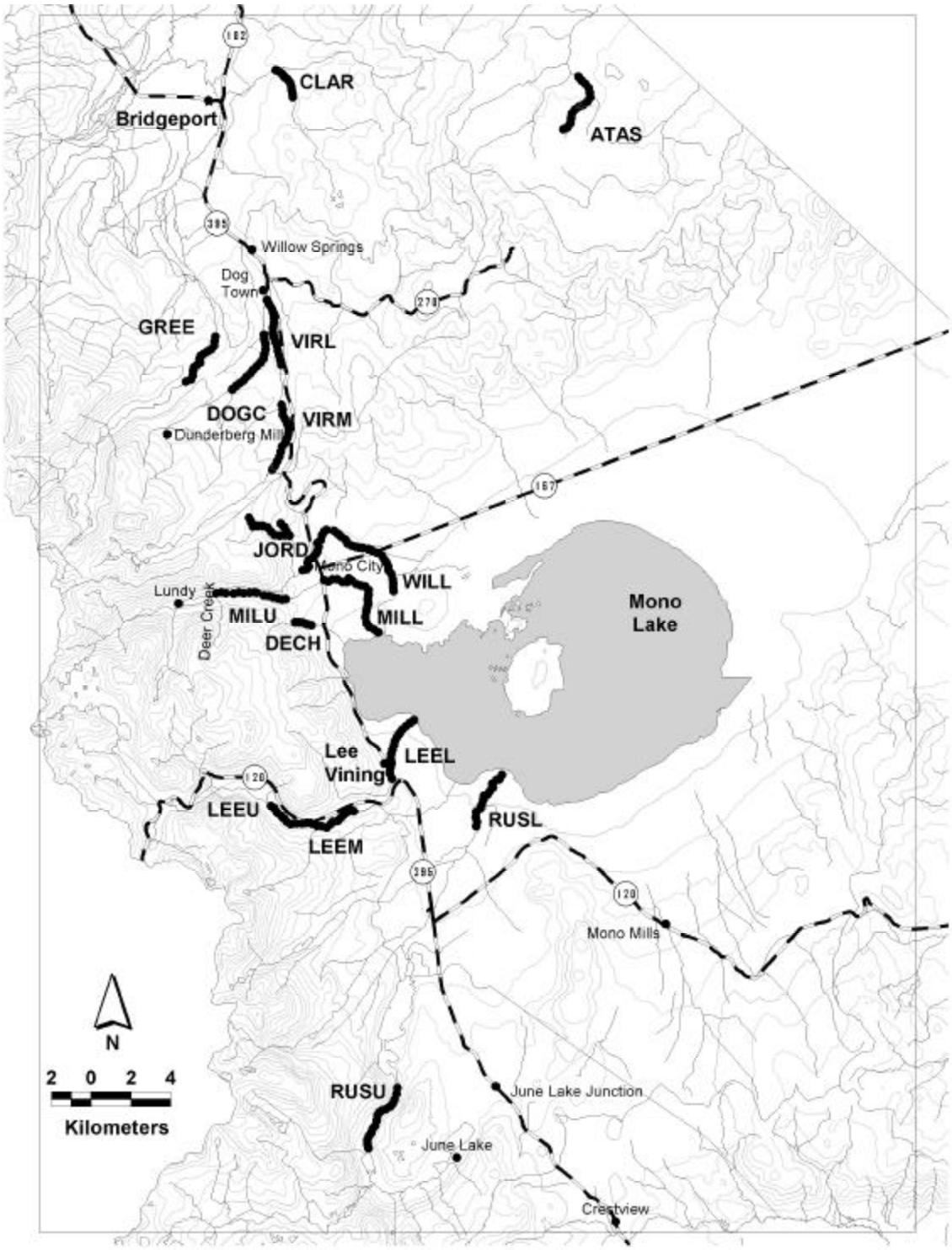
Appendix 2 – Figure a. Point count locations, 2001. Overview for Figures b – f.



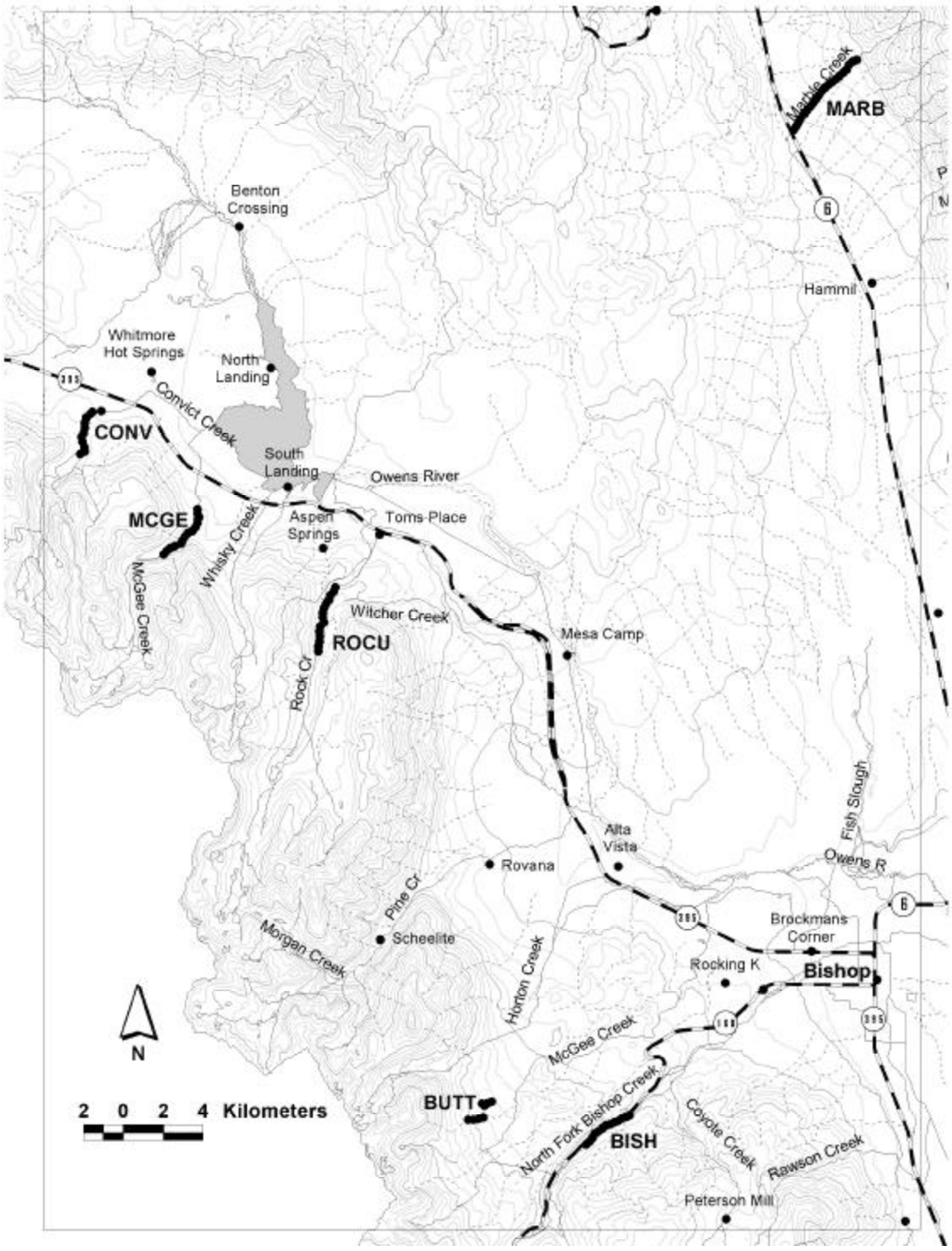
Appendix 2 – Figure b. East and West Walker River watersheds, 2001. Four letter transect codes correspond with Appendix 2 – Table a.



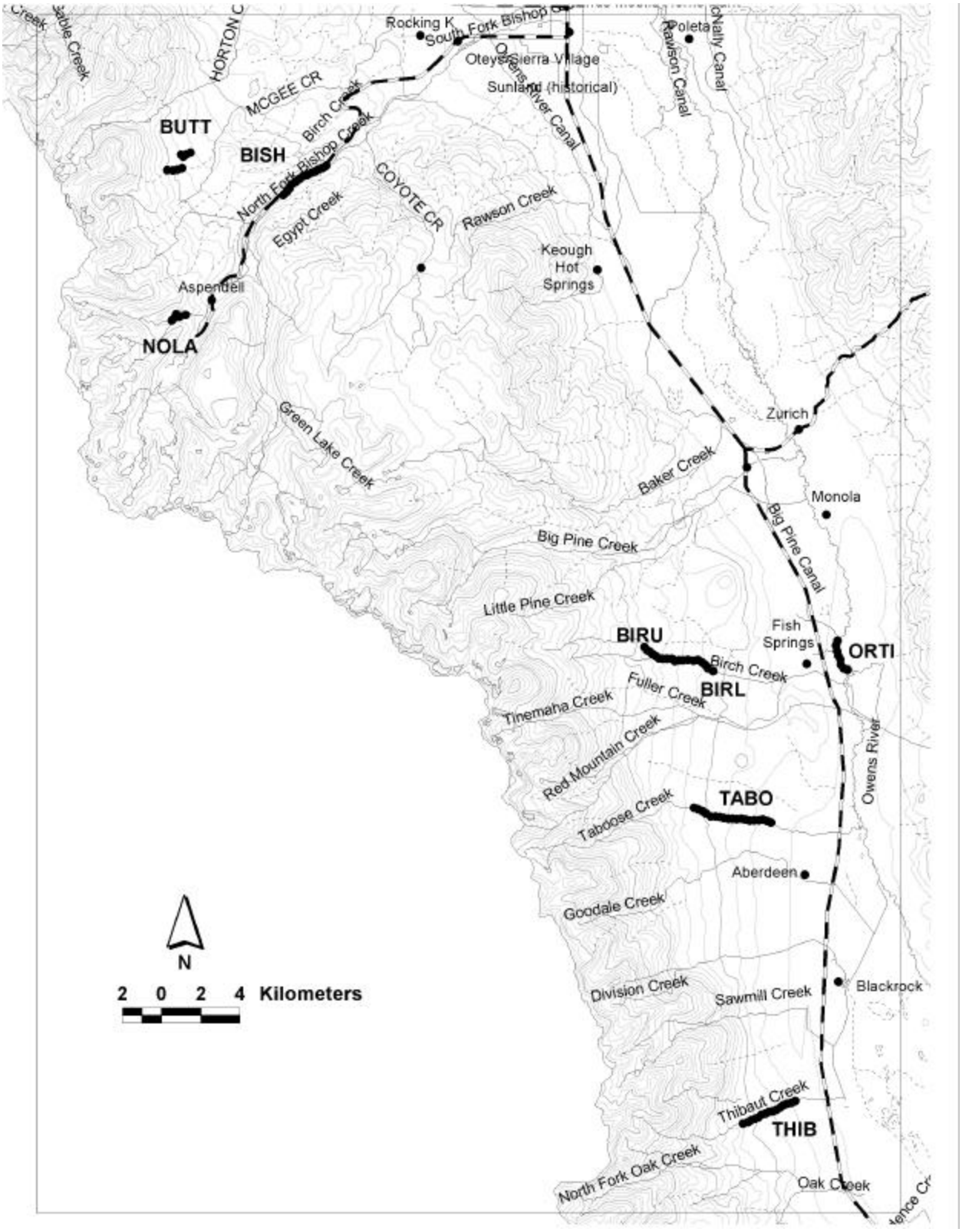
Appendix 2 – Figure c. Walker River and Mono Basin watersheds, 2001. Four letter transect codes correspond with Appendix 2 – Table a.



