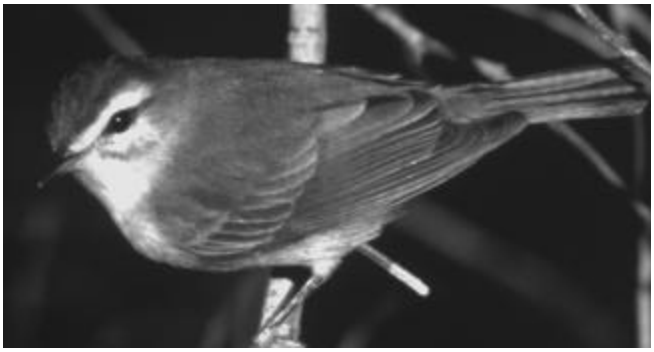
RIPARIAN BIRD MONITORING AND HABITAT ASSESSMENT IN THE EAST AND WEST WALKER RIVER WATERSHEDS

BRIDGEPORT RANGER DISTRICT, HUMBOLDT-TOIYABE NATIONAL FOREST

RESULTS FROM THE 2001 FIELD SEASON



SACHA K. HEATH AND GRANT BALLARD

JANUARY 2002

PRBO CONTRIBUTION # 1006
WWW.PRBO.ORG

SUMMARY

In 2001, the Point Reyes Bird Observatory implemented a standardized riparian songbird monitoring program in the East and West Walker watersheds of the Humboldt-Toiyabe National Forest, Bridgeport Ranger District (HTNF). We established 149 individual point count stations in riparian habitat on ten drainages. HTNF sites are comparable with other sites established in the eastern Sierra as a part of the Eastern Sierra Riparian Songbird Conservation Project (ESRSC).

One hundred and three species were detected at all sites combined, and breeding status was determined for each. Breeding status of focal species for the California Partners in Flight (CPIF) Riparian and Coniferous Forest Bird Conservation Plans were submitted for inclusion in the most current distribution maps for those species.

An index of bird diversity, species richness and abundance was determined for all species and separately for breeding species only, at each of the 149 point count stations and at each transect. All transects had relatively high breeding bird diversity, with Robinson, Silver, and By-Day Creek among the highest. Indices of breeding bird diversity at HTNF sites are generally similar to those at Mono Basin and upper Owens River watershed sites, and are generally higher than those at Owens Valley alluvial fan sites.

We determined relative abundance for 74 species at ten transects. Species detected at over 30% of the stations included American Robin, Western Wood-Pewee, Warbling Vireo, Yellow Warbler and Audubon's Warbler. The most abundant species among HTNF sites was the Brewer's Blackbird at Upper West Walker River. Warbling Vireos at Robinson and Green Creek were more abundant than at other eastern Sierra riparian locations. Other species with relatively high abundances included Oregon Juncos at Wolf Creek, Yellow Warblers at Green Creek, Western Wood-Pewees at Buckeye Creek and House Wrens at By-Day Creek.

An index of Brown-headed Cowbird presence was determined by transect for all 10 drainages. We detected the highest numbers of Brown-headed Cowbirds at Robinson and Little Walker Creeks and Upper West Walker River. No cowbirds were detected at By-Day Creek.

We determined Sawyer Keeler-Wolf habitat types for all 149 points and determined mean breeding species abundance, diversity and richness for the three most common types. Breeding species abundance was highest among Mixed Willow habitat types. Breeding species diversity and richness were not significantly different among Mixed Willow, Aspen or Lodgepole Pine habitat types. We assessed the relationship between breeding species diversity and aspen patch size, and found no significant differences among four patch sizes.

We recommend continuing the efforts presented here through at least the summer of 2003, in order to get more complete information about natural variability in bird numbers and timing of the breeding season in this area.

INTRODUCTION AND BACKGROUND

Declines in populations of North American landbirds, specifically Neotropical migrants, have been and continue to be well documented (Finch and Stangel 1993, Askins 2000). Riparian habitat has been identified as critical for the majority of the declining landbird species in western North America (Miller 1951, Gaines 1974, Knopff et al. 1988, Manley and Davidson 1993, Ohmart 1994, RHJV 2000) and the loss and degradation of this habitat has been implicated as the most important cause of landbird population declines (DeSante and George 1994). In accordance with this concern, land management agencies are charged with managing for healthy, functioning riparian ecosystems.

Starting in 1998, the Point Reyes Bird Observatory (PRBO), in collaboration with Inyo National Forest (USFS), United States Forest Service Region 5 Partners in Flight (Region 5), Bureau of Land Management Bishop Field Office (BLM), California Department of Fish and Game (CDFG), Eastern Sierra Audubon Society (ESAS), Mono Lake Committee (MLC), Eastern Sierra Institute for Collaborative Education (ESICE), Los Angeles Department of Water and Power (LADWP) and Mono Lake Tufa State Reserve (MLTSR) began to gather baseline songbird breeding data over a large portion of the eastern Sierra Nevada / western Great Basin region. The effort continued through 2001, with additional partners including Mono County, consulting firms, other researchers, and educators in the region. This project, known as the Eastern Sierra Riparian Songbird Conservation Project (ESRSC) is part of the statewide California Partners in Flight (CPIF) Riparian Habitat Joint Venture (RHJV) effort to address the decline of riparian breeding songbirds and their habitats in California (RHJV 2000).

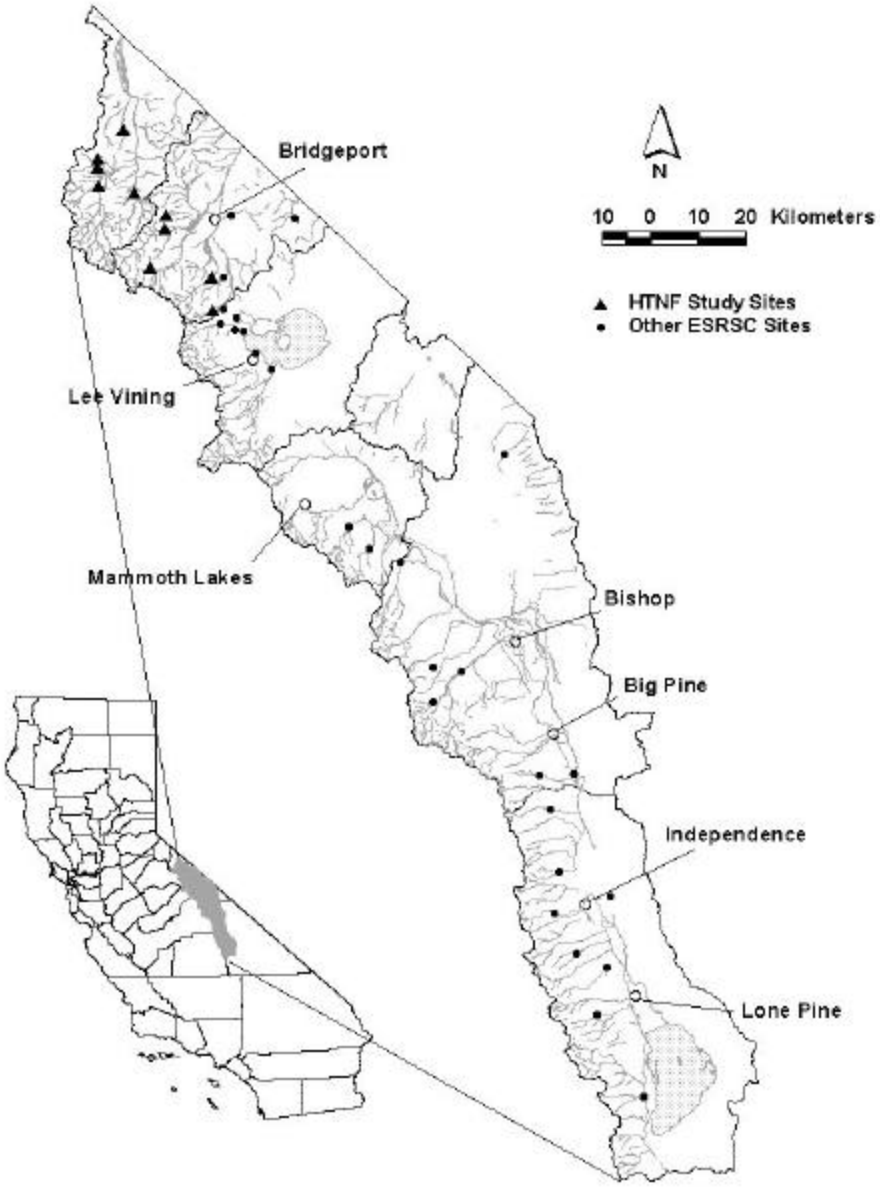
The northern extent of the ESRSC study area in 2001 was on Humboldt-Toiyabe National Forest lands managed by the Bridgeport Ranger District (HTNF). To our knowledge, no prior standardized baseline songbird data existed for riparian habitats in the East and West Walker River drainages of the HTNF. In 2001, PRBO and HTNF implemented 149 standardized songbird monitoring and habitat assessment stations at ten HTNF riparian drainages, establishing HTNF as a partner in the ESRSC project (Figure 1).

The objectives of the HTNF monitoring program are to:

- Develop a systematic monitoring program and Geographic Information System (GIS) of breeding riparian bird species utilizing HTNF lands.
- Assess the relationship of riparian songbird abundance, richness and diversity to regional habitat and landscape characteristics.
- Determine presence/absence of Brown-headed Cowbirds in riparian habitats on HTNF.
- Determine issues specific to riparian habitat and songbird management on HTNF lands and provide recommendations to enhance bird populations and assist riparian management.
- Encourage coordination between HTNF and existing collaborators of the ESRSC project in addition to other potential partners in the HTNF region.
- Train HTNF biologists and local experts in standardized monitoring methods, insuring monitoring beyond the life of the project.
- Contribute to regional and statewide conservation efforts by providing key information to CPIF and Nevada Partners in Flight and the RHJV Riparian Bird Conservation Plan.

- Contribute songbird data and evaluate regional conservation efforts for Forest Plan Amendments, Sierra Nevada Framework and other collaborative efforts within the upper Walker River Basin and Eastern Sierra Nevada.
- Provide information to Bridgeport Ranger District for public outreach and education to promote avian conservation and watchable wildlife on the HTNF and in the eastern Sierra Nevada.

Figure 1. Eastern Sierra Riparian Songbird Conservation project and Humboldt-Toiyabe National Forest study area, 2001.



METHODS

Study area description

The study area is located in riparian habitat in the West and East Walker River Watersheds (Mono County, California), mostly on HTNF lands, with a small portion on CDFG Wildlife Refuge lands. Nine separate tributaries and one section of the upper West Walker River were surveyed, totaling approximately 37.5 stream-km or 375 ha of riparian habitat, ranging in elevation from 2150m to 2900m (Figure 2, Table 1).

Figure 2. Study area, Humboldt-Toiyabe National Forest, Bridgeport Ranger District, 2001. Dots represent individual point count stations in transects of 14 – 15 points.