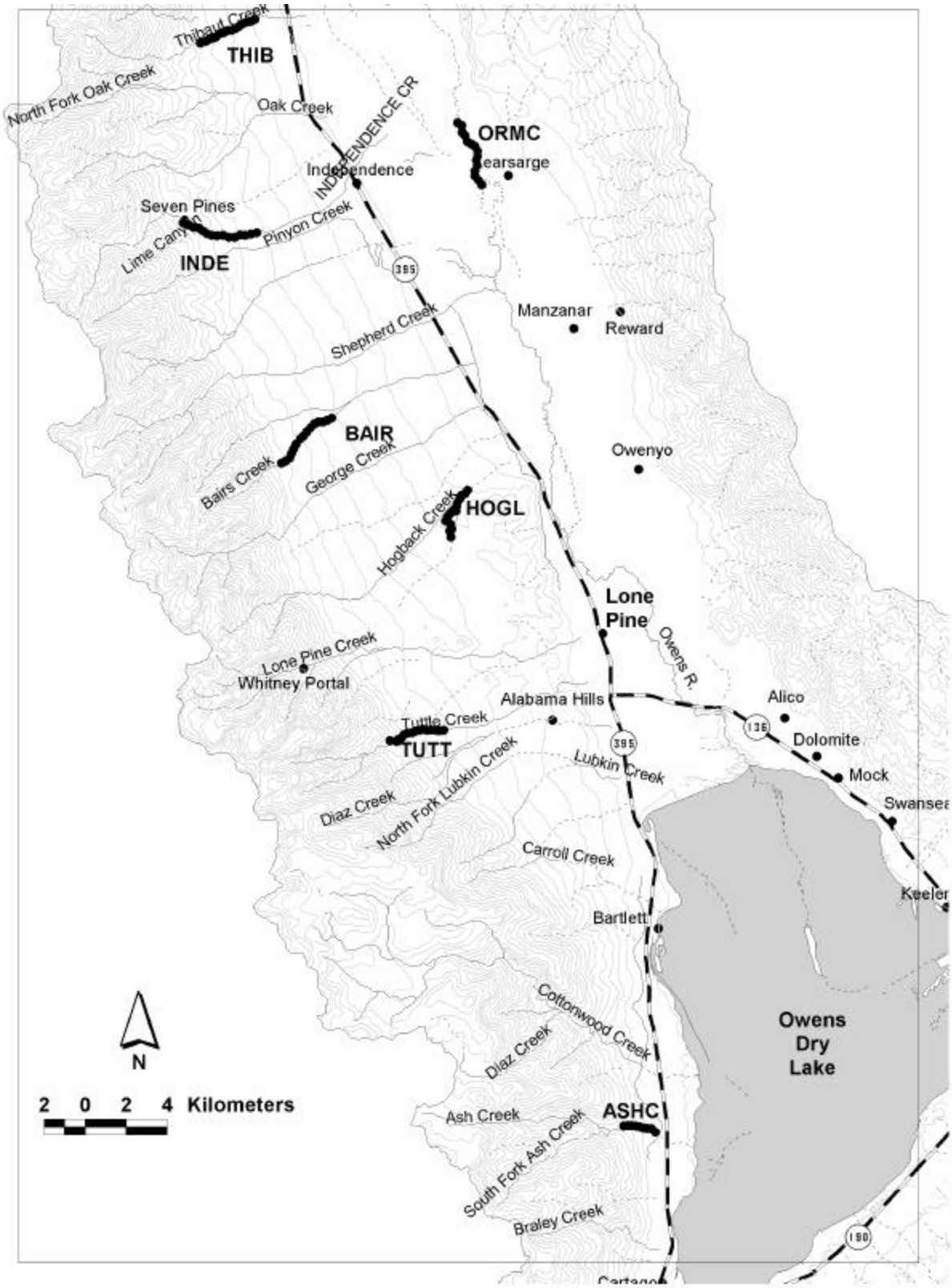
Appendix 2 – Figure d. Upper Owens River and Hammill Valley watersheds, 2001. Four letter transect codes correspond with Appendix 2 – Table a.



Appendix 2 – Figure e. Owens River watershed. Four letter transect codes correspond with Appendix 2 – Table a.



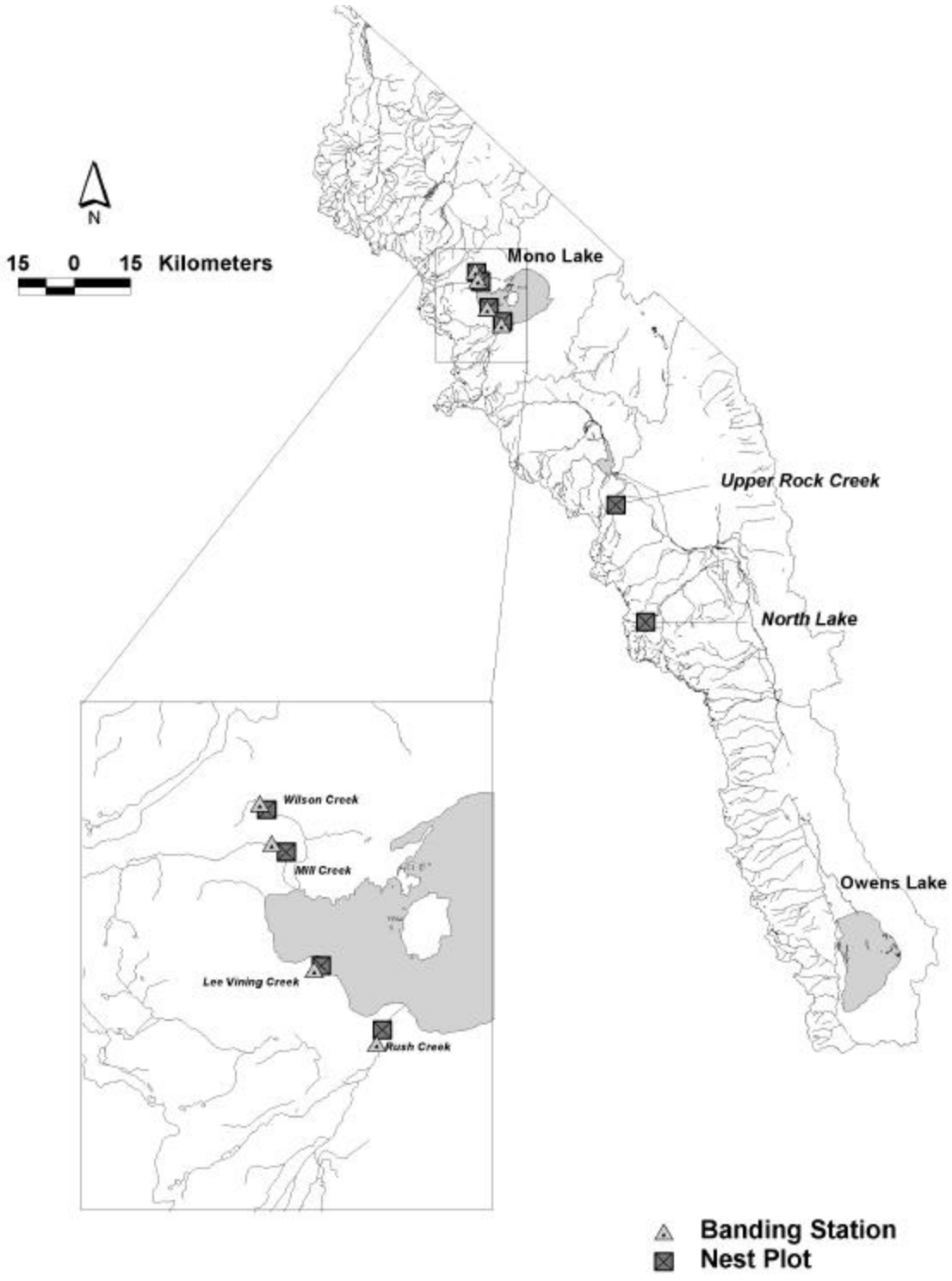
Appendix 2 – Figure f. Owens River watershed, 2001. Four letter transect codes correspond with Appendix 2 – Table a.



Appendix 3 – Table a. Nest plot sites, size of plots in creek kilometers and hectares, census dates and hours, and number of visits at Mono Basin and INF sites 2001.

Site	Creek Kilometers	Size of Plot (ha)	# sub plots	Year	Census Period	Total Hours	Total Visits
Mono Basin							
Rush Creek	2.2	39	2	2001	May 5 – July 28	454	92
Lee Vining Creek	1.9	24	2	2001	May 7 – August 5	434	74
Wilson Creek	2.4	15	2	2001	May 8 – July 17	351	60
Mill Creek	3.0	15	2	2001	May 6 – July 28	309	75
Inyo National Forest							
North Lake	1	13	1	2001	May 10 – August 13	198	38
Rush Creek	1	12	1	2001	May 9 – August 12	198	37

Appendix 4 – Figure a. Nest plots and mist netting stations, 2001.



Appendix 5 – Table a. Constant effort mist netting locations, year, and census dates per period for each year at Mono Basin sites 2001.

	Census periods										
Site	1	2	3	4	5	6	7	8	9	10	11
Lee Vining Creek	May 5	May 17	May 28	June 6	June 15	June 28	July 8	July 13	Aug 2	Aug 8	Aug 12
Rush Creek	May 8	May 16	May 29	June 5	June 16	June 29	July 9	July 15	July 29	Aug 7	Aug 13
Mill Creek	May 7	May 12	May 21	June 1	June 11	June 20	June 30	July 10	July 23	July 31	Aug 9
Wilson Creek	May 6	May 14	May 23	June 2	June 14	June 22	July 1	July 12	July 21	Aug 1	Aug 11

Appendix 5 – Table b. Mist net pole locations, 2001, in decimal degrees, NAD83.

Site	lat	lon	Site	lat	lon	Site	lat	lon
Lee Vining Creek			Wilson Creek			Rush Creek		
LEEV1a	37.972966	-119.111624	WILS1a	38.062719	-119.153397	RUSH1a	37.933753	-119.067818
LEEV1b	37.972902	-119.111726	WILS1b	38.062767	-119.153472	RUSH1b	37.933849	-119.067877
LEEV2a	37.972988	-119.111238	WILS2a	38.062509	-119.153166	RUSH2a	37.933849	-119.067877
LEEV2b	37.973090	-119.111216	WILS2b	38.062568	-119.153316	RUSH2b	37.933946	-119.067909
LEEV3a	37.973117	-119.111103	WILS3a	38.062327	-119.152190	RUSH3a	37.934155	-119.067872
LEEV3b	37.973224	-119.111028	WILS3b	38.062241	-119.152265	RUSH3b	37.934284	-119.067856
LEEV4a	37.973186	-119.110894	WILS4a	38.062171	-119.151980	RUSH4a	37.934482	-119.067974
LEEV4b	37.973213	-119.110771	WILS4b	38.062134	-119.152093	RUSH4b	37.934375	-119.067984
LEEV5a	37.973310	-119.110755	WILS5a	38.061801	-119.151567	RUSH5a	37.934600	-119.067952
LEEV5b	37.973385	-119.110615	WILS5b	38.061731	-119.151471	RUSH5b	37.934482	-119.067974
LEEV6a	37.973449	-119.110503	WILS6a	38.061554	-119.151321	RUSH6a	37.934064	-119.067571
LEEV6b	37.973385	-119.110615	WILS6b	38.061463	-119.151262	RUSH6b	37.934182	-119.067609
LEEV7a	37.973980	-119.110519	WILS7a	38.061506	-119.151009	RUSH7a	37.924553	-119.047964
LEEV7b	37.973927	-119.110444	WILS7b	38.061367	-119.150956	RUSH7b	37.928672	-119.056617
LEEV8a	37.974200	-119.109451	WILS8a	38.060884	-119.150693	RUSH8a	37.934428	-119.067603
LEEV8b	37.974120	-119.109542	WILS8b	38.060970	-119.150629	RUSH8b	37.934530	-119.067662
LEEV9a	37.974147	-119.109231	WILS9a	38.061088	-119.150505	RUSH9a	37.934235	-119.067142
LEEV9b	37.974243	-119.109188	WILS9b	38.061013	-119.150398	RUSH9b	37.934133	-119.067169
LEEV10a	37.974147	-119.108904	WILS10a	38.061082	-119.150344	RUSH10a	37.934042	-119.067088
LEEV10b	37.974222	-119.108834	WILS10b	38.060986	-119.150280	RUSH10b	37.933951	-119.067126
Mill Creek								
MILL1	38.039265	-119.144014	MILL6	38.039598	-119.142571			
MILL2	38.039271	-119.143778	MILL7	38.039743	-119.142518			
MILL3	38.039346	-119.143633	MILL8	38.039791	-119.142341			
MILL4	38.039324	-119.143558	MILL9	38.039485	-119.141209			
MILL5	38.039582	-119.142695	MILL10	38.039179	-119.140511			

Appendix 6 – Table a. Area search sites, number of sub-plots, total plot size, year and census dates, 2001.

Site	# Sub plots	Total plot size (ha)	Visit 1	Visit 2	Visit 3
Lee Vining Creek - Delta	1	2	~	June 2	June 12
Thompson Ranch	3	6	June 2	July 2	July 19

Appendix 7. List of variables and definitions, point count vegetation assessments, 2001.

Hab1: The dominant (i.e., most abundant) habitat type and Sawyer/Keeler-Wolf series
Hab2: Secondary habitat type and Sawyer/Keeler-Wolf series.
Hab1%: Percent of the plot that is Habitat1.
Hab2%: Percent of the plot that is Habitat2. Habitat percentages added together should not exceed 100%.
Snagsg10: record the number of snags with dbh >10 cm on the plot.
Logs: record the number of logs (diameter > 10cm) on the plot.
Width of riparian: estimate the width of the riparian zone, including river or streams (if > 100m, record " 110"). If river is >50m wide, do not include river or vegetation on opposite bank. This estimate is from one edge of the riparian to the other, even if the vegetation is patchy inbetween (see %riparian).
Percent Riparian: The percent of the riparian width that is taken up by riparian vegetation. If the riparian is wide, but very patchy (ie willows interspersed with pasture) the % riparian may be low.
Aspen Patch width: Estimate the width of the aspen patch of which the 50m radius circle is sampling (in meters).
Aspen Patch perp. width: Estimate the width of the aspen patch, perpendicular to the first Aspen patch width estimate (m)
Total cover: Estimate the cover that each of the following vegetative layers provides over the 50 meter plot area. The layers are strictly defined by height categories, and should be thought of as:

1 or "tree" layer - the layer dominated by trees. This layer may contain vegetation that is not strictly a tree, such as vines hanging from trees, so long as its within the height range (5 meters to highest tree height). If there are two sublayers, add "T2" to layers box and record % cover, low and high species information.

2 or "shrub" layer - the layer dominated by shrubs. This layer may contain non-woody plants within the height range (.5 meters to less than 5 meters). If there are two sublayers, add "S2" to layers box and record % cover, low and high species information.

3 or "herb" layer - the layer dominated by herbs (0 to less than .5 meters). This layer may contain small shrubs and other woody plants less than .5 meters high.

4 or "totalwoody" layer - absolute cover of all woody vegetation combined across height categories.

5 standing water – the absolute cover of standing water (includes ponds, shallow floodwater etc.)

6 running water - the absolute cover of running water (creeks, aqueducts, rivers)

7 litter – the absolute cover provided by litter (leaf, fallen branches, pine needles. Anything that is not a log (as defined above) is litter.

8 road – the absolute cover of road (including paved, dirt, gravel, human trails or campground, parking lots etc.)

9 rock – the absolute cover provided by rocks (large boulders, cliffs, river rocks, lava flows).

10 bare ground – bare ground that is not road or rock (sandbar, gravel bar, decomposed granite, soil)

The tree and the shrub layers can each be divided into 2 sublayers, if appropriate. If two distinct layers within a layer (by height) can be identified, estimate the cover of each separately. If both are 20% or more, they qualify as separate sublayers. Otherwise, lump them. The herb layer should never have more than one sublayer. The second tree layer should be labeled "T2" and the second shrub layer should be labeled "S2". T1 and S1 should always be the taller than T2 and S2, respectively. Total cover for each vegetation sublayer could theoretically reach 100%.
High: Estimate to the nearest 0.1 meter the average height of the upper bounds of the vegetation sublayers (tree, shrub, herb). This is not usually the height of the tallest plant: if a single tree, which takes up a very small area, is much higher than the average high layer, this is NOT the height that is recorded. Another way to think of this is the height above which only 10% of individuals of the dominant species in a layer reach.
Low: Estimate to the nearest 0.1 meter the average height of the lower bounds of the tree and shrub sublayers. This should be the average low living branches for each sublayer, not the height of low trees and low shrubs, so a LoHeight for atree sublayer can be less than 5 meters!
Lower and Upper Species: Record the 6-letter code of the dominant plant species that make up the upper and lower bounds for the tree and shrub sublayers.
D.b.h.: Estimate the minimum and maximum diameter at breast height to the nearest 0.1 centimeters, for the tree layer and, if applicable (if shrubs reach or exceed dbh level) the shrub layer.
Minimum and maximum species: Record the species of tree or shrub used for min and max dbh, giving the 6-letter code.
Species: Record in the appropriate place the 6-letter code for most species that occur in each sublayer. A species that occurs in multiple sublayers should be recorded separately for each.
Cover: Record the relative cover of that sublayer made up by that species. The sum of all the species' covers within a sublayer should equal approximately 100%.