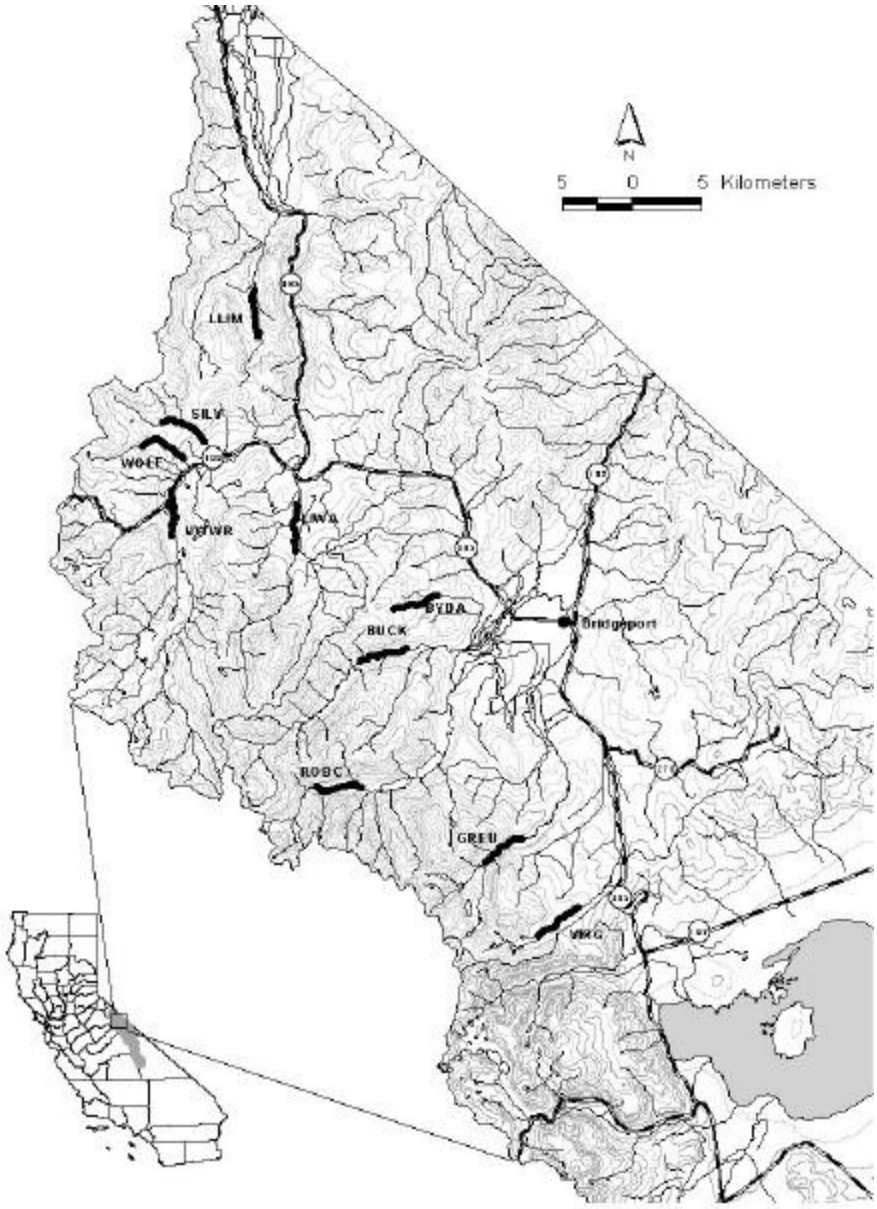


Table 1. Study sites, 4-letter transect codes, number of points per transect, elevations and management categories, Humboldt-Toiyabe National Forest, Bridgeport Ranger District, 2001.

Study site	4-letter transect code	Number of points	Transect elevation (m)	Management[1]
Mill Creek (near Walker)	LLIM	15	2050-2250	SG, LCT, CAR, USMC-MWTC, DC
Silver Creek	SILV	15	2200-2700	SG'95, LCT, CAR, USMC-MWTC
Wolf Creek	WOLF	15	2300-2800	SG'95, LCT, CAR, USMC-MWTC
Upper W. Walker River	UWWR	15	2150-2200	SG, CG, USMC-MWTC, PS,
Little Walker	LIWA	15	2150-2400	CG, DC
By-Day Creek	BYDA	15	2450-2850	SG, CDFG
Buckeye Creek	BUCK	15	2250-2300	CG, RHT
Robinson Creek	ROBC	15	2250-2500	CG, RHT, RES, DVC
Virginia Creek	VIRG	15	2780-2900	CG, DC, PS, RES
Green Creek (Upper)	GREU	14	2410-2580	SG, RHT, DC

[1] Provided by HTNF biologist. SG = current sheep grazing, CG = current cattle grazing, SG'95 = sheep grazing until 1995, LCT = Lahontan Cutthroat Trout management area, CAR = Critical Aquatic Refuge in Sierra Nevada Framework, USMC-MWTC = Marine Corp Mountain Warfare Training Center, DC = Dispersed camping, DVC = Developed commercial campground, RHT = Recreation, hiking trail, wilderness trailhead, RES = resort within 1km of transect, PS = pack station within 1km of transect, CDFG = public access limited by CDFG.

Point Count Censuses

We established ten riparian transects, totaling 149 independent stations in May of 2001. 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 10, 2001.

We used point counts to obtain broad coverage of riparian habitats on HTNF lands and to obtain information on creeks with different management regimes. HTNF biologists selected the ten study streams. PRBO biologists chose starting points on these streams that would contain the total survey transect within HTNF lands 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, where we were only able to fit 14 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 stations were censused three 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 three censuses. Additionally, when possible, points were censused in order from 1 to 15 for 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. Dates of censuses, GPS coordinates and transect descriptions are presented in Appendix 1.

Point Count Vegetation Assessment

We conducted vegetation assessments at each of the 149 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). 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.

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 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.

Statistical Analysis and Definitions

We summarized species diversity and species richness for all species detected during point counts (breeders, non-breeders, all species) and for breeding species only. For the analysis of breeding species alone, we excluded all non-breeding migrant species (3 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. HTNF transects contained 15 points each (with the exception of Green Creek – Upper, 14 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 all species and 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 all species and breeding species for each point count station and each transect, using all detections within 50m summed over three visits.

Species abundance: We calculated the mean number of breeding species individuals by point by transect, averaged over three visit, 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 (relative abundance).

Brown-headed Cowbird presence: We summarized Brown-headed Cowbird data by transect using all detections (<50m & >50m), summed over 3 visits. Cowbirds are known to travel several kilometers from feeding sites to breeding locations in the eastern Sierra (Rothstein et al. 1984). It is possible, therefore, for cowbirds to fly the entire length of the transect, making it difficult to distinguish between individuals. Assuming that cowbirds behaved this way equally among all transects, we counted all cowbirds seen (within the census times) and summarized the detections as an index of cowbird presence.

Bird and habitat relationships

We square root transformed breeding species diversity, species richness and relative abundance to normalize the data. We compared transformed mean breeding species diversity, richness and relative abundance among Sawyer Keeler-Wolf habitat types and among aspen patch size categories using one-way ANOVA. When results from ANOVA indicated significant differences among habitat types, we used Kruskall-Wallace equality of populations rank test to evaluate the differences between specific habitat types in question.

Statistical calculations were performed using Stata (Stata Corp. 1999). Significance was assumed at $P = 0.05$. Residuals from ANOVA's passed Skewness/Kurtosis tests for normality ($P>0.05$).

Breeding Status

Breeding status was determined for all species encountered at all study sites between May 26 and August 8, 2001. We used observations recorded before, during, and after point count 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, http://www.prbo.org/CPIF/coplbkgr.html.)

0 No evidence of breeding: Species not detected during breeding season, or species known not to breed within the general study area.
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.
1 Confirmed breeding: distraction display; nest building (except woodpeckers and wrens); nesting material or fecal sack being carried by adult; independent juveniles with adults; active territory observed on at least three days (at least one week apart); active nest observed.

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 before, during and after point count censuses, and during project set up and vegetation assessments. Wildlife and management observations were also recorded.

Personnel

PRBO: All aspects of fieldwork, study design and set-up, and data analysis were conducted by staff biologists Sacha Heath and Grant Ballard, with the guidance from Terrestrial Program Director, Geoffrey R. Geupel and Population Ecologist, Nadav Nur. Fieldwork was conducted by field biologists Andrew Jobes, Heidi Kirk, Kristie Nelson and Mark Pollock.

USFS: Humboldt-Toiyabe National Forest, Bridgeport Ranger District Wildlife Biologist Gerrit Buma selected study sites.

RESULTS AND DISCUSSION

Bird species composition, distribution and breeding status

One hundred and three species were detected by point count censuses and other observations at HTNF sites in 2001. We determined breeding status for all species encountered at all locations and ranked their breeding status using the RHJV breeding scale (Appendix 2).

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) to assist in documenting the most current California breeding distribution for these species. 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 HTNF sites. See http://www.prbo.org/CPIF/Consplan.html for the most current California distribution maps for all CPIF riparian and coniferous forest focal species.

Sensitive and focal species and species of special concern

Seven species detected on HTNF lands are considered sensitive or of concern and 18 species are riparian, coniferous forest, or grassland focal species (Table 2). Focal species (such as those for riparian, coniferous forest, 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).

Table 2. Sensitive and focal species detected as possible, probable or confirmed breeders during, before and after point count censuses on Humboldt-Toiyabe National Forest, 2001. See Appendix 2 for breeding status and site.

Common name	Latin name	CDFG CSSC	ST	USFS	USFWS MNBMC	CDF	PIF WL	Aud. WL	RHJV RFS	CPIF CFS	CPIF GFS
Northern Goshawk	*Accipiter gentilis*	1st		X	X	X					
Belted Kingfisher	*Ceryle alcyon*	3rd									
Olive-sided Flycatcher	*Contopus cooperi*	2nd			X			X		X	
Western Meadowlark	*Sturnella neglecta*										X
Savannah Sparrow	*Passerculus sandwichensis*										X
Brewer's Sparrow	*Spizella breweri*				X		X				
Oregon Junco	*Junco hyemalis thurberi*									X	
Song Sparrow	*Melospiza melodia*								X		
Fox Sparrow	*Passerella iliaca*									X	
Black-headed Grosbeak	*Pheucticus melanocephalus*								X		
Western Tanager	*Piranga ludoviciana*									X	
Bank Swallow	*Riparia riparia*		X						X		
Warbling Vireo	*Vireo gilvus*								X		
Yellow Warbler	*Dendroica petechia*	2nd							X		
Mac Gillivray's Warbler	*Oporornis tolmei*									X	
Common Yellowthroat	*Geothlypis trichas*								X		
Wilson's Warbler	*Wilsonia pusilla*								X		
Brown Creeper	*Certhia americana*									X	
Red-breasted Nuthatch	*Sitta canadensis*									X	
Golden-crowned Kinglet	*Regulus satrapa*									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; 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, BSSC 2001)

Breeding Bird Survey results, interpreted for the Avian Conservation Plan for the Sierra Nevada Bioregion, suggest that several species detected on HTNF lands are experiencing significant Sierra Nevada – wide populations declines. These include Olive-sided Flycatcher, Western Wood-Pewee, Mountain Chickadee, Golden-crowned Kinglet, Green-tailed Towhee, White-crowned Sparrow, Oregon Junco, Chipping Sparrow, American Robin, Cassin's Finch, Mourning Dove, Belted Kingfisher, Steller's Jay, Lesser Goldfinch, Winter Wren and Brown-headed Cowbirds. Cassin's Vireos, Tree Swallows and Red Crossbills are experiencing significantly increasing trends (Siegel and DeSante 1999).

Species diversity and richness

We summarized species diversity and richness for all species detected (Table 3) and breeding species only (Table 4). Because all transects (with the exception of Green Creek, n = 14) had the same number of survey points, comparisons can be made between transects using total transect bird indices. In order to compare HTNF transects with those of varying numbers of points per transect, we also present mean by point per transect summaries.

Table 3. Shannon-Weiner index of diversity and species richness by transect, mean by point per transect and standard error of the mean, for **all species** detected within 50m during fixed-radius point counts, 2001.

	Species Diversity			Species Richness		
Station	Total transect	Mean by point	SE	Total transect	Mean by point	SE
Mill Creek	17.61	5.91	0.54	27	6.53	0.62
Silver Creek	20.44	4.51	0.42	31	5.07	0.47
Wolf Creek	16.9	5.66	0.77	31	6.27	0.86
Upper West Walker River	16.22	6.45	0.49	37	7.93	0.56
Little Walker	19.92	6.67	0.49	31	7.87	0.61
By-Day Creek	19.55	7.63	0.31	31	8.53	0.38
Buckeye Creek	16.45	5.65	0.36	23	6.20	0.45
Robinson Creek	21.68	7.54	0.70	35	8.93	0.90
Virginia Creek	16.6	6.89	0.42	25	7.60	0.43
Green Creek - Upper	19.02	7.55	0.57	35	8.64	0.72

Table 4. Shannon-Weiner index of diversity and species 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, 2001.