Defenitioins:
cover - the percent of ground obscured from above. For layer descriptions, this is the absolute cover (pretending that the other layers do not exist). For species lists cover is relative to the other species in the layer.
layer - a height category for describing habitat. A tree or shrub layer can be comprised of 2 "sublayers.""
sublayer - a layer that falls within a larger layer.

Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Owens River and Hammil Valley watershed sites

Common name	Latin name	ASHC	BAIR	BIRL	BIRU	BISH	BUTT	CONV	HOGL	INDE	MARB	MCGE	NOLA	ORMC	ORTI	ROCU	TABO	THIB	TUTT
Pied-billed Grebe	Podilymbus podiceps	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
California Gull	Larus californicus	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	0	~	~
Ring-billed Gull	Larus delawarensis	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Caspian Tern	Sterna caspia	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Double-crested Cormorant	Phalacrocorax auritus	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Common Merganser	Mergus merganser	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Mallard	Anas platyrhynchos	~	~	0	0	~	~	~	~	0	~	0	2	~	1	~	~	~	~
Gadwall	Anas strepera	~	~	0	~	~	~	~	~	~	~	~	~	~	1	~	~	~	~
American Green-winged Teal	Anas crecca	~	~	~	~	~	~	~	~	~	~	~	1	~	~	~	~	~	~
Cinnamon Teal	Anas cyanoptera	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Northern Pintail	Anas acuta	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~
Wood Duck	Aix sponsa	~	~	~	~	~	~	~	~	~	~	~	~	~	1	~	~	~	~
White-faced Ibis	Plegadis chihi	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Great Blue Heron	Ardea herodias	~	~	~	~	0	~	~	~	~	~	~	~	~	0	~	0	~	~
Great Egret	Ardea alba	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Black-crowned Night Heron	Nycticorax nycticorax	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Sora	Porzana carolina	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~
Common Snipe	Gallinago gallinago	~	~	~	~	~	~	~	~	~	~	2	~	~	0	~	~	~	~
Greater Yellowlegs	Tringa melanoleuca	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Spotted Sandpiper	Actitis macularia	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	0	~	~
Willet	Catoptrophorus semipalmatus	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~
Killdeer	Charadrius vociferus	~	~	~	~	~	~	~	~	~	~	1	~	~	3	~	~	~	~
Rock Dove	Columba livia	~	~	~	~	~	~	~	~	0	~	~	0	~	~	~	0	~	~
Mourning Dove	Zenaida macroura	3	1	1	1	3	3	0	3	0	3	0	~	1	0	~	1	2	1
California Quail	Callipepla californica	2	1	2	2	2	1	0	3	1	1	0	~	2	2	2	1	1	1
Mountain Quail	Oreortyx pictus	~	1	~	~	~	2	~	0	~	~	~	~	~	~	2	2	2	2
Blue Grouse	Dendragapus obscurus	~	~	~	~	~	1	~	~	~	~	2	3	~	~	1	~	~	~
Chukar	Alectoris chukar	~	0	2	3	~	~	~	0	~	~	~	~	~	~	~	0	~	0
Turkey Vulture	Cathartes aura	~	0	0	0	0	0	0	~	0	~	0	0	0	0	~	0	0	0
Northern Harrier	Circus cyaneus	~	~	0	1	~	3	~	0	0	~	~	~	0	0	~	0	0	0
Sharp-shinned Hawk	Accipiter striatus	~	~	0	0	~	~	~	~	0	~	~	~	~	~	~	~	~	~

Confirmed Breeding - 1 Probable Breeding - 3 Possible Breeding - 2 No Evidence of Breeding - 0 Not Detected - ~ (see methods for further explanation of codes)

Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Owens River and Hammil Valley watershed sites

Common name	Latin name	ASHC	BAIR	BIRL	BIRU	BISH	BUTT	CONV	HOGL	INDE	MARB	MCGE	NOLA	ORMC	ORTI	ROCU	TABO	THIB	TUTT
Cooper's Hawk	Accipiter cooperii	~	~	~	~	~	~	~	0	0	~	~	2	~	~	~	~	~	0
Northern Goshawk	Accipiter gentilis	~	~	~	~	~	~	~	~	~	~	~	2	~	~	~	~	~	~
Red-tailed Hawk	Buteo jamaicensis	0	0	0	1	~	0	0	0	0	~	1	~	0	0	~	0	~	~
Swainson's Hawk	Buteo swainsoni	~	~	0	~	~	~	~	~	~	~	~	~	0	1	~	~	~	~
Golden Eagle	Aquila chrysaetos	0	~	0	0	~	0	~	0	0	0	0	~	~	~	0	0	0	0
Prairie Falcon	Falco mexicanus	~	~	~	~	0	~	~	~	0	~	~	~	~	~	~	0	~	~
American Kestrel	Falco sparverius	~	0	0	~	2	2	2	1	0	0	1	~	1	1	~	0	~	2
Osprey	Pandion haliaetus	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Barn Owl	Tyto alba	~	~	~	~	~	~	~	~	~	~	~	~	~	3	~	~	~	~
Long-eared Owl	Asio otus	~	~	~	~	~	3	~	~	~	~	~	~	~	~	~	0	~	0
Great Horned Owl	Bubo virginianus	~	~	2	0	~	~	~	0	~	~	~	~	~	1	~	~	~	~
Greater Roadrunner	Geococcyx californianus	2	0	0	2	~	~	~	~	~	2	~	~	0	~	~	3	2	0
Yellow-billed Cuckoo	Coccyzus americanus	~	~	0	~	~	~	~	0	0	~	~	~	~	~	~	~	~	~
Belted Kingfisher	Ceryle alcyon	0	~	0	0	0	0	2	~	0	~	~	~	~	2	2	0	~	~
Hairy Woodpecker	Picoides villosus	~	1	0	0	2	~	0	~	1	~	1	1	~	~	1	0	~	2
Downy Woodpecker	Picoides pubescens	~	0	~	~	0	~	~	~	0	~	1	~	0	0	~	0	~	0
Nuttal's Woodpecker	Picoides nuttallii	~	0	~	~	0	~	~	3	0	~	~	~	3	2	~	0	~	0
Red-naped Sapsucker	Sphyrapicus nuchalis	~	~	~	~	~	~	~	~	~	~	~	2	~	~	~	~	~	~
Red-breasted Sapsucker	Sphyrapicus ruber	~	~	~	0	3	3	3	~	0	~	2	1	2	~	1	0	~	~
Williamson's Sapsucker	Sphyrapicus thyroideus	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~
Acorn Woodpecker	Melanerpes formicivorus	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Lewis' Woodpecker	Melanerpes lewis	~	~	~	0	~	~	1	~	~	~	1	~	~	~	~	~	~	~
Red-shafted Flicker	Colaptes auratus	~	1	0	1	2	1	1	1	1	2	1	1	1	0	1	0	~	2
Common Poorwill	Phalaenoptilus nuttallii	~	~	0	0	~	0	~	~	~	~	~	~	~	~	~	~	~	~
Common Nighthawk	Chordeiles minor	~	0	0	0	~	0	0	0	0	0	0	~	~	0	~	0	~	~
Lesser Nighthawk	Chordeiles acutipennis	~	~	0	~	~	~	~	0	0	~	~	~	0	~	~	0	~	~
Black Swift	Cypseloides niger	~	0	0	~	~	~	~	~	0	~	~	~	~	~	~	0	0	~
Vaux's Swift	Chaetura vauxi	~	0	0	0	~	~	~	~	0	~	~	~	~	~	~	0	~	0
White-throated Swift	Aeronautes saxatalis	0	0	0	0	~	~	0	0	0	0	~	~	~	~	0	0	0	0
Black-chinned Hummingbird	Archilochus alexandri	2	1	1	1	~	1	2	1	1	~	2	~	~	~	~	1	2	2
Costa's Hummingbird	Calypte costae	1	1	1	1	~	~	~	0	3	3	1	~	~	~	~	1	3	3

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Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Owens River and Hammil Valley watershed sites