	Species Diversity			Species Richness		
Station	Total transect	Mean by point	SE	Total transect	Mean by point	SE
Mill Creek	16.96	5.85	0.55	26	6.47	0.62
Silver Creek	19.01	4.33	0.42	28	4.87	0.47
Wolf Creek	16.26	5.54	0.75	29	6.13	0.84
Upper West Walker River	12.21	5.50	0.53	29	6.67	0.61
Little Walker	17.73	6.31	0.44	28	7.33	0.60
By-Day Creek	18.87	7.46	0.31	30	8.33	0.37
Buckeye Creek	16.11	5.61	0.34	22	6.13	0.41
Robinson Creek	20.46	7.29	0.66	32	8.60	0.83
Virginia Creek	15.53	6.66	0.42	22	7.33	0.43
Green Creek - Upper	17.03	7.20	0.45	30	8.21	0.57

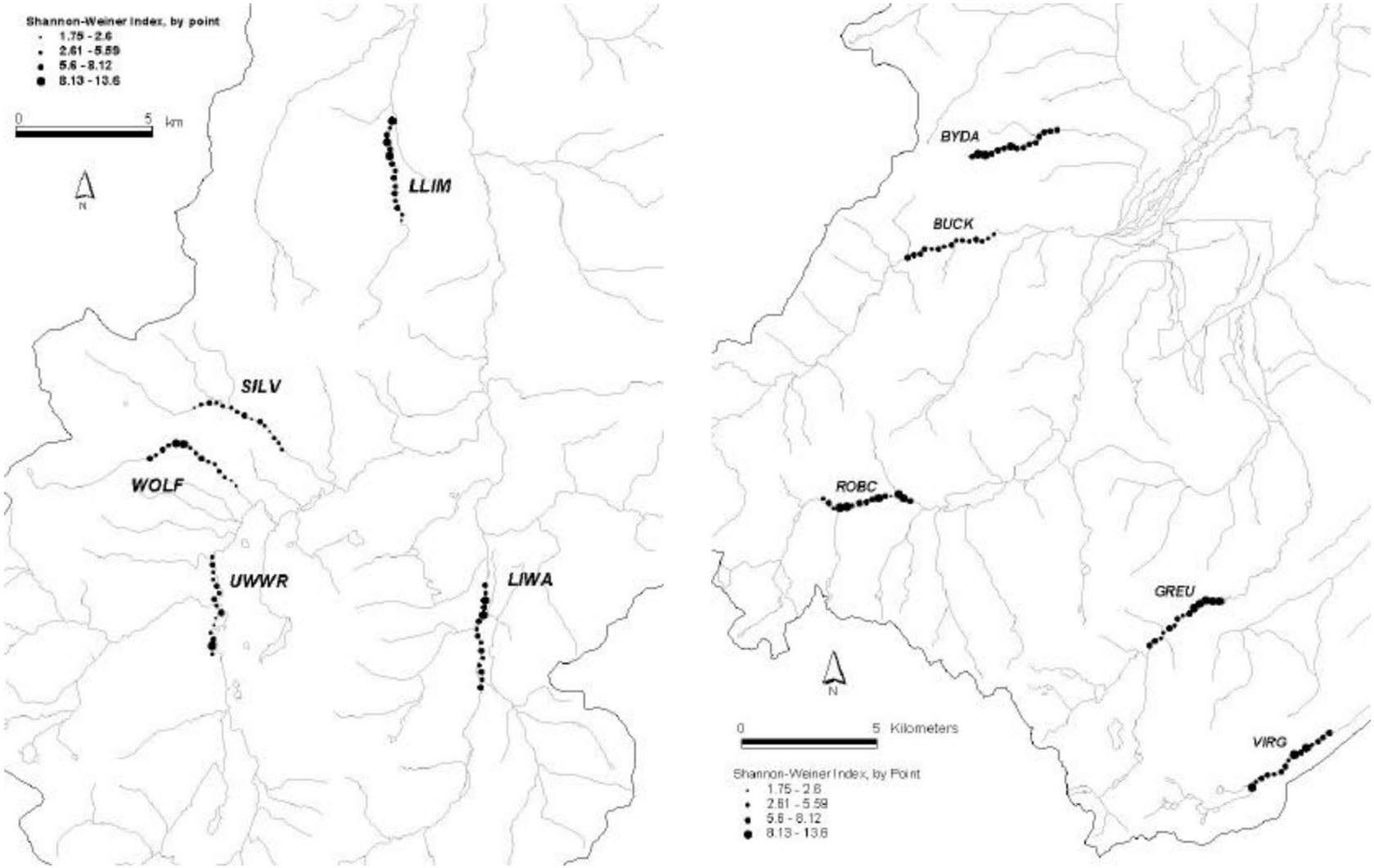
All species summaries versus breeding species summaries were similar. Unlike other riparian sites in the eastern Sierra (Heath et al. 2001), few non-breeding migrants were detected at HTNF sites, probably because most non-breeding migrants had already moved through the area at the times of the surveys. The majority of non-breeding migrant detections were of Rufous Hummingbirds, an early fall migrant.

Species diversity and richness were generally high at HTNF transects. Robinson, By-Day, Little Walker Creek and Silver were transects with the highest total breeding species diversity and richness. Conversely, Silver Creek also had the lowest mean by point per transect breeding species diversity (significantly lower than Buckeye Creek $?^2 = 5.49$, $P = 0.019$), suggesting that indices at individual points varied. Figure 3 displays breeding species diversity for each point, providing insights into within-transect differences.

Total transect breeding species diversity at HTNF sites are generally higher than transects with similar number of point in the Owens Valley alluvial fan and are generally similar to those in the higher elevation reaches of Mono Basin creeks and Owens River watershed (Heath and Ballard 1999a and 1999b). By point per transect species diversity at eastern Sierra riparian transects with fewer or more points than HTNF sites ranged from 1.21 to 10.51 (1998-2000). By point per transect breeding species diversity at some higher elevation Mono Basin and upper Owens River watershed sites was higher than that of HTNF sites. For example, sites at HTNF had lower by point per transect breeding species diversity than Buttermilk Country, which was highest among all eastern Sierra riparian sites (10.51, Heath et al. 2001).

Comparisons of breeding species diversity between transects should be made with caution because of some of the inherent elevational, habitat and geomorphic differences among sites. Species composition may vary greatly between two transects with the same diversity. Therefore, indices of diversity and richness should be considered in conjunction with species composition (Table 5).

Figure 3. Breeding bird diversity by point. All detections within 50m radius point count, summed over three visits, 2001.



Species abundance and frequency of occurrence

American Robins were detected within 50m of 71% of all point count stations, and were the most frequently detected species (Table 5). Species detected at over 30% of the stations included Western Wood-Pewee, Warbling Vireo, Yellow Warbler and Audubon's Warbler. The most abundant species among HTNF sites was the Brewer's Blackbird at Upper West Walker River. Warbling Vireos at Robinson and Green Creek were more abundant than at other eastern Sierra riparian locations (Heath et al. 2001). Other species with relatively high abundances included Oregon Juncos at Wolf Creek, Yellow Warblers at Green Creek, Western Wood-Pewees at Buckeye Creek and House Wrens at By-Day Creek.

Table 5. Frequency of occurrence and mean relative abundance[1] for all breeding species detected at Humboldt-Toiyabe National Forest riparian sites during fixed radius point counts. Number of individual detected within 50m, by point by transect, mean of three visits, June 1 – July 10, 2001.

Species	% points present (n = 149)	Mill Creek	Silver Creek	Wolf Creek	Upper West Walker	Little Walker	By-Day Creek	Buckeye Creek	Robinson Creek	Green Creek	Virginia Creek
California Quail	1%	0.02	--	--	--	--	--	--	--	--	--
Mountain Quail	1%	--	--	--	--	--	0.04	--	--	--	--
Mourning Dove	1%	0.02	--	--	--	--	--	--	--	--	--
Hairy Woodpecker	5%	0.04	0.02	0.04	--	--	0.02	--	0.04	0.02	--
Red-breasted Sapsucker	13%	--	--	0.09	0.07	0.04	0.13	0.07	0.11	0.02	--
Williamson's Sapsucker	2%	--	0.04	--	--	--	0.02	--	--	--	--
Red-shafted Flicker	12%	--	0.04	0.02	0.09	0.07	0.04	0.02	0.13	0.02	--
Anna's Hummingbird	1%	--	--	--	0.02	--	--	--	--	--	--
Calliope Hummingbird	5%	0.02	--	0.04	0.07	--	--	--	0.07	--	--
Black Phoebe	1%	--	--	--	--	0.02	--	--	--	--	--
Olive-sided Flycatcher	3%	--	0.02	--	--	--	0.04	--	0.02	--	--
Western Wood-Pewee	40%	0.27	0.18	--	0.09	0.29	0.29	0.53	0.33	0.33	0.20
Western Flycatcher	3%	--	--	--	--	--	--	--	0.20	--	--
Cordilleran Flycatcher	1%	--	--	--	--	--	--	--	--	0.07	--
Dusky Flycatcher	22%	--	0.07	0.11	0.22	--	0.04	--	0.02	0.17	0.51
Steller's Jay	23%	0.47	0.07	0.07	0.09	0.13	0.13	0.09	0.27	0.02	--
European Starling	1%	--	--	--	0.02	--	--	--	--	--	--
Red-winged Blackbird	13%	0.04	--	--	0.02	0.49	--	0.22	0.27	0.29	0.02
Western Meadowlark	1%	--	--	--	--	0.02	--	--	--	--	--
Bullock's Oriole	1%	--	--	0.02	--	--	--	--	--	--	--
Brewer's Blackbird	25%	0.18	--	--	1.47	0.42	--	0.07	0.38	0.48	0.09
Cassin's Finch	28%	0.04	0.09	0.29	0.11	0.04	0.04	0.24	0.11	0.07	0.51
House Finch	1%	--	--	--	--	--	0.13	--	--	--	--
Pine Siskin	4%	--	0.02	0.02	--	--	--	--	--	0.05	0.11
Mtn. White-crowned Sparrow	11%	--	--	0.24	--	0.07	0.11	--	--	--	0.38
Chipping Sparrow	1%	--	--	0.02	--	--	--	--	--	--	--
Brewer's Sparrow	4%	--	--	--	0.04	--	--	--	--	--	0.16
Oregon Junco	40%	0.36	0.4	0.75	0.02	0.11	0.49	0.13	0.09	0.12	0.29
Song Sparrow	23%	0.04	--	0.02	0.42	0.29	0.02	0.13	0.4	0.21	0.09
Lincoln's Sparrow	1%	--	--	0.02	--	--	--	--	--	--	--

Table continues on next page.

Table 5 – continued. Frequency of occurrence and mean relative abundance[1] for all breeding species detected at Humboldt-Toiyabe National Forest riparian sites during fixed radius point counts. Number of individual detected within 50m, by point by transect, mean of three visits, June 1 – July 10, 2001.