Common name	Latin name	ASHC	BAIR	BIRL	BIRU	BISH	BUTT	CONV	HOGL	INDE	MARB	MCGE	NOLA	ORMC	ORTI	ROCU	TABO	THIB	TUTT
Anna's Hummingbird	Calypte anna	2	2	0	~	0	~	~	~	2	0	~	~	~	~	2	0	~	2
Broad-tailed Hummingbird	Selasphorus platycercus	~	0	~	0	~	~	~	~	0	~	~	~	~	~	0	0	~	2
Rufous Hummingbird	Selasphorus rufus	~	0	0	0	~	~	~	~	0	~	~	0	~	~	0	0	~	0
Calliope Hummingbird	Stellula calliope	~	1	1	1	3	3	1	~	1	~	1	1	~	~	1	1	~	0
Western Kingbird	Tyrannus verticalis	0	0	0	1	0	0	~	0	0	~	~	~	0	3	0	0	0	0
Ash-throated Flycatcher	Myiarchus cinerascens	0	~	0	0	0	~	~	3	0	~	~	~	1	0	~	0	2	~
Say's Phoebe	Sayornis saya	~	~	0	~	~	~	~	0	~	~	~	~	0	0	~	~	~	~
Black Phoebe	Sayornis nigricans	0	0	2	0	~	~	~	~	0	~	0	~	1	1	~	0	~	0
Olive-sided Flycatcher	Contopus cooperi	0	0	0	0	0	0	2	0	0	~	0	2	~	~	1	0	0	0
Western Wood-pewee	Contopus sordidulus	0	0	0	2	1	3	1	2	1	0	3	1	0	0	1	0	2	0
Western Flycatcher	E. occidentalis or difficilis	0	0	0	0	0	0	~	0	0	~	3	~	~	~	~	0	~	0
Willow Flycatcher	Empidonax traillii	0	0	0	0	~	0	0	0	0	~	0	~	~	~	~	0	~	0
Hammond's Flycatcher	Empidonax hammondii	~	0	0	0	~	~	0	0	0	~	0	~	~	~	~	0	0	0
Dusky Flycatcher	Empidonax oberholseri	0	0	0	0	~	3	2	0	0	~	2	1	0	~	1	0	0	0
Gray Flycatcher	Empidonax wrightii	~	0	~	0	~	0	~	~	0	~	~	~	~	~	~	0	~	0
Horned Lark	Eremophila alpestris	~	0	0	0	~	~	~	~	~	0	~	~	~	~	~	0	0	~
American Magpie	Pica hudsonia	~	~	0	0	~	2	2	2	~	2	2	~	1	2	~	0	~	~
Steller's Jay	Cyanocitta stelleri	3	1	0	0	3	0	3	~	1	~	0	3	~	~	1	1	2	1
Western Scrub-Jay	Aphelocoma californica	0	1	0	0	~	~	~	0	1	2	~	~	0	~	~	1	2	1
Common Raven	Corvus corax	0	1	0	1	1	2	0	0	1	0	1	3	0	1	2	0	1	0
American Crow	Corvus brachyrhynchos	~	~	0	0	0	~	~	~	0	~	~	~	~	~	~	0	~	0
Clark's Nutcracker	Nucifraga columbiana	~	0	0	0	2	~	1	~	0	0	~	~	~	~	2	0	~	0
Pinyon Jay	Gymnorhinus cyanocephalus	~	~	0	0	2	~	~	~	~	2	~	~	~	~	~	~	~	0
European Starling	Sturnus vulgaris	0	~	0	1	~	0	1	0	0	~	1	~	1	~	~	~	~	~
Brown-headed Cowbird	Molothrus ater	3	1	1	1	3	1	1	3	1	3	3	1	3	3	1	1	3	2
Yellow-headed Blackbird	Xanthocephalus xanthocephalus	~	~	~	~	~	~	~	~	~	~	0	~	0	2	~	0	~	~
Red-winged Blackbird	Agelaius phoeniceus	~	~	0	0	~	0	0	~	0	~	1	1	1	1	~	~	~	~
Western Meadowlark	Sturnella neglecta	~	~	0	0	~	1	~	~	0	2	~	~	2	3	~	0	~	~
Scott's Oriole	Icterus parisorum	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Hooded Oriole	Icterus cucullatus	~	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Bullock's Oriole	Icterus bullockii	0	0	0	1	1	2	1	3	1	2	3	~	~	~	2	0	2	0

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Common name	Latin name	ASHC	BAIR	BIRL	BIRU	BISH	BUTT	CONV	HOGL	INDE	MARB	MCGE	NOLA	ORMC	ORTI	ROCU	TABO	THIB	TUTT
Brewer's Blackbird	Euphagus cyanocephalus	~	0	~	~	~	1	1	2	0	1	1	1	2	2	1	0	~	0
Great-tailed Grackle	Quiscalus mexicanus	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~
Evening Grosbeak	Coccothraustes vespertinus	~	~	~	0	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Cassin's Finch	Carpodacus cassinii	~	0	~	~	1	2	1	0	0	0	2	1	0	~	1	~	0	~
House Finch	Carpodacus mexicanus	0	~	0	0	0	3	~	0	~	1	~	~	0	~	~	0	~	~
Red Crossbill	Loxia curvirostra	~	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Gray-crowned Rosy-Finch	Leucosticte tephrocotis	~	~	0	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~
American Goldfinch	Carduelis tristis	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~
Lesser Goldfinch	Carduelis psaltria	2	2	1	1	2	3	0	3	2	2	2	2	0	~	2	1	2	2
Lawrence's Goldfinch	Carduelis lawrenei	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	0	~	~
Pine Siskin	Carduelis pinus	~	~	~	~	~	0	~	~	~	~	0	2	~	~	~	~	~	~
Vesper Sparrow	Pooecetes gramineus	~	~	~	~	~	2	0	~	~	~	~	~	~	~	~	~	~	~
Savannah Sparrow	Passerculus sandwichensis	~	~	~	~	~	1	~	~	~	~	~	~	~	3	~	~	~	~
Lark Sparrow	Chondestes grammacus	1	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
White-crowned Sparrow	Zonotrichia leucophrys	~	0	0	0	~	1	~	~	0	~	~	~	~	~	~	0	0	~
Mtn. White-crowned Sparrow	Zonotrichia leucophrys oriantha	~	~	~	~	~	1	~	~	~	~	~	1	~	~	~	~	~	~
Golden-crowned Sparrow	Zonotrichia atricapilla	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	0	~	~
White-throated Sparrow	Zonotrichia albicollis	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Chipping Sparrow	Spizella passerina	~	1	0	2	0	2	~	1	0	~	~	~	~	~	~	0	~	0
Brewer's Sparrow	Spizella breweri	2	1	0	3	2	1	3	0	0	2	1	1	~	~	~	3	3	2
Black-chinned Sparrow	Spizella atrogularis	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~	~	~	0
Black-throated Sparrow	Amphispiza bilineata	1	2	1	1	~	~	~	2	1	1	~	~	~	~	~	1	1	3
Sage Sparrow	Amphispiza belli	3	1	1	3	~	0	0	2	3	1	2	2	2	~	~	1	1	3
Oregon Junco	Junco hyemalis thurberi	~	0	~	~	~	2	0	~	0	~	~	1	~	~	1	~	~	0
Song Sparrow	Melospiza melodia	~	~	1	1	2	1	1	1	1	1	1	1	1	1	1	0	2	2
Lincoln's Sparrow	Melospiza lincolnii	~	~	~	~	~	0	~	~	0	~	~	~	~	~	1	0	~	~
Fox Sparrow	Passerella iliaca	~	~	~	~	2	1	3	~	0	~	3	1	~	~	1	0	~	0
Spotted Towhee	Pipilo maculatus	1	1	1	1	1	3	1	1	1	1	3	~	1	3	1	1	1	1
Green-tailed Towhee	Pipilo chlorurus	~	2	2	3	1	3	3	~	3	~	1	~	~	~	1	0	~	2
Rose-breasted Grosbeak	Pheucticus ludovicianus	~	~	0	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Black-headed Grosbeak	Pheucticus melanocephalus	0	3	1	1	2	1	3	2	1	3	2	2	0	2	2	1	2	1

Confirmed Breeding - 1 Probable Breeding - 3 Possible Breeding - 2 No Evidence of Breeding - 0 Not Detected - ~ (see methods for further explanation of codes)

Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Owens River and Hammil Valley watershed sites

Common name	Latin name	ASHC	BAIR	BIRL	BIRU	BISH	BUTT	CONV	HOGL	INDE	MARB	MCGE	NOLA	ORMC	ORTI	ROCU	TABO	THIB	TUTT
Blue Grosbeak	Guiraca caerulea	~	~	1	0	~	0	~	2	0	3	~	~	1	2	~	1	3	~
Indigo Bunting	Passerina cyanea	0	~	1	0	2	~	~	~	2	~	~	~	~	~	~	0	~	0
Indigo x Lazuli Bunting Hybrid	Passerina cyane/amoena	~	~	0	0	2	~	~	~	~	~	~	~	~	~	~	~	~	~
Lazuli Bunting	Passerina amoena	3	1	1	1	2	1	3	0	1	3	1	2	3	3	~	1	2	2
Dickcissel	Spiza americana	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~
Western Tanager	Piranga ludoviciana	0	1	0	0	3	2	2	2	1	0	0	2	0	~	2	0	0	2
Summer Tanager	Piranga rubra	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~	0	~	~
Cliff Swallow	Petrochelidon pyrrhonota	1	0	0	0	~	~	0	0	0	~	0	~	0	0	~	0	~	~
Barn Swallow	Hirundo rustica	0	0	0	0	0	~	~	0	0	~	~	~	~	~	~	0	~	~
Tree Swallow	Tachycineta bicolor	~	~	~	~	0	~	1	~	~	~	0	~	~	~	~	0	~	~
Violet-green Swallow	Tachycineta thalassina	0	0	0	0	0	0	1	0	3	0	1	1	0	0	1	0	~	0
Northern Rough-winged Swallow	Stelgidopteryx serripennis	~	~	~	~	~	~	0	~	~	~	~	~	~	1	~	0	~	~
Cedar Waxwing	Bombycilla cedrorum	0	0	0	~	~	~	0	0	0	~	~	~	~	~	~	0	~	0
Phainopepla	Phainopepla nitens	0	~	0	0	~	~	~	1	~	~	~	~	~	~	~	0	~	~
Loggerhead Shrike	Lanius ludovicianus	~	0	0	1	~	~	~	0	0	2	~	~	1	~	~	3	0	2
Warbling Vireo	Vireo gilvus	0	0	0	1	3	3	1	2	1	3	3	1	2	0	1	0	0	3
Cassin's Vireo	Vireo cassinii	~	~	~	~	~	~	~	~	0	~	~	~	~	~	2	~	~	~
Solitary Vireo	Vireo cassinii or plumbeus	~	0	0	0	0	0	2	0	0	~	2	~	~	~	~	0	~	0
Black-and-White Warbler	Mniotilta varia	~	~	~	~	~	~	~	~	0	~	0	~	~	~	~	0	0	0
Nashville Warbler	Vermivora ruficapilla	~	~	0	0	~	~	~	~	0	~	~	~	~	~	~	~	~	0
Orange-crowned Warbler	Vermivora celata	~	1	1	3	2	3	0	2	1	~	3	2	~	~	1	0	2	1
Tennessee Warbler	Vermivora peregrina	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Yellow Warbler	Dendroica petechia	0	0	1	1	3	1	1	3	0	2	1	1	2	3	1	0	0	0
Yellow -rumped Warbler	Dendroica coronata	~	0	0	0	3	0	2	~	0	~	0	~	~	~	~	0	~	0
Audubon's Warbler	Dendroica coronata auduboni	~	~	~	~	~	~	~	~	~	~	0	1	~	~	1	~	~	~
Chestnut-sided Warbler	Dendroica penylvanica	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Black-throated Gray Warbler	Dendroica nigrescens	~	0	0	0	~	~	~	~	0	~	~	~	~	~	~	0	0	0
Townsend's Warbler	Dendroica townsendi	0	0	0	0	0	~	0	~	0	0	0	~	~	~	~	0	~	0
Hermit Warbler	Dendroica occidentalis	~	0	0	0	~	~	~	~	0	~	~	~	~	~	~	~	~	0
Kentucky Warbler	Oporornis formosus	~	~	~	0	0	~	~	~	~	~	~	~	~	~	~	~	~	~
MacGillivray's Warbler	Oporornis tolmei	0	1	2	2	~	2	2	~	3	3	2	~	~	~	2	0	2	2