Species	% points present (n = 149)	Mill Creek	Silver Creek	Wolf Creek	Upper West Walker	Little Walker	By-Day Creek	Buckeye Creek	Robinson Creek	Green Creek	Virginia Creek
Fox Sparrow	22%	--	0.13	0.20	0.02	0.04	0.31	--	0.18	0.07	0.07
Spotted Towhee	5%	0.20	0.02	--	--	0.02	--	--	0.02	--	--
Green-tailed Towhee	19%	0.18	0.04	0.02	0.09	0.22	0.16	0.13	0.09	0.02	--
Black-headed Grosbeak	7%	0.02	0.04	--	0.02	0.11	--	--	0.09	0.05	--
Lazuli Bunting	3%	--	0.04	--	--	--	0.09	--	--	--	--
Western Tanager	20%	0.16	0.04	0.02	0.02	0.04	0.04	0.33	0.07	0.12	--
Warbling Vireo	46%	0.38	0.11	0.22	0.16	0.31	0.29	0.38	0.75	0.71	0.16
Cassin's Vireo	2%	0.07	--	--	--	--	--	--	--	--	--
Nashville Warbler	3%	--	--	0.04	--	--	--	--	--	0.07	--
Orange-crowned Warbler	5%	--	0.04	0.11	--	--	--	--	0.02	--	--
Yellow Warbler	34%	--	--	--	0.78	0.64	0.13	0.18	0.64	0.81	0.40
Audubon's Warbler	36%	0.11	0.33	0.20	0.04	0.04	0.02	0.20	0.13	0.48	0.42
MacGillivray's Warbler	24%	0.18	0.18	0.16	--	0.09	--	0.02	0.04	0.07	0.04
Wilson's Warbler	3%	--	--	0.09	--	--	--	--	--	0.02	--
American Dipper	5%	--	0.02	0.02	0.09	--	--	0.02	0.02	0.05	--
House Wren	29%	0.04	0.02	--	0.22	0.36	0.58	0.07	0.24	0.50	--
Winter Wren	1%	--	--	--	--	--	--	--	0.02	--	--
Brown Creeper	19%	0.24	0.09	0.04	--	0.07	0.07	0.22	0.13	0.07	--
White-breasted Nuthatch	2%	--	--	--	0.02	0.02	0.02	--	--	--	--
Red-breasted Nuthatch	1%	0.02	--	--	--	--	--	--	--	--	--
Mountain Chickadee	27%	0.11	0.16	0.04	0.07	0.13	--	0.04	0.11	0.19	0.24
Golden-crowned Kinglet	1%	--	--	--	--	--	--	--	0.02	--	0.02
Ruby-crowned Kinglet	3%	--	0.07	--	--	--	--	--	--	--	0.07
Townsend's Solitaire	9%	0.09	0.02	0.09	0.02	--	0.04	0.04	--	0.02	0.02
Hermit Thrush	3%	--	0.07	--	--	--	--	--	--	--	0.07
American Robin	71%	0.56	0.22	0.47	0.73	0.53	0.42	0.33	0.62	0.67	0.31
Mountain Bluebird	1%	--	--	--	--	0.02	--	--	--	--	--

[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 Table 1). Because few species are 100% detectable, such calculations probably underestimate absolute density. Therefore results should be considered a minimum estimate of abundance, or relative abundance.

Figures 4 and 5 geographically display Warbling Vireo and Yellow Warbler abundance by point. By point differences in abundance are probably most influenced by localized habitat characteristics. Future analysis will investigate these relationships. High resolution GIS vegetation layers (not presently available) with superimposed bird data would further elucidate these relationships.

Figure 4. Warbling Vireo relative abundance by point. All detections within 50m radius point count, mean of three visits, 2001.

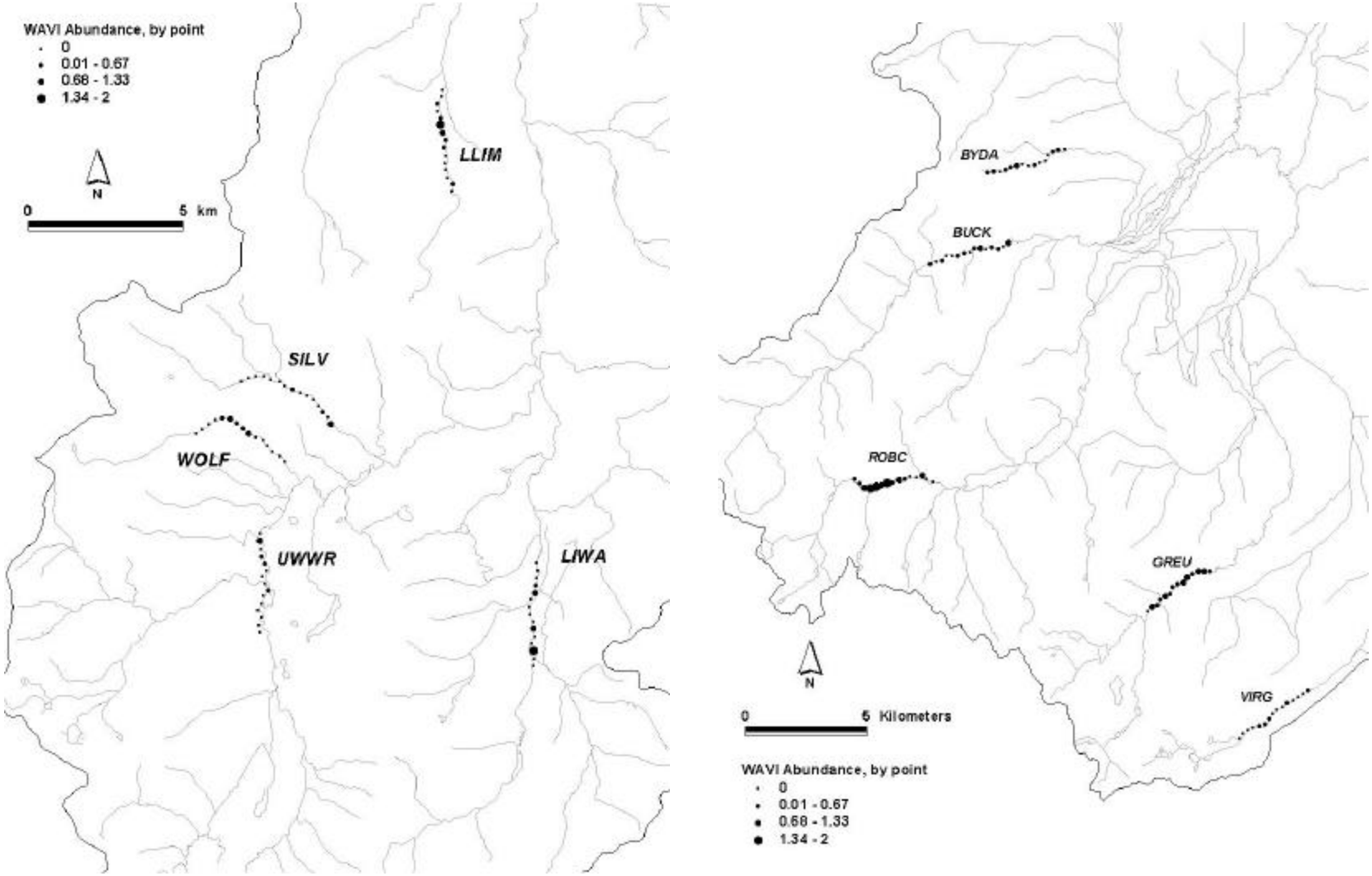
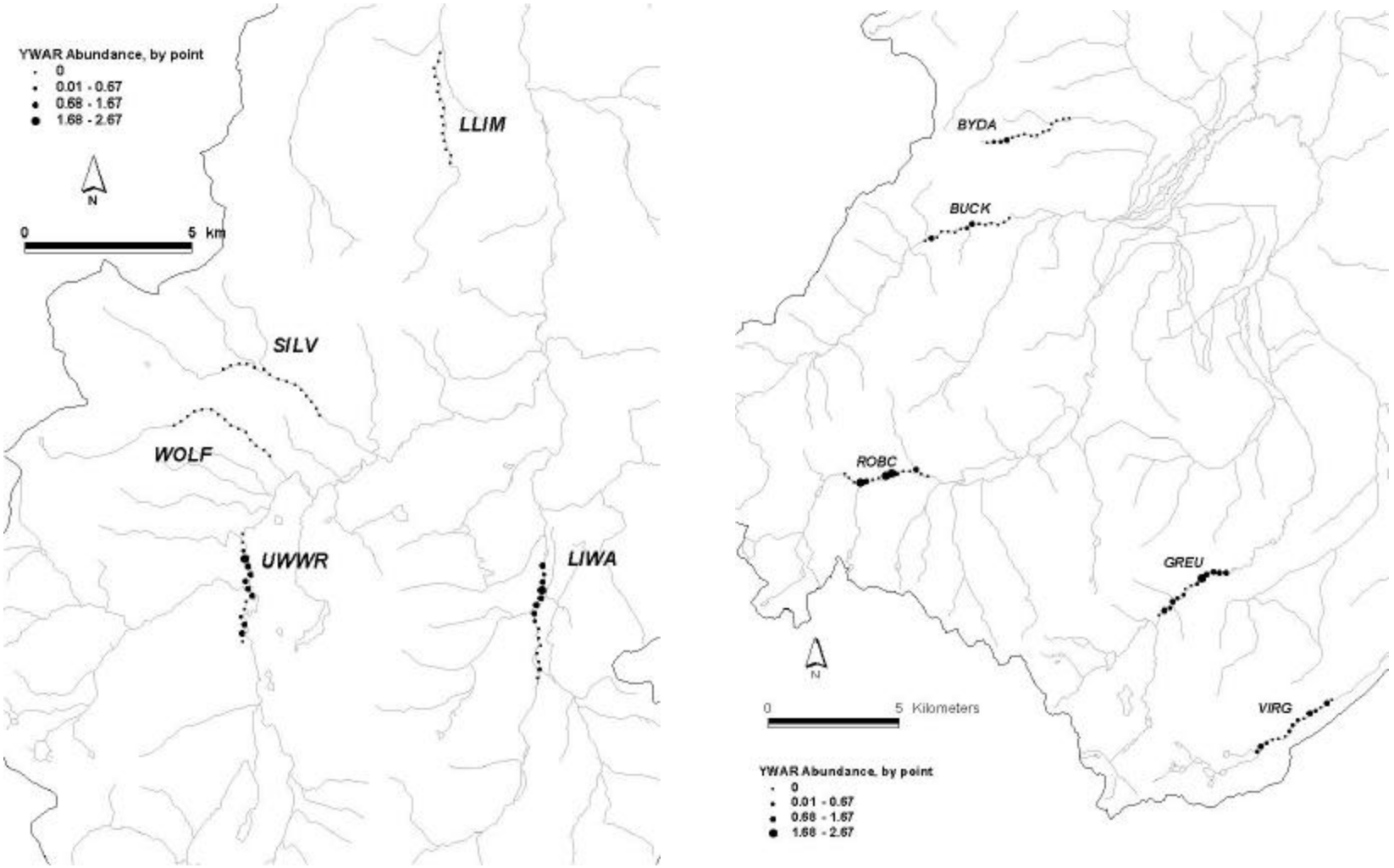


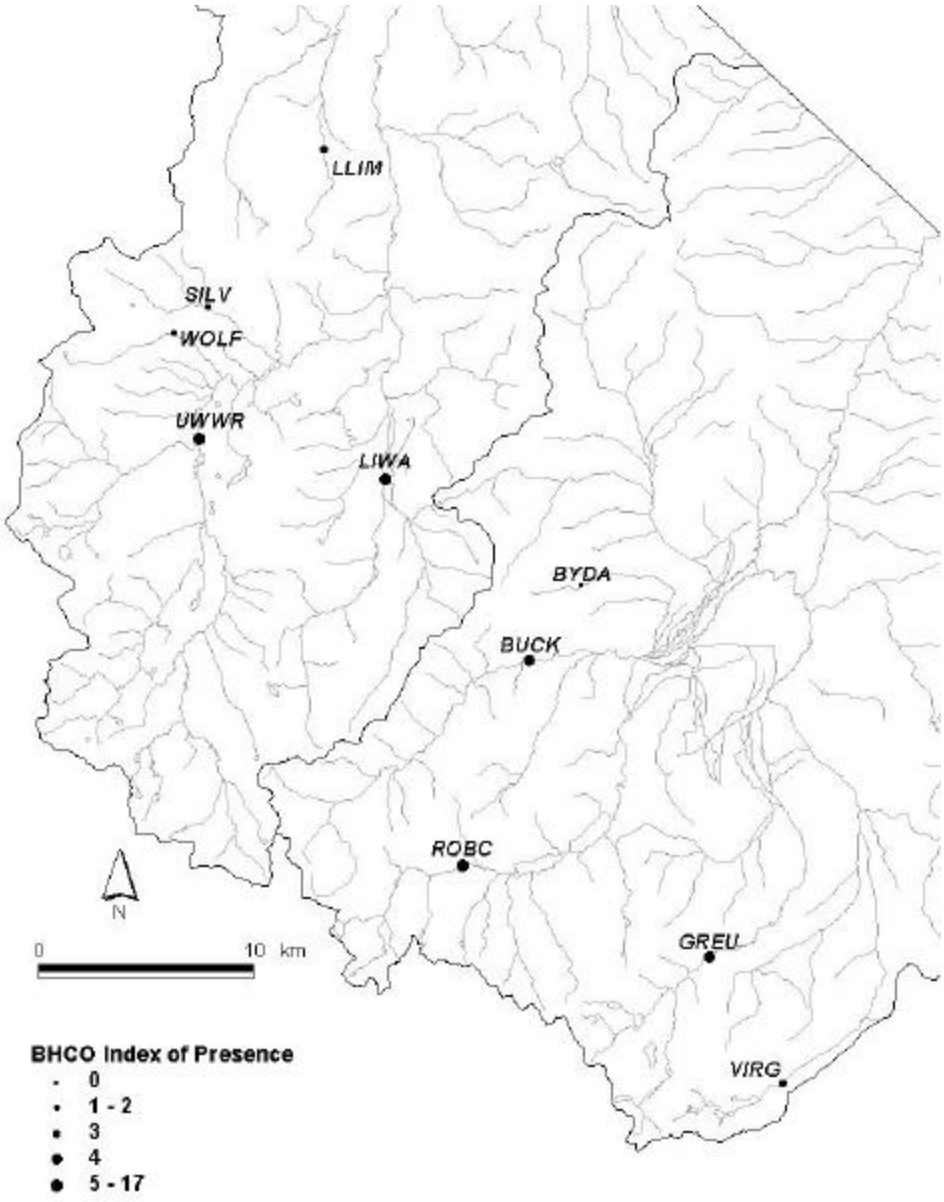
Figure 5. Yellow Warbler relative abundance by point. All detections within 50m radius point count, mean of three visits, 2001.



Brown-headed Cowbirds

Brown-headed Cowbirds were detected at all sites, except By-Day Creek (Figure 6). Robinson and Little Walker Creeks and Upper West Walker River had the highest index of cowbird presence.

Figure 6. Index of Brown-headed Cowbird presence by transect. Total number of detections < 50m & > 50m for each transect, Humboldt-Toiyabe National Forest, 2001.



Riparian habitat characteristics in relation to breeding bird indices

Sawyer Keeler-Wolf habitat types

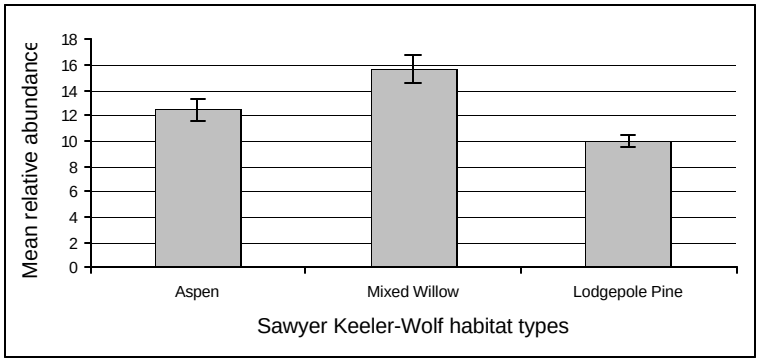
Eight Sawyer Keeler-Wolf riparian habitat types were assigned to HTNF sites (Table 6). Aspen and Mixed Willow habitat types characterized the most points. Sites categorized as White Fir, Lodgepole Pine or Jeffrey Pine were those that had very little to no riparian vegetation present within 50m. These sites were characterized by continuous stands of pine or fir that grew to the creek or river's edge. 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 the riparian types are discussed here.

Table 6. Sawyer Keeler-Wolf riparian habitat types for 149 point count stations and percent of points characterized by each type.

Sawyer Keeler-Wolf habitat types	percent points
White Fir	< 1 %
Alder	1 %
Meadow	< 1 %
Jeffrey Pine	1 %
Black Cottonwood	3 %
Aspen	38 %
Mixed Willow	40 %
Lodgepole Pine	15 %

Mean relative abundance of breeding species differed significantly among habitat types ($F_{(2, 138)} = 5.26$, $P = 0.001$. $R^2 = 0.06$). Abundance was higher at Mixed Willow habitat types than at either Aspen or Lodgepole Pine habitat types ($P = 0.04$ and $P = 0.005$ respectively, Figure 7). Species diversity and species richness were not significantly different among the three habitat types ($F_{(2,136)} = 0.43$, $P = 0.65$; $F_{(2,138)} = 1.19$, $P = 0.31$).

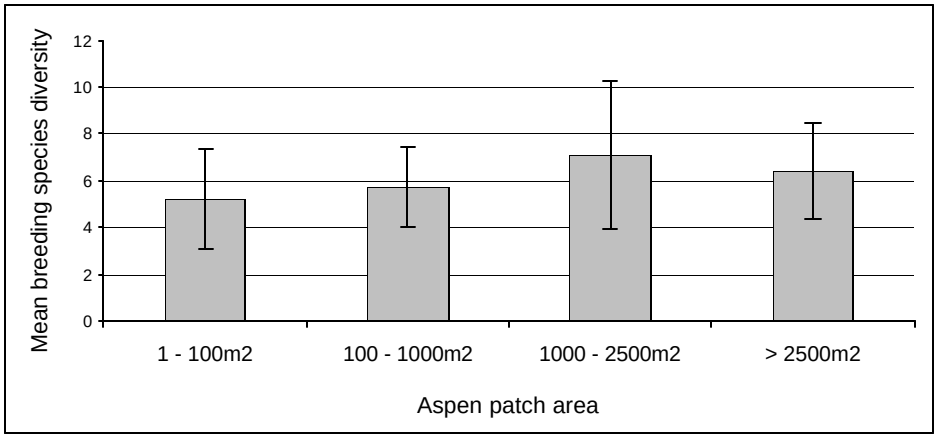
Figure 7. Comparisons of mean breeding species relative abundance, within 50m during fixed radius point counts, among three Sawyer Keeler-Wolf riparian habitat types, 2001. Standard error bars shown.



Aspen patch size

Aspen cover is significantly and positively correlated with breeding bird diversity among other eastern Sierra riparian sites (Heath et al. 2001). At HTNF sites, we further examined the relationship between breeding bird diversity and aspen by examining the influence of aspen patch size (Figure 8). Breeding bird diversity was not significantly different among different aspen patch sizes ($F_{(3, 81)} = 1.40$, $P = 0.25$). Future analysis will investigate several other components of the aspen plant community that may influence breeding birds and the effects of aspen patch size on individual species abundance.

Figure 8. Comparisons of mean breeding bird diversity, within 50m during fixed radius point counts, among four aspen patch size categories (m^2), 2001. Standard error bars shown.



CONCLUSIONS AND FUTURE WORK

Riparian habitats on HTNF lands harbor abundant breeding populations of several species including Western Wood-Pewee, Warbling Vireo, Yellow Warbler, Oregon Junco and Audubon's Warbler. Species richness and diversity are also high, suggesting the importance of these lands to multiple species bird communities. Our results thus far demonstrate the importance of mixed willow and aspen habitat types to songbirds in this region.

Brown-headed Cowbirds were detected at most sites, with the highest counts at Robinson Creek, Little Walker and Upper West Walker River. Future work will investigate the landscape, habitat, and management features that may be influencing cowbird numbers, as well as the influence of host population abundance.

Because scant standardized songbird monitoring has been conducted within riparian habitats on HTNF lands, results presented herein represent a significant increase in the understanding of songbird occurrence, breeding status, diversity, abundance and associated habitat features on HTNF lands. These results provide HTNF with information to promote avian conservation through outreach, education and watchable wildlife on forest lands. In addition, these and future analyses will provide HTNF managers with recommendations to enhance bird populations and assist riparian management. Riparian songbird data derived on HTNF lands will contribute to statewide songbird and riparian habitat conservation efforts such as CPIF and RHJV, specifically providing information to the Riparian and Coniferous Bird Conservation Plans. Lastly, as a part of the Eastern Sierra Riparian Songbird Conservation project, this project will ensure coordination among HTNF and other national forests, state and county agencies and non-governmental groups in the eastern Sierra region.

With the submission of this report, the first year of a proposed three-year pilot riparian songbird monitoring project on HTNF lands is complete. All point count stations will be censused three times during June and July of 2002 and 2003, funding pending. A more rigorous analysis of habitat association on songbird abundance and diversity is planned for the fall of 2003, after the third year of data collection.

ACKNOWLEDGEMENTS

We are grateful for the financial support of Region 4 Partners in Flight, Bridgeport Ranger District, National Fish and Wildlife Foundation, and the Bureau of Land Management. We would like to thank Jan Simis and Joel Ellis for providing field season living quarters and office space. Chris McCreedy designed report maps, with the assistance of Diana Stralberg. This is PRBO contribution # 1006.

LITERATURE CITED

ASKINS, R.A. 2000. Restoring North America's Birds: Lessons from landscape ecology. Yale University Press. 288pp.

BSSC (BIRD SPECIES OF SPECIAL CONCERN). 2001. California bird species of special concern draft list. http://www.prbo.org/BSSC/BSSCintro.htm.

CPIF (CALIFORNIA PARTERS IN FLIGHT). 2000a. Version 1.0. The draft grassland bird conservation plan: a strategy for protecting and managing grassland habitats and associated birds in California (B. Allen, lead author). Point Reyes Bird Observatory, Stinson Beach, CA. http://www.prbo.org/CPIF/Grasslnd/Grassland.html.

CPIF (CALIFORNIA PARTERS IN FLIGHT). 2000b. Executive summary and outline of the coniferous forest bird conservation plan: a strategy for protecting and managing coniferous forest habitats and associated birds in California. http://www.prbo.org/CPIF/Conifer/Conifer.html

DFG (DEPARTMENT OF FISH AND GAME). 1999. The state of California, the resources agency. Department of Fish and Game Natural Diversity Database. Birds. http://www.dfg.ca.gov/endangered/birds.html

DESANTE, D.F. AND T.L. GEORGE. 1994. Population trends in landbirds of western North America. In A Century of Avifaunal Change in Western North America. Studies in Avian Biology No. 15. Cooper Ornithological Society.

ESRI. 2000. ArcView Geographic Information System version 3.2a. Redlands, CA: Environmental Systems Research Institute, Inc.

FINCH,D. AND P. STANGEL (Eds.). 1993. Status and Management of neotropical migrant birds: Proceedings of the Estes Park Partners in Flight Conference .USDA Forest Service Publication: GTR RM-229, Fort Collins, Co.

GAINES, D. 1974. A new look at the nesting riparian avifauna of the Sacramento River Valley, California. Western Birds. 5:61-84.

HEATH, S.K. AND G. BALLARD. 1999a. Songbird monitoring of riparian communities in the eastern Sierra Nevada and western Great Basin region: Results of the 1998 field season. PRBO contribution number 849. Stinson Beach, CA.

HEATH, S.K. AND G. BALLARD. 1999b. Eastern Sierra Riparian Songbird Conservation project: preliminary results from the 1999 field season - a progress report. PRBO contribution number 884. Stinson Beach, CA.