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Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Owens River and Hammil Valley watershed sites

Common name	Latin name	ASHC	BAIR	BIRL	BIRU	BISH	BUTT	CONV	HOGL	INDE	MARB	MCGE	NOLA	ORMC	ORTI	ROCU	TABO	THIB	TUTT
Common Yellowthroat	Geothlypis trichas	~	0	~	~	~	~	~	~	~	~	~	2	3	3	~	~	~	~
Yellow-breasted Chat	Icteria virens	~	~	0	0	~	~	~	1	0	~	2	~	~	3	~	0	~	~
Wilson's Warbler	Wilsonia pusilla	0	0	0	0	0	0	0	0	0	0	2	0	0	~	0	0	0	0
American Redstart	Setophaga ruticilla	~	~	0	0	~	0	~	~	~	~	0	~	~	~	~	~	~	~
House Sparrow	Passer domesticus	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
American Dipper	Cinclus mexicanus	~	~	3	~	1	~	1	~	1	~	1	2	~	2	3	2	~	~
Sage Thrasher	Oreoscoptes montanus	~	~	~	~	~	0	0	~	~	~	~	~	~	~	~	~	0	~
Northern Mockingbird	Mimus polyglottos	~	~	~	~	~	~	~	~	~	~	~	~	2	0	~	~	~	~
Gray Catbird	Dumetella carolinensis	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~
LeConte's Thrasher	Taxostoma lecontei	~	~	~	~	~	~	~	~	~	~	~	~	2	~	~	~	~	~
Rock Wren	Salpinctes obsoletus	1	~	1	3	1	0	~	~	0	~	0	~	~	~	2	0	~	2
Canyon Wren	Catherpes mexicanus	~	~	0	3	~	~	~	~	~	~	~	~	~	~	~	~	~	3
Bewick's Wren	Thryomanes bewickii	2	1	1	1	2	3	2	3	1	3	2	~	1	1	~	1	3	1
House Wren	Troglodytes aedon	~	2	0	1	1	1	1	1	1	~	1	1	0	3	1	0	~	0
Marsh Wren	Cistothorus palustris	~	~	~	~	~	~	~	~	~	~	~	~	2	1	~	~	~	~
Brown Creeper	Certhia americana	~	~	~	~	~	~	~	~	~	~	1	3	~	~	1	~	~	~
White-breasted Nuthatch	Sitta carolinensis	~	0	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Red-breasted Nuthatch	Sitta canadensis	~	~	0	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Mountain Chickadee	Poecile gambeli	~	0	~	~	3	2	1	~	2	~	2	3	~	~	1	~	~	0
Wrentit	Chamaea fasciata	~	~	~	~	~	~	~	2	~	~	~	~	~	~	~	~	~	~
Bushtit	Psaltriparus minimus	2	1	1	1	1	~	~	1	1	1	~	~	2	2	~	1	1	1
Ruby-crowned Kinglet	Regulus calendula	~	0	0	0	~	~	~	~	0	~	~	~	~	~	~	0	~	0
Blue-gray Gnatcatcher	Polioptila caerulea	~	1	1	1	~	2	0	3	1	2	~	~	0	1	~	1	2	0
Townsend's Solitaire	Myadestes townsendii	~	0	~	0	~	~	~	~	0	~	0	2	~	~	2	~	~	~
Swainson's Thrush	Catharus ustulatus	~	0	0	0	~	0	0	~	0	~	0	~	~	~	~	0	~	0
Hermit Thrush	Catharus guttatus	0	~	0	0	0	0	0	~	0	~	3	1	~	~	2	0	~	0
American Robin	Tudus migratorius	~	1	2	1	1	1	1	1	1	2	1	1	0	0	1	1	~	2
Western Bluebird	Sialia mexicana	~	~	~	~	0	~	~	~	1	~	~	~	~	~	~	0	~	~
Mountain Bluebird	Sialia currucoides	~	~	~	~	0	1	0	~	~	~	1	1	~	~	~	~	~	~

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Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Mono Basin and West Walker River watershed and Bodie Hills sites

Common name	Latin name	ATAS	CLAR	DECH	DOGC	GREE	JORD	LEEL	LEEM	LEEU	MILL	MILU	RUSL	RUSU	THOM	VIRL	VIRM	WILL	WILU
Eared Grebe	Podiceps nigricollis	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
California Gull	Larus californicus	~	0	0	~	0	~	0	0	0	0	0	0	0	~	0	0	0	0
Caspian Tern	Sterna caspia	~	~	0	~	0	~	~	~	~	0	~	0	0	~	~	~	0	0
Forster's Tern	Sterna forsteri	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	0	0
Double-crested Cormorant	Phalacrocorax auritus	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Common Merganser	Mergus merganser	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Red-breasted Merganser	Mergus serrator	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Mallard	Anas platyrhynchos	~	1	~	~	~	~	1	~	0	1	~	1	3	~	~	~	1	1
Gadwall	Anas strepera	~	~	~	~	~	~	0	~	~	0	~	1	~	~	~	~	0	0
American Wigeon	Anas americana	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
American Green-winged Teal	Anas crecca	~	~	~	~	~	~	1	~	~	0	~	1	0	~	~	~	1	1
Cinnamon Teal	Anas cyanoptera	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	0
Northern Shoveler	Anas clypeata	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Northern Pintail	Anas acuta	~	~	~	~	~	~	0	~	~	~	~	0	~	~	~	~	0	~
Redhead	Athya americana	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Ruddy Duck	Oxyura jamaicensis	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Great Blue Heron	Ardea herodias	~	~	~	~	~	~	0	~	~	0	0	0	~	~	~	~	0	0
Great Egret	Ardea alba	~	~	~	~	~	~	~	~	~	0	~	0	0	~	~	~	~	~
Snowy Egret	Egretta thula	~	~	~	~	~	~	0	~	~	0	~	0	~	~	~	~	0	0
Green Heron	Butorides virescens	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	0
Black-crowned Night Heron	Nycticorax nycticorax	~	~	~	~	~	~	0	~	0	0	0	0	0	~	0	~	0	0
Virginia Rail	Rallus limicola	~	~	~	~	~	~	0	~	~	~	1	~	~	~	~	~	~	~
Sora	Porzana carolina	~	~	~	~	2	~	~	~	~	~	~	~	~	~	~	~	~	~
Wilson's Phalarope	Phalaropus tricolor	~	~	~	~	~	~	~	~	~	~	~	2	~	~	~	~	~	~
American Coot	Fulica americana	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Common Snipe	Gallinago gallinago	~	~	~	~	~	~	0	~	0	2	~	0	~	~	~	2	2	0
American Avocet	Recurvirostra americana	~	~	~	~	~	~	0	~	~	0	~	2	~	~	~	~	~	~
Black-necked Stilt	Himantopus mexicanus	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Spotted Sandpiper	Actitis macularia	~	~	~	~	3	~	1	0	2	3	~	1	2	~	2	~	2	~
Long-billed Curlew	Numenius americanus	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Killdeer	Charadrius vociferus	~	~	~	~	2	~	3	~	~	1	~	1	2	~	~	2	1	0

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Mono Basin and West Walker River watershed and Bodie Hills sites