HEATH, S.K., G. BALLARD, AND C. MCCREEDY. 2001. Eastern Sierra Riparian Songbird Conservation: 1998-2000 final report and Mono Basin 2000 Progress report. PRBO contribution # 1002. Stinson Beach, CA.

KNOPF, F.L., R.R. JOHNSON, T.R. RICH, F.B. SAMSON, AND R.C. SZARO. 1988. Conservation of riparian ecosystems in the United States. Wilson Bulletin 100(2):272-284.

KREBS, C.J. 1989. Ecological methodology. Harper and Row Publishers, New York, New York: 654 pp.

LAMBECK, R.J. 1997. Focal species: a multi-species umbrella for nature conservation. Conservation Biology Vol. 11, No.4:849-856.

MACARTHUR, R.H. 1965. Patterns of species diversity. Biological Reviews 40: 510 -533.

MANLEY, P. AND DAVIDSON.1993. A risk analysis of neotropical migrant birds in California, USFS report, Region 5, San Francisco CA.

MILLER, A. H. 1951. An analysis of the distribution of the birds of California. Univ. Calif. Publication Zool. 50: 531-643.

OHMART, R.D. 1994. The effects of human-induced changes on the avifauna of western riparian habitats. Studies in Avian biology No. 15:273-285.

RHJV (RIPARIAN HABITAT JOINT VENTURE). 2000. Version 1.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. California Partners in Flight: http://www.prbo.org/CPIF/Riparian/Riparian.html.

RALPH, C. J., G. R. GEUPEL, P. PYLE, T. E. MARTIN, AND D. F. DESANTE. 1993 . Field Methods for Monitoring Landbirds. USDA Forest Service Publication: PSW-GTR 144, Albany, CA.

RALPH, C. J, S. DROEGE AND J. R. SAUER. 1995. Managing and Monitoring Birds using Point Counts: Standards and Applications (in) Monitoring Bird Populations by Point Counts. USDA Forest Service General Technical Report: PSW-GTR-149. 181 pp.

ROTHSTEIN, S.R., J. VERNER, AND E. STEVENS. 1984. Radio-tracking confirms a unique diurnal pattern of spatial occurrence in the parasitic Brown-headed Cowbird. Ecology 65(1).

SAWYER, J. O. AND T. KEELER-WOLF. 1995. A manual of California vegetation. California Native Plant Society. Sacramento, CA.

SHUFORD, W.D. 1993. The Marin County breeding bird atlas: A distributional and natural history of coastal California. Bushtit Books, Bolinas, CA.

SIEGEL, R. B. AND D. F. DESANTE. 1999. Version 1.0. The draft avian conservation plan for the Sierra Nevada Bioregion: conservation priorities and strategies for safeguarding Sierra bird populations. Institute for Bird Populations report to California Partners in Flight. Available online at http://www.prbo.org/CPIF/Sierra/SierraPlan.html#info

STATA CORP. 1999. Stata Statistical Software, Release 6.0. Stata Corp., College Station, TX.

Appendix 1 – Table A. Point count transects, 4-letter codes, number of points, and census dates, 2001.

Site	Code	# points	Visit 1	Visit 2	Visit 3
Buckeye Creek	BUCK	15	15 June	27 June	10 July
By-Day Creek	BYDA	15	7 June	21 June	9 July
Green Creek – Upper	GREU	14	2 June	16 June	30 June
Little Walker	LIWA	15	5 June	19 June	9 July
Mill Creek	MILL	15	6 June	20 June	3 July
Robinson Creek	ROBC	15	3 June	17 June	1 July
Silver Creek	SILV	15	7 June	21 June	4 July
Upper West Walker River	UWWR	15	8 June	22 June	5 July
Virginia Creek	VIRG	15	4 June	18 June	2 July
Wolf Creek	WOLF	15	7 June	21 June	4 July

Appendix 1 – Table B. GPS locations of all point count stations, 2001, in decimal degrees, NAD 83.

station	site	lat	lon	station	site	lat	lon	station	site	lat	lon
BUCK	1	38.235914	-119.358323	LIWA	9	38.314149	-119.452157	UWWR	1	38.333225	-119.552155
BUCK	2	38.234643	-119.360667	LIWA	10	38.316359	-119.451653	UWWR	2	38.330998	-119.55193
BUCK	3	38.233624	-119.363226	LIWA	11	38.318204	-119.45007	UWWR	3	38.328778	-119.551646
BUCK	4	38.234112	-119.365892	LIWA	12	38.320414	-119.449979	UWWR	4	38.326578	-119.551324
BUCK	5	38.233624	-119.368644	LIWA	13	38.32256	-119.449636	UWWR	5	38.324625	-119.549999
BUCK	6	38.233699	-119.371439	LIWA	14	38.324776	-119.449309	UWWR	6	38.322528	-119.549087
BUCK	7	38.233784	-119.374196	LIWA	15	38.326964	-119.449888	UWWR	7	38.320822	-119.550921
BUCK	8	38.232154	-119.376331					UWWR	8	38.318768	-119.549865
BUCK	9	38.231741	-119.379013	LLIM	1	38.434027	-119.484751	UWWR	9	38.316911	-119.548379
BUCK	10	38.230587	-119.38154	LLIM	2	38.435975	-119.484462	UWWR	10	38.315259	-119.550272
BUCK	11	38.230796	-119.384372	LLIM	3	38.437761	-119.48635	UWWR	11	38.313065	-119.550723
BUCK	12	38.230732	-119.38743	LLIM	4	38.439939	-119.487069	UWWR	12	38.311021	-119.551925
BUCK	13	38.228715	-119.389211	LLIM	5	38.442096	-119.487514	UWWR	13	38.308999	-119.550798
BUCK	14	38.228431	-119.392027	LLIM	6	38.444284	-119.487342	UWWR	14	38.306821	-119.55142
BUCK	15	38.227465	-119.394618	LLIM	7	38.446591	-119.488088	UWWR	15	38.304589	-119.551152
				LLIM	8	38.448833	-119.487535				
BYDA	1	38.271169	-119.333046	LLIM	9	38.450856	-119.488758	VIRG	1	38.05459	-119.24438
BYDA	2	38.270708	-119.33584	LLIM	10	38.45304	-119.48978	VIRG	2	38.05638	-119.24269
BYDA	3	38.270289	-119.338587	LLIM	11	38.455104	-119.489488	VIRG	3	38.05769	-119.24032
BYDA	4	38.268825	-119.340717	LLIM	12	38.457035	-119.490931	VIRG	4	38.05892	-119.23792
BYDA	5	38.266765	-119.341881	LLIM	13	38.459267	-119.491017	VIRG	5	38.0593	-119.23509
BYDA	6	38.26611	-119.344595	LLIM	14	38.461263	-119.489665	VIRG	6	38.06013	-119.23241
BYDA	7	38.264909	-119.346956	LLIM	15	38.463489	-119.489145	VIRG	7	38.06192	-119.23047
BYDA	8	38.264587	-119.34975					VIRG	8	38.0639	-119.22899
BYDA	9	38.265241	-119.352454	ROBC	1	38.146645	-119.390799	VIRG	9	38.06564	-119.22702
BYDA	10	38.264587	-119.355179	ROBC	2	38.147509	-119.393792	VIRG	10	38.06652	-119.22433
BYDA	11	38.2639	-119.357904	ROBC	3	38.148887	-119.395884	VIRG	11	38.06809	-119.22225
BYDA	12	38.262854	-119.360324	ROBC	4	38.148286	-119.398647	VIRG	12	38.06919	-119.21964
BYDA	13	38.262275	-119.363043	ROBC	5	38.148276	-119.401469	VIRG	13	38.07042	-119.21724
BYDA	14	38.262232	-119.365854	ROBC	6	38.14729	-119.40416	VIRG	14	38.07187	-119.21496
BYDA	15	38.261878	-119.368671	ROBC	7	38.147053	-119.406779	VIRG	15	38.0732	-119.21244
				ROBC	8	38.146167	-119.409365				
GREU	1	38.11595	-119.259998	ROBC	9	38.145711	-119.412144	WOLF	1	38.361779	-119.576601
GREU	2	38.11588	-119.26274	ROBC	10	38.144971	-119.414848	WOLF	2	38.363045	-119.574214
GREU	3	38.116094	-119.265572	ROBC	11	38.144193	-119.41753	WOLF	3	38.364451	-119.571977
GREU	4	38.115059	-119.268281	ROBC	12	38.143748	-119.420309	WOLF	4	38.365792	-119.569708
GREU	5	38.113654	-119.270572	ROBC	13	38.143947	-119.422964	WOLF	5	38.366312	-119.566913
GREU	6	38.111857	-119.272331	ROBC	14	38.145416	-119.425035	WOLF	6	38.366307	-119.56407
GREU	7	38.111095	-119.275051	ROBC	15	38.1468	-119.427234	WOLF	7	38.365148	-119.561618
GREU	8	38.109968	-119.277347					WOLF	8	38.363678	-119.559386
GREU	9	38.10771	-119.278275	SILV	1	38.377191	-119.56032	WOLF	9	38.362171	-119.557262
GREU	10	38.106626	-119.280705	SILV	2	38.378211	-119.557863	WOLF	10	38.361297	-119.554575
GREU	11	38.105355	-119.283076	SILV	3	38.378731	-119.554993	WOLF	11	38.36054	-119.551908
GREU	12	38.10322	-119.284143	SILV	4	38.378854	-119.552161	WOLF	12	38.358673	-119.550315
GREU	13	38.102281	-119.286536	SILV	5	38.37785	-119.54961	WOLF	13	38.357016	-119.548255
GREU	14	38.100795	-119.288655	SILV	6	38.377503	-119.546517	WOLF	14	38.355938	-119.545648
				SILV	7	38.376183	-119.54427	WOLF	15	38.354425	-119.543637
LIWA	1	38.296956	-119.450215	SILV	8	38.375228	-119.54148				
LIWA	2	38.299139	-119.449754	SILV	9	38.374456	-119.538567				
LIWA	3	38.301339	-119.450129	SILV	10	38.373758	-119.535885				
LIWA	4	38.303522	-119.450966	SILV	11	38.372363	-119.533755				
LIWA	5	38.305555	-119.449813	SILV	12	38.370663	-119.53191				
LIWA	6	38.30776	-119.450306	SILV	13	38.369091	-119.530048				
LIWA	7	38.309959	-119.450387	SILV	14	38.367434	-119.528289				
LIWA	8	38.311949	-119.451771	SILV	15	38.365545	-119.526969				

Appendix 2. Point count transect descriptions, 2001.

STATION: Buckeye Creek (BUCK) **POINT MARKER:** Orange Flagging & Metal Tags
INTERVAL BETWEEN POINTS: 250mwith GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: Points run upstream. There is often a small subtle trail along creek… I followed this whenever I saw it. Because a GPS was used to set up this transect, distances are *linear* from Points, and *not* paced along creek. You might get your feet wet on this one

ACCESS: Drive north from Lee Vining on 395 to Bridgeport. Continue through Bridgeport & turn left at Texaco station onto Twin Lakes Road. Follow Twin Lakes Road through a large pasture area and into the mountains. After ≈3 miles you'll pass a small subdivision & see a sign on left for "Doc & Al's Resort". Turn right onto Buckeye Road here. Follow Buckeye Road ≈3 miles to a fork with a "Buckeye CG/Hwy 395" sign. Take left fork (towards Buckeye CG) & drive across bridge over creek. Drive through campground to a gate. If gate is locked, park here. If not, go through it and park 200m later at 2nd gate.

Point #1: Walk 500m west along Forest Service road from 2nd gate to 2 large diameter 2-3m long logs on ground ≈4m south of road (waypoint "BUCKRD" on GPS #1). Walk 200m @ 336 degrees to Point, which is 10m from creek in a Willow in a small circular basin. Several large fallen trees cross creek by Point.

Point #2: Walk upstream ≈20-25m away from creek for first 60-70m, then closer to creek. You will reach a large opening at 220m. Point in 5m Lodgepole Pine 7m from creek, 8m downstream of 5m snag, & 2m downstream of 2 fallen many-branched Pine snags.

Point #3: Continue upstream, staying on top of ridge (creek will be 20-30m to your right). Point on 4m Fir on edge of steep ridge (≈20m drop) overlooking a 90 degree bend in creek. 4 fallen logs cross creek at base of slope below Point.

Point #4: Walk due west for ≈150m, staying high on ridge… creek will get further away from you as you walk. You should pass an old rusty rebar at 140m, & at 150m an indistinct animal trail heads downhill towards creek. Walk down trail (or downhill in general if you don't find trail) to open Sage area & continue upstream. At west end of open area head towards creek. Point in 8m Lodgepole Pine 4m from creek in small open grassy area. Several logs cross creek 10-15m downstream of Point & there is an 8x10m cobbly area on bank opposite Point.

Point #5: Continue upstream, staying low & close to creek. At 130m go upslope, dropping back down towards creek at 150m & continuing upstream. Point in 4.5m Lodgepole Pine 2m from creek in open area, 3m downstream of *Ribes* patch, 12m downstream of log crossing stream, 8m downstream of 1m diameter black rock in middle of creek, & 2m north of 5m tall many-branched snag.

Point #6: Continue upstream, staying close to creek. Point on dead branch of 12" DBH Lodgepole Pine 6m from creek. There are 2 large (14" DBH) Trembling Aspens immediately south of Point, 1 with lots of woodpecker excavations, other with "CAP CWF" carved on side facing Point. A dense pile of dead wood crosses creek near Point.

Point #7: Continue upstream, staying close to creek. Vegetation opens up & becomes Willowy at 90m. Cross barbed wire fence at 120m & continue upstream, hugging creek bank. You'll reach a 10m Lodgepole followed by a bank of Willows at 240m. Point in 2nd Lodgepole (2' DBH), 8m from creek & 8m southwest of 1st Lodgepole.

Point #8: Creek does a wide oxbow upstream of Point 7, so walk 70m @ 220 degrees and skirt top of steep bank. Continue upstream, staying close to creek. Point in 2' DBH Lodgepole Pine 4m from bend in creek. 10m downstream from Point in a large log jam with an old rusty 40–gallon pail in it.

Point #9: Continue upstream, staying close to creek. At 250m you'll reach two 10" DBH Aspen snags 5m from creek & a 15" diameter snag crossing creek. Point in 15" DBH Lodgepole Pine 10m from creek. Lots of dead wood on ground at/near Point. There is a curvy, 10m tall, 75% barkless snag ≈8m ≈south of Point.

Point #10: Continue upstream, staying close to creek. Vegetation opens up & becomes grassy at 130m & there is lots of fallen dead wood in/around creek at 210m. Point in Pine on creek edge by large (2' DBH) fallen tree in creek whose root mound (≈6m northeast of Point) has a 4' dying Lodgepole growing out of it.

Point #11: Continue upstream, staying close to creek. At 235m there is a tall Pine snag with another leaning against it at a 45-degree angle on opposite bank. Point in 14" DBH Lodgepole Pine 5m from bend in creek. Lots of dead trees cross creek ≈15m upstream & downstream of Point. Bank opposite Point is 10' tall, steep, & sandy.

Point #12: Continue upstream, staying close to creek. Pass small rarely used campsite at 210-220m. Point in 12" DBH Lodgepole Pine 2m from creek. A large fallen snag & large (5' diam.) rock are on opposite bank ≈10m west of Point.

Point #13: Continue upstream, staying close to creek. Pass a very cool large Pine snag at 170m & a 2nd at 190m. Point on 10m Lodgepole Pine on creek bank 10m on downstream side of wide bend in creek. 3 large blowndown trees cross creek near Point. All 3 have lots of soil in their upturned root masses. Point between 2 upstream-most root masses.

Point #14: Continue upstream, staying close to creek. Point ≈10m from creek in 2.25' DBH Lodgepole Pine on slight (2') raised bank by 10x10m open grassy area with lots of small Willows. A tall lone Pine is visible on mountaintop at 18 degrees from Point. (this Point had LOTS of mosquitoes!)

Point #15: Continue upstream, staying close to creek. You'll reach a small side channel & a half-built wooden lean-to at 170m. Follow side channel upstream. Point is in 14" DBH Lodgepole Pine on creek bank at base of small, open, Sage-filled slope just upstream of where side channel departs from main channel.

End of transect. To return to car, follow creek downstream, or walk away from creek ≈100m towards south/west. You'll reach 2-track that is the Forest Service road followed to get to Point #1. Follow it downstream ≈4km to get to car.

Appendix 2. Point count transect descriptions, 2001.

STATION: By-Day Creek (BYDA) **POINT MARKER:** Orange flagging & standard metal tagging.
INTERVALS BETWEEN POINTS: 250m with GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: All points run along north side of creek from downstream (Pt #1) to upstream (Pt #15), except for Point #12 (on south side). You may need a Forest Service Key for 2 gates. **4WD ONLY**!
ACCESS: 3.5 miles NE on 395 past "Buster's Market" at NE end of Bridgeport, take Buckeye Road to left (North). Road is just across 395 from USFS Housing complex. Continue on Buckeye Road until you come to USFS road # "076" to west. Take this for 1.8 miles to a grassy opening and dispersed campsite on left side of road (also where road splits and crosses creek). Park here.

Point 1: On 8m Jeffrey Pine ~ 30m upstream from where road crosses creek, on north side of creek.

Point 2: Continue up road. Look for a bunch of downed snags on left side of road, followed by a few Aspens and a field of *Artemisia*. Go to creek at snags. Point on 16m Jeffrey Pine, 5m from creek and 13m downstream from a 10m Juniper.

Point 3: Continue up road until it crosses a small rocky side drainage. Go to creek here. Point on 7m Aspen, 6m from creek.

Point 4: Continue upstream along road until you come to a 5m Juniper on south side of road. Go to creek at an upstream angle, crossing over a tributary and a grassy open area. Point on *Ribes* 11m from creek.

Point 5: Continue upstream along this branch of creek. Point on *Ribes*, 5m from creek and 12m upstream from a tree that has been girdled to form a snag, with a USFS "Wildlife Tree" tag on it.

Point 6: Continue upstream as it gets steeper. Point on 6m Aspen on SW corner of a pink/orange rock outcrop that is more or less in line with upstream edge of a large Willow patch on other side of creek.

Point 7: Continue upstream. Riparian flattens out at ≈170m continue upstream along riparian edge. Point at upstream end of a wet grassy open but small meadow (15m X 8m). Meadow is the result of a small spring that runs from North and also forms a draw of Willows (upslope from Point). Point on 5m Aspen right next to a 4m White Fir ≈20m from creek.

Point 8: At 200m, creek curves to right and you come across a blocky boulder on north ridge and you enter an open area with *Artemisia* and boulders that have fallen from upslope. Point on 4m Aspen at upstream end of opening, 5m from creek and in corner of 2 lines of aspen that form a 90 degree angle.

Point 9: At 190m, you reach a large Juniper at upstream end of an *Artemisia* meadow where Willow lines creek. At 250m, Point on 2.5m Aspen, 8m from creek. 10m upstream from Point and the same distance from creek is a snag broken at 2.5m with top pointing down to ground.

Point 10: As you near high point of a large rocky pink outcrop to north, you will also reach a 15m Juniper at its base and on edge of an Aspen patch. Go toward creek here. Point on 5m Aspen, 8m from creek and right next to an Aspen that is 2/3 dead and has "RIOJA 1937" carved into it.

Point 11: Walk 10m from creek, pass an open patch of snowberry and grass. When patch turns to Aspen, go to creek and upstream for 20m. Point on 5m Aspen, 9m from creek and at upstream end of a forby, soil open area. At creek, an Aspen snag has fallen over and forms a bridge.

Point 12: Continue along N side of creek. At 230m, pass 2 10m Aspens (one of which is a snag) on south side of creek. Cross creek at next available opening. Point on Shiny Willow, 6m from creek and 20m upstream from before-mentioned Aspens.

Point 13: Continue upstream, crossing back over to North side when convenient. Follow main creek side. Point on Shiny Willow on edge of south side of creek (but reaches over to north side), next to 20m snag (also on south side of creek) and 10m upstream from a 5m snag with a pointed top.

Point 14: Point 40m upstream from a small but steep slope with mostly exposed soil and *Artemisia*. Point on Shiny Willow on edge of creek, ≈40m downstream from where Willows head upslope and meet a patch of Aspens.

Point 15: Continue upstream, but walk upslope along Sage instead of through Willows. Point on 2.5m Aspen, 4m from creek, among a line of Aspens that ascend upslope from creek. ≈40m upstream from Point, Willows become thick again.

Appendix 2. Point count transect descriptions, 2001.

STATION: Green Creek Upper (GREU) **POINT MARKER:** Orange flagging & standard metal tag
INTERVALS BETWEEN POINTS: 250m with GPS (as a crow flies) **TOTAL # POINTS:** 14

NOTES: Points run downstream. Points 1-11 on south side of creek, 12-15 on north side.
ACCESS: ≈4 miles south of Bridgeport on 395, take Green Creek Road west towards hills. Road is marked with a sign for your convenience. Follow this road for a few miles, turning hard right (where the road ends at a "T") at its intersection with Dunderburg Meadow Road (2nd labled junction). Pass Dynamo Pond, cross over Green Creek via bridge and pass long Willow meadow on left. ≈15m past a Toiyabe National Forest sign, pull left onto a 2 track road leading to a dispersed campsite. Park here.