Common name	Latin name	ATAS	CLAR	DECH	DOGC	GREE	JORD	LEEL	LEEM	LEEU	MILL	MILU	RUSL	RUSU	THOM	VIRL	VIRM	WILL	WILU
Rock Dove	Columba livia	~	~	~	~	~	~	0	~	~	0	~	~	~	~	~	~	~	~
Mourning Dove	Zenaida macroura	2	1	0	3	3	0	0	~	0	2	0	1	0	3	2	2	3	2
California Quail	Callipepla californica	~	~	1	2	~	~	1	~	~	3	~	3	2	~	~	~	1	0
Mountain Quail	Oreortyx pictus	2	1	~	1	~	2	0	~	~	2	2	0	0	~	~	~	1	0
Blue Grouse	Dendragapus obscurus	~	~	3	~	2	1	~	~	~	~	~	~	2	~	~	~	~	~
Greater sage Grouse	Centrocercus urophasianus	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	0	0
Turkey Vulture	Cathartes aura	0	~	~	0	0	~	0	0	~	0	0	0	~	~	~	~	0	0
Northern Harrier	Circus cyaneus	~	~	~	~	~	~	1	~	~	0	~	0	~	~	~	~	0	~
Cooper's Hawk	Accipiter cooperii	~	~	~	~	~	~	0	~	~	0	2	~	~	~	~	~	~	~
Red-tailed Hawk	Buteo jamaicensis	2	~	0	0	2	0	0	2	0	1	1	0	0	1	1	0	0	1
Golden Eagle	Aquila chrysaetos	~	~	~	~	~	~	~	~	~	0	~	0	0	~	~	~	~	~
Bald Eagle	Haliaeetus leucocephalus	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Prairie Falcon	Falco mexicanus	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	0	0
American Kestrel	Falco sparverius	2	~	1	3	0	1	1	1	2	1	3	1	~	1	2	2	0	1
Osprey	Pandion haliaetus	~	~	~	~	~	~	0	~	~	0	~	0	~	~	~	~	0	0
Long-eared Owl	Asio otus	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	0
Northern Saw-whet Owl	Aegolius acadicus	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Great Horned Owl	Bubo virginianus	~	0	~	~	~	~	0	~	~	2	0	~	~	2	~	~	2	0
Greater Roadrunner	Geococcyx californianus	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Yellow-billed Cuckoo	Coccyzus americanus	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Belted Kingfisher	Ceryle alcyon	~	~	0	~	2	~	0	~	2	1	2	1	~	~	~	~	2	1
Hairy Woodpecker	Picoides villosus	2	~	1	~	~	~	2	2	3	1	3	0	2	1	~	~	0	0
Downy Woodpecker	Picoides pubescens	~	~	0	2	1	~	0	0	1	3	1	~	~	2	~	~	0	0
Nuttal's Woodpecker	Picoides nuttallii	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
White-headed Woodpecker	Picoides albolarvatus	~	~	~	~	~	~	~	~	~	~	0	0	~	~	~	~	~	~
Red-naped Sapsucker	Sphyrapicus nuchalis	1	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Red-naped/breasted Sapsucker	Sphyrapicaus nuchalis/ruber	~	~	1	~	1	~	~	~	~	~	~	~	~	2	~	~	~	~
Red-breasted Sapsucker	Sphyrapicus ruber	~	~	1	2	1	1	2	1	1	0	1	0	3	~	1	2	0	2
Acorn Woodpecker	Melanerpes formicivorus	~	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~
Lewis' Woodpecker	Melanerpes lewis	~	~	0	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Red-shafted Flicker	Colaptes auratus	3	2	1	3	1	3	1	3	1	1	3	1	1	3	1	3	3	1

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Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Mono Basin and West Walker River watershed and Bodie Hills sites

Common name	Latin name	ATAS	CLAR	DECH	DOGC	GREE	JORD	LEEL	LEEM	LEEU	MILL	MILU	RUSL	RUSU	THOM	VIRL	VIRM	WILL	WILU
Common Poorwill	Phalaenoptilus nuttallii	~	~	1	~	~	~	~	~	~	~	0	~	~	~	~	~	0	~
Common Nighthawk	Chordeiles minor	~	3	0	0	~	~	0	~	~	0	~	0	~	~	~	~	0	0
Vaux's Swift	Chaetura vauxi	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
White-throated Swift	Aeronautes saxatalis	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Black-chinned Hummingbird	Archilochus alexandri	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	0
Costa's Hummingbird	Calypte costae	~	2	~	~	~	~	0	~	~	0	0	~	~	~	~	0	~	~
Anna's Hummingbird	Calypte anna	~	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~	~	~
Rufous Hummingbird	Selasphorus rufus	0	~	0	0	~	~	0	0	0	0	0	0	~	~	~	~	0	0
Calliope Hummingbird	Stellula calliope	~	~	~	2	1	2	~	~	~	~	3	~	~	~	~	2	~	~
Western Kingbird	Tyrannus verticalis	~	~	~	~	~	~	0	~	~	~	~	0	~	~	~	~	0	0
Ash-throated Flycatcher	Myiarchus cinerascens	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	0	0
Say's Phoebe	Sayornis saya	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Black Phoebe	Sayornis nigricans	~	~	~	~	~	~	0	~	~	0	~	0	~	~	~	~	~	~
Olive-sided Flycatcher	Contopus cooperi	~	~	0	~	2	2	0	2	~	0	2	~	3	~	~	~	~	0
Western Wood-pewee	Contopus sordidulus	3	1	3	1	1	3	3	1	1	1	1	0	1	3	3	3	0	0
Pacific Slope Flycatcher	Empidonax difficilis	~	~	~	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~
Western Flycatcher	E. occidentalis or difficilis	~	~	0	~	3	~	0	~	0	0	0	0	2	~	~	~	~	0
Willow Flycatcher	Empidonax traillii	~	~	0	~	~	~	0	~	~	0	~	1	0	~	~	~	~	0
Hammond's Flycatcher	Empidonax hammondii	~	~	0	~	~	~	0	~	0	0	~	~	0	~	~	~	0	0
Dusky Flycatcher	Empidonax oberholseri	1	2	0	0	0	2	0	~	1	0	2	0	3	~	2	3	0	0
Gray Flycatcher	Empidonax wrightii	~	~	0	~	~	~	0	~	~	0	2	0	2	~	~	~	0	0
Horned Lark	Eremophila alpestris	2	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
American Magpie	Pica hudsonia	~	0	0	1	~	2	1	~	0	1	0	1	~	1	1	1	1	1
Steller's Jay	Cyanocitta stelleri	3	1	3	3	3	3	1	1	1	3	1	0	1	2	2	~	~	2
Western Scrub-Jay	Aphelocoma californica	~	~	~	~	~	~	0	~	~	0	~	2	~	~	~	~	2	0
Common Raven	Corvus corax	~	0	~	~	~	~	0	0	0	0	0	0	0	~	0	~	0	0
Clark's Nutcracker	Nucifraga columbiana	0	0	0	0	2	0	2	0	0	0	2	0	0	0	0	~	0	~
Pinyon Jay	Gymnorhinus cyanocephalus	~	3	~	~	~	~	~	~	~	0	~	0	~	~	~	~	0	~
European Starling	Sturnus vulgaris	~	~	1	3	1	1	1	~	0	1	~	0	1	1	3	1	0	1
Brown-headed Cowbird	Molothrus ater	2	3	3	1	3	3	1	3	3	1	1	1	1	1	3	1	1	1
Yellow-headed Blackbird	Xanthocephalus xanthocephalus	~	~	~	~	0	~	0	~	1	0	~	0	0	~	~	~	0	0

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Appendix 8. Breeding status of all species detected at all sites using all methods and observations, May 1 1998 - August 15 2001.

Mono Basin and West Walker River watershed and Bodie Hills sites

Common name	Latin name	ATAS	CLAR	DECH	DOGC	GREE	JORD	LEEL	LEEM	LEEU	MILL	MILU	RUSL	RUSU	THOM	VIRL	VIRM	WILL	WILU
Red-winged Blackbird	Agelaius phoeniceus	~	~	0	~	3	~	1	~	1	3	3	1	1	~	2	3	1	1
Western Meadowlark	Sturnella neglecta	~	~	1	~	~	~	~	~	~	3	~	0	~	2	~	3	2	1
Bullock's Oriole	Icterus bullockii	~	~	1	1	1	1	1	0	0	1	3	1	1	3	1	2	0	2
Brewer's Blackbird	Euphagus cyanocephalus	3	1	1	3	1	~	1	1	1	1	1	1	1	1	1	1	1	1
Great-tailed Grackle	Quiscalus mexicanus	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Cassin's Finch	Carpodacus cassinii	1	2	0	2	1	1	0	1	2	1	1	0	3	~	3	3	0	0
House Finch	Carpodacus mexicanus	3	0	~	2	~	2	~	~	~	0	0	0	~	~	3	2	0	0
Red Crossbill	Loxia curvirostra	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
American Goldfinch	Carduelis tristis	~	~	~	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~
Lesser Goldfinch	Carduelis psaltria	~	0	0	~	~	2	0	~	~	0	0	0	0	~	~	2	0	0
Pine Siskin	Carduelis pinus	~	~	~	~	~	2	~	~	~	0	0	~	~	~	~	~	~	~
Vesper Sparrow	Pooecetes gramineus	2	~	~	2	~	~	0	~	~	~	~	~	~	~	~	2	3	1
Savannah Sparrow	Passerculus sandwichensis	~	~	~	~	~	~	0	~	0	~	~	1	~	~	~	~	0	1
Lark Sparrow	Chondestes grammacus	~	~	~	~	~	~	0	~	~	0	~	~	~	~	~	~	~	~
White-crowned Sparrow	Zonotrichia leucophrys	~	~	~	~	~	~	0	~	0	0	~	0	0	~	~	~	0	0
Mtn. White-crowned Sparrow	Zonotrichia leucophrys oriantha	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	1	~	~
Golden-crowned Sparrow	Zonotrichia atricapilla	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Chipping Sparrow	Spizella passerina	~	1	0	~	2	~	~	0	0	0	0	~	~	~	~	~	0	0
Brewer's Sparrow	Spizella breweri	1	2	3	2	3	1	1	0	3	1	3	1	3	~	~	2	1	1
Black-throated Sparrow	Amphispiza bilineata	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~
Sage Sparrow	Amphispiza belli	~	~	~	1	~	~	~	~	~	2	~	2	~	~	~	~	2	0
Oregon Junco	Junco hyemalis thurberi	1	0	~	~	1	~	0	1	1	~	1	~	3	~	2	3	~	0
Song Sparrow	Melospiza melodia	1	1	1	3	1	3	1	3	1	1	1	1	1	2	1	1	1	1
Lincoln's Sparrow	Melospiza lincolnii	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	0
Swamp Sparrow	Melospiza georgiana	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Fox Sparrow	Passerella iliaca	1	~	3	0	~	3	0	~	3	2	1	~	3	~	~	2	0	0
Spotted Towhee	Pipilo maculatus	3	3	1	1	3	3	1	0	2	1	2	1	2	2	3	2	1	1
Green-tailed Towhee	Pipilo chlorurus	1	3	1	3	3	1	1	2	3	1	1	1	3	2	3	3	1	1
Rose-breasted Grosbeak	Pheucticus ludovicianus	~	~	~	~	~	~	0	~	~	~	0	~	~	~	~	~	0	~
Black-headed Grosbeak	Pheucticus melanocephalus	3	1	1	2	2	~	0	3	3	0	3	1	3	~	3	2	0	2
Blue Grosbeak	Guiraca caerulea	~	~	~	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~

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Mono Basin and West Walker River watershed and Bodie Hills sites

Common name	Latin name	ATAS	CLAR	DECH	DOGC	GREE	JORD	LEEL	LEEM	LEEU	MILL	MILU	RUSL	RUSU	THOM	VIRL	VIRM	WILL	WILU
Indigo Bunting	Passerina cyanea	2	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Lazuli Bunting	Passerina amoena	2	~	2	3	~	2	1	~	2	1	2	0	2	3	3	~	0	0
Western Tanager	Piranga ludoviciana	~	2	2	~	1	~	2	1	1	0	3	0	3	2	0	~	0	0
Summer Tanager	Piranga rubra	~	~	~	~	~		~	~	~	~	~	0	~	0	~	~	~	~
Cliff Swallow	Petrochelidon pyrrhonota	~	0	~	0	~	~	0	~	~	0	~	0	~	~	2	2	1	0
Barn Swallow	Hirundo rustica	~	~	~	~	~	~	0	~	~	0	~	0	~	~	~	~	0	0
Tree Swallow	Tachycineta bicolor	~	~	0	0	1	~	0	1	1	~	0	~	2	~	1	2	~	~
Violet-green Swallow	Tachycineta thalassina	3	0	1	2	1	2	1	0	1	1	1	1	1	1	2	1	2	0
Northern Rough-winged Swallow	Stelgidopteryx serripennis	~	~	0	~	~	~	1	~	~	0	~	1	2	~	0	~	0	1
Cedar Waxwing	Bombycilla cedrorum	~	~	~	~	~	~	0	~	~	0	0	0	~	~	~	~	~	~
Phainopepla	Phainopepla nitens	~	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	0
Loggerhead Shrike	Lanius ludovicianus	~	0	~	~	~	~	0	~	~	~	~	0	~	~	~	~	2	~
Red-eyed Vireo	Vireo olivaceus	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Warbling Vireo	Vireo gilvus	3	3	1	1	1	3	3	3	3	0	3	0	1	3	3	3	0	0
Yellow-throated Vireo	Vireo flavifrons	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Cassin's Vireo	Vireo cassinii	~	~	0	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~
Solitary Vireo	Vireo cassinii or plumbeus	~	2	~	~	~	~	~	~	0	0	2	0	~	~	~	~	~	~
Black-and-White Warbler	Mniotilta varia	~	~	~	~	~	~	0	~	~	0	~	0	~	~	~	~	~	0
Nashville Warbler	Vermivora ruficapilla	2	~	~	~	~	~	0	~	~	0	~	~	~	~	~	~	~	~
Orange-crowned Warbler	Vermivora celata	2	2	3	2	~	2	0	0	2	0	1	2	2	~	2	2	0	2
Northern Parula	Parula americana	~	~	~	~	~	~	0	~	~	0	~	~	~	~	~	~	~	~
Yellow Warbler	Dendroica petechia	2	~	1	1	1	3	1	3	3	1	1	1	1	1	3	1	1	1
Black-throated Blue Warbler	Dendroica cærulescens	~	0	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~
Yellow-rumped Warbler	Dendroica coronata	~	2	0	~	1	~	0	3	3	0	2	0	3	~	~	~	0	0
Audubon's Warbler	Dendroica coronata auduboni	~	2	0	~	1	~	0	3	3	0	~	0	~	~	~	~	~	~
Myrtle Warbler	Dendroica coronata coronata	~	~	~	~	~	~	0	~	~	0	~	0	~	~	~	~	~	~
Magnolia Warbler	Dendroica magnolia	~	~	~	~	~	~	0	~	~	~	~	0	~	~	~	~	~	~
Chestnut-sided Warbler	Dendroica penylvanica	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Bay-breasted Warbler	Dendroica castanea	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~
Black-throated Gray	Dendroica nigrescens	~	~	~	~	~	~	~	0	~	~	0	~	~	~	~	~	~	~
Townsend's Warbler	Dendroica townsendi	~	~	~	~	0	~	0	~	0	0	~	0	0	~	~	~	0	0

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Mono Basin and West Walker River watershed and Bodie Hills sites

Common name	Latin name	ATAS	CLAR	DECH	DOGC	GREE	JORD	LEEL	LEEM	LEEU	MILL	MILU	RUSL	RUSU	THOM	VIRL	VIRM	WILL	WILU
Hermit Warbler	Dendroica occidentalis	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~	~	~
Ovenbird	Seiurus aurocapillus	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~
Kentucky Warbler	Oporornis formosus	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Mac Gillivray's Warbler	Oporornis tolmei	3	2	3	2	~	3	1	2	2	0	3	1	2	2	2	~	0	2
Common Yellowthroat	Geothlypis trichas	~	~	~	~	~	~	0	~	0	0	~	0	0	~	~	~	2	1
Yellow-breasted Chat	Icteria virens	~	~	~	~	~	~	0	~	~	0	0	0	~	~	~	~	~	~
Hooded Warbler	Wilsonia canadensis	~	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~
Wilson's Warbler	Wilsonia pusilla	~	0	0	~	0	~	0	0	0	0	2	0	2	~	~	~	0	0
American Redstart	Setophaga ruticilla	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	0
House Sparrow	Passer domesticus	~	~	~	~	~	~	~	~	~	2	~	~	~	~	~	~	~	~
American Dipper	Cinclus mexicanus	~	~	~	~	~	~	0	3	3	1	3	1	3	~	~	~	~	~
Sage Thrasher	Oreoscoptes montanus	2	0	~	2	~	~	0	~	~	2	~	1	~	~	~	~	1	~
Gray Catbird	Dumetella carolinensis	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~	~
Rock Wren	Salpinctes obsoletus	2	3	1	3	~	1	~	~	~	~	0	~	2	~	3	2	~	2
Canyon Wren	Catherpes mexicanus	~	2	~	~	~	~	~	~	~	~	~	~	2	~	~	~	~	~
Bewick's Wren	Thryomanes bewickii	~	3	2	~	~	~	3	3	0	1	0	1	2	3	~	~	3	3
House Wren	Troglodytes aedon	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	2	3
Marsh Wren	Cistothorus palustris	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	0
Brown Creeper	Certhia americana	~	~	~	~	3	~	~	3	3	0	1	~	3	~	~	2	~	~
White-breasted Nuthatch	Sitta carolinensis	~	~	~	~	~	~	0	2	2	0	1	~	~	~	~	~	~	~
Pygmy Nuthatch	Sitta pygmaea	~	~	~	~	~	~	~	~	1	~	0	~	~	~	~	~	~	~
Juniper Titmouse	Baeolophus ridgwayi	~	~	~	~	~	~	~	~	~	1	~	0	~	~	~	~	~	~
Mountain Chickadee	Poecile gambeli	3	1	1	~	1	2	1	1	1	2	1	~	1	0	2	2	0	0
Bushtit	Psaltriparus minimus	~	1	1	~	~	~	0	~	~	1	~	1	0	~	~	~	1	0
Golden-crowned Kinglet	Regulus satrapa	~	~	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~	~
Ruby-crowned Kinglet	Regulus calendula	~	~	~	~	~	~	~	~	~	0	~	0	~	~	~	~	~	~
Blue-gray Gnatcatcher	Polioptila caerulea	~	2	~	~	~	~	0	~	~	1	~	1	~	~	~	~	0	2
Townsend's Solitaire	Myadestes townsendii	~	~	~	~	0	~	0	0	1	~	0	~	2	~	~	~	~	~
Swainson's Thrush	Catharus ustulatus	~	~	0	~	~	~	0	~	2	0	~	0	2	~	~	~	0	0
Hermit Thrush	Catharus guttatus	3	~	0	~	0	~	0	~	2	0	2	0	3	~	~	2	~	~
American Robin	Tudus migratorius	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1	1	1
Varied Thrush	Ixoreus naevius	~	~	~	~	~	~	~	~	~	0	~	~	~	~	~	~	~	~
Mountain Bluebird	Sialia currucoides	1	3	1	3	1	2	0	~	1	~	~	0	2	3	1	2	~	~

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Appendix 9. Jepson Climate Zone groupings for all point count transects, 1998-2001.

Appendix 9 – Table a. Jepson Climate Zone groupings for eastern sierra transects, past and present (based on Hickman 1993).

Jepson Climate Zone 11	Jepson Climate Zone 2/3
2001 sites	2001 sites
Ash Creek	Buttermilk Country
Hogback Creek - lower	Bishop Creek
Tuttle Creek	North Lake
Bairs Creek	Rock Creek - upper
Independence Creek	McGee Creek
Taboose Creek	Convict Creek
Thibaut Creek	Rush Creek - lower, upper
Birch Creek - lower, upper	Lee Vining Creek - lower, middle, upper
Owens River - Tinemaha Resevoir	Mill Creek - lower, upper
Owens River - North of Mazourka Cyn.	Wilson Creek - lower, upper
Marble Creek	Dechambeau Creek
	Jordan Springs
1998-2000 sites	Atastra Creek
Walker Creek	Virginia Creek - lower, middle, upper
Lone Pine Creek	Green Creek – lower and upper
Lubken Creek	Dog Creek
Hogback Creek - upper	Clark Canyon
Shepherd Creek	Robinson Creek
Sawmill Creek	Buckeye Creek
Horton Creek	By-Day Creek
Rock Creek - lower	Little Walker
	Upper West Walker River
	Wolf Creek
	Silver Creek
	Mill Creek (near walker)
	1998-2000 sites
	Indian Springs