Point 1: Walk west, upstream along a small trail from campsite for ≈50m. Point on 10m Lodgepole Pine, on NW side of an open grassy area, at a 90 degree bend in creek.
Point 2: Continue upstream. Just before Point, you will pass an open campground accessed by a dirt road. Point on small Lodgepole Pine that is part of a cluster of 3 small Pines, adjacent to a big one. Point is also 3m from a Juniper on edge of creek and 12m downstream from an old stump.
Point 3: Continue upstream past another campground close to road, and through an open rocky area. Point just past this open area on a young Aspen ≈10m from water's edge and a big Lodgepole Pine on stream bank and 6m from a 3m Juniper.
Point 4: Continue upstream until you come to another campsite on left side of road, flanked by a large rock outcrop on its upstream edge. Follow east edge of rock outcrop through campsite to creek. Point on young Aspen growing at base of rock, ≈3m from water's edge. There are an old 0.9m DBH log and Wild Rose shrub at base of Aspen, and North and ≈1m away from Point is a small cluster of Junipers.
Point 5: Continue upstream, passing a large open area with many young Willows on the side of road. Toward end of this open grassy area, and right before edge of a Lodgepole patch, there is a campground pullout on north side of road and a split, ½ dead Lodgepole on south side and 20m from road. Turn south toward creek at Lodgepole. Cross over small rivulets and through some Willow, walking 50m from road to Point that is 2.5m from main stem of Green Creek. Point on young Willow ≈5m west of a cluster of 4 tall Lodgepoles (2 big, 1 med., 1 small) and ≈2m from 4 stumps. Stand on one of nearest stumps to do count.
Point 6: ≈260m up road, take a dirt driveway on south side of road, bearing right at fork, towards a wooden gate with "Gerbig" sign. Point is 110 degrees (mag) and 50m downhill toward creek from gate. Point is 15m upslope from point in creek that flattens out into a braided channel with many young Willows, and ≈1/3 of the way up north side of a large rock outcrop. Point on 4m tall Aspen sapling (3" DBH) with a dead tip bent at a 90 degree angle and pointing north, and directly adjacent to a 1.5m Juniper sapling.
Point 7: Walk on road upstream. Bear left on main road, where there is a Green Creek trailhead parking sign. Continue up road until point where last Green Creek trailhead parking loop road reunites with main road. Point is 165 degrees (mag) and 70m from here. Point on a 30cm DBH Jeffrey Pine that forks into 3 branches at ≈2m from the base. Point is 25m downstream from a very large (1.5 DBH) Jeffrey Pine (largest around).
Point 8: Continue upstream along main road. Pass a HUMUNGOUS snag on left side of road and through a metal gate. Point is off left side of road in line with US FEE AREA sign (on the right side of road). Point on a crooked Aspen sapling 1.5m from road and 5m from creek. Top of sapling bends at a 90 degree angle, 1m from its base. Feel free to do count from North side of road, keeping sapling as center of census plot, due to loud water.
Point 9: Continue upstream along main road. Go through orange gate with ROAD CLOSED sign and past cabin on left side of road. 20m past house turn left toward the creek for ≈25m. Point on 8cm DBH Aspen ≈8m from main stem of creek. A few meters west of tree is a bend in creek with standing water.
Point 10: Continue upstream on main road. Just before a wooden sign on right side of road (that faces the opposite direction) reading TRAILHEAD/CAMPGROUND, there is a very large Jeffrey Pine on right side of road. Turn in toward creek here. Point on 5m Lodgepole Pine surrounded by small Aspens ≈5m from road. It is the only Lodgepole Pine in nearby area.
Point 11: Continue upstream on main road until you come to a small meadow on left side of road. Point on 70cm long rock in front of ≈6 Lodgepole Pines in a row just along edge of creek and a stump on east end of meadow.
Point 12: Continue upstream on main road. After ≈150m, bear left at "Y" and follow small side stream down toward Green Creek. ≈15m before reaching main Creek, walk upstream, staying to right of large rock outcrop abutting creek. You will pass an old outhouse on east end of rock outcrop. Point ≈60m upstream from outhouse on 4.5m Juniper adjacent to an 8m long old, partly decomposed log. Point is 20m uphill from creek. If you stand on log and look toward other side of creek, you will see a 20m snag with a large boulder at its base and a taller snag to left.
Point 13: Continue to walk upstream, ≈30-40m upslope from creek. Nearing 250m, you will come to remains of an old cabin with a very large Jeffrey Pine (largest in sight) and a rock outcrop between it and creek. Point at western end of rock outcrop on an Aspen sapling growing right at rock's edge.
Point 14: Walk uphill and away from creek until you are back on trail. Stay on trail until you come to a 55cm DBH Juniper on left side of trail, and a cluster of medium sized rocks with a Jeffrey Pine in its center on right. Standing at Juniper, look toward creek to a large boulder where ground flattens out. Point on 3.5m White Fir between Juniper and boulder. If you come to a low rock wall supporting left side of trail, you have come to far.

Appendix 2. Point count transect descriptions, 2001.

STATION: Little Walker River (LIWA) **POINT MARKER:** Orange flagging & standard metal tagging
INTERVALS BETWEEN POINTS: 250m with GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: Points run upstream (PT #1) to downstream (Pt # 15). All points on east side of creek, except Point #2 which is on west side of Molubdinite Creek.
ACCESS: Take hwy 395 NE out of Bridgeport for ≈14 miles until you reach USFS Wheeler Guard Station. 0.9 miles past station, take left on Little Walker River Road. Drive up dirt road, veering right at Obsidian Campground road junction until you come to "Burt Canyon Trailhead Parking Lot." Park here.

Point 1: On 10m Jeffrey Pine, 50m downstream from very large Jeffrey Pine in parking lot.
Point 2: Walk high along ridge downstream. ≈75m before confluence of Little Walker River and Molybdinite Creek (running in from SE), head east toward Molybdinite Creek, where Point is on its west side. Point on dead Aspen with 2 forks next to a row of several 3m Aspens. Point tree forms a triangle with the 2 two-stumped 7m Junipers in sage to west.
Point 3: Walk up Molybdinite Creek until you come to road, turn left and head down road, past confluence of creek and river until you are again along east side of Little Walker River. Point is downslope on a 3m Jeffrey Pine. ≈50m downstream from Point, road curves right significantly, and 10m before curve, there are 2 7m Jeffrey Pines on right bank in Sage.
Point 4: Down road, look for a 4m long brown boulder on right side of road in Sage. At this point, head down toward creek, keeping your eye on and heading toward a group of ≈6 Jeffries, one of which is ≈5m taller than the rest and has a broken branch that points to ground. Point on 6m Aspen, 2m upslope from large Jeffrey and ≈40m upslope from creek.
Point 5: Down road, look on right for 3 Aspens right on edge of road. Head down toward creek through roadside strip of Aspens and toward a Jeffrey Pine with a few diagonal yellow slashes on its trunk. Walk down steep slope to next Sage/Aspen edge. Point on *Ribes* next to a patch of Aspens. Point is between and in line with slashed Jeffrey (downslope) and a white 4m boulder peppered with black lichen (upslope).
Point 6: Head on down road until you come to a large turnout on left. At this point, head down to creek at a downstream angle until you reach a dispersed campground with 4 dirt roads heading off like spokes of a wheel, with campground as center. Point on 3m Jeffrey Pine ≈20m toward creek from campground. Across a small trail from Point is a scraggly 4m Black Cottonwood.
Point 7: Continue downstream along main campground road until it begins to climb uphill. At this point, head through Sage to creek and continue downstream along river. Point ≈25m upslope from river on 4m Aspen, next to *Ribes*, a 7m Jeffrey and some Aspens. Between Point and creek are 7 decadent Black Cottonwoods.
Point 8: Head downstream along river. Point is 25m past a tallest of 3 Lodgepole Pines that reside along creek. Point on 4m Aspen at downstream end of a 20m fallen Jeffrey log, and about 15m from creek.
Point 9: Truckin' on downstream, pass through a Willow patch and enter a small Aspen grove. Point on a 2m Aspen on right side of grove to left of a 7m Jeffrey Pine.
Point 10: Head on down river until you enter a pasture and cross over an irrigation ditch. Point is 40m downstream from ditch, on a Yellow Willow ≈15m from creek and 8m and slightly downstream from a tall Aspen snag.
Point 11: Continue downriver. You will reach a section of river with only grass on its bank and a 9m snag in middle of grassy patch. Point on Aspen, on left side of Aspen patch, more or less in line with snag and a beaver stump (≈1.5 m from Point).
Point 12: Stay close to river and head through Willows. Point on Yellow Willow at downstream end of an open patch littered with downed Aspen snags and *Artemisia*. Point is also 25m away from a 12m riverside Aspen snag that is at junction of main river and a side channel.
Point 13: Continue down river until you reach an open patch of *Artemisia* littered with many beaver-downed snags. Point on a very scraggly and apparently old 5m tall Aspen, ≈8m from creek, and 10m downstream from 3 Black Cottonwood snags.
Point 14: Enter an open meadow with no Willows. Point on 1m Shiny Willow on side of river, across river from 2 Lodgepole Pines and in line with a white boulder and a group of Aspens to NE.
Point 15: Continue down meadow. Before Willows again thicken, Point on a Yellow Willow on an island in River. Do Point from grass, keeping Point as the center of survey.

Appendix 2. Point count transect descriptions, 2001.

STATION: Mill Creek (north of Bridgeport) (LLIM) **POINT MARKER:** Orange flagging & standard metal tagging.
INTERVALS BETWEEN POINTS: 250m with GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: Points run upstream (#1) to downstream (#15). Points 1, 2, 14 & 15 are on east side of creek. All others on west side. You can drive to Point #1 and ride your bike for entire transect.
ACCESS: Drive NW out of Bridgeport on 395, staying on 395 when it meets 108, and past town of Walker. About a mile or less past Walker proper, take a left on Mill Creek Canyon Road and follow it up for a little less than 8 miles where you will cross creek, stay right and reach a dead end. Park here.

Point 1: From circle of Aspens surrounded by parking loop, head 50m downstream along road you came in on. Point on 10cm DBH 6m tall Aspen just off left side of road.
Point 2: Point on 3m Alder 50cm from left side of road. 3m downstream from Point are 3 Aspens, all <3m tall right on left edge of road.
Point 3: Stay on road and cross creek. Point in middle of a dispersed campsite on right side of road. It is on a 6m Alder with many stems right along creek. ≈20m downstream from Point, a patch of Alders spread out and away from creek.
Point 4: Continue down road and look for patch of white boulders on right side. ≈20m later, you will come to a 2m pink and gray boulder on right. Point on 5m mangly Aspen, 5m toward creek from boulder and 6m from creekside Dogwood.
Point 5: Point on 4m Alder, 5m downstream from junction of main creek and a small side stream that runs from west and under road via a culvert.
Point 6: At 225m you will pass a 5m long dark gray boulder with a flat top on east side of road. Point on 4m Alder, 25m downstream from this boulder and 4m downstream from a Jeffrey Pine with exposed roots on west side of road.
Point 7: At a pullout on east side of road and 75m upstream from an outhouse structure with a green roof, leave road and head in toward creek. Point on 2.5m Aspen, 5m from creek. At creek is a 5m skinny Willow weaved in with an 8m Aspen.
Point 8: When you reach a barbed wire fence on T-posts on right side of road, follow fence to creek and to point where wire wraps around a 1.2m DBH Jeffrey Pine. Point 12m upstream from wrapped tree, on 2nd T-post upstream from tree.
Point 9: Continue down road until you come to USFS sign shaped like the silhouette of a house and facing the other way on west side of road. Go to creek at 45 degrees (True). Point on 3m mangly Aspen ≈14m from creek, on eastern edge of a dry channel.
Point 10: Down road, you will pass 4 pink boulders on west side of road. 20m later, look for a 2m long pink boulder also on west side of road. Head to creek at this point. Point on 2m Aspen, inches from two 1m Aspens. Point 9m from creek and 8m downstream from two 1' DBH Aspen snags, 1 ≈2x as tall as other (6 & 12m tall).
Point 11: Head down road until you come to another road that heads east to creek. Take this to creek and then head downstream along western edge of creek until you reach Point, 50m from side road. Point on 6m Aspen ≈15m from creek, on Aspen-Sage edge.
Point 12: Walk down road, or along creek. On road, head to creek just before you come to a pullout on west side of road, at Jeffrey Pine on east side of road with Rose growing around it. Point on 8m Jeffrey Pine in middle of a grassy patch, 12m from creek.
Point 13: Continue down road until you come to an open grassy patch near creek. Go to creek. Point on Shiny Willow on edge of Willow/grass edge, in middle of long stretch of grassy patch.
Point 14: Continue along creek or road until riparian vegetation opens up into a grassy Willow meadow. Cross creek and head into Willows. Point on 2.5m Shiny Willow 45m east of creek, and 40m upstream from a large lone Jeffrey Pine that resides on west side of creek.
Point 15: Continue downstream through Willows, passing a few beaver dams as you go. Point on 8m Jeffrey Pine ≈8m east of a beaver dam at end of a grassy patch with many beaver-cut aspen stumps. Point is also right next to another Jeffrey Pine 3x the size of Point Pine.

Appendix 2. Point count transect descriptions, 2001.

STATION: Robinson Creek (ROBC) **POINT MARKER:** Orange Flagging & standard metal tag
INTERVALS BETWEEN POINTS: 250 m using GPS (as a crow flies). **TOTAL # POINTS:** 15

NOTES: Points run from downstream to upstream, on north side of Robinson Creek. Point 1 is 1.16km from trailhead parking. If the campground attendant lets you through with a letter from USFS, drive up through campground to a bridge crossing Robinson Creek and park. If not, you will need to plan for a short hike to Point 1. Also, GPS has problems at some points due to high canopy cover – navigating with a compass from clearings (where GPS reception is good) is very useful.
ACCESS: On NW edge of town of Bridgeport, at Texaco station, take a left (south) turn onto Twin Lakes Road. Drive through Twin Lakes Recreation Road and into Mono Village. Park at trailhead parking near marina.

Point 1: Walk through middle of campground, ignoring TRAIL THIS WAY signs. Eventually a dirt road will be taking you along northern edge of a large meadow. Follow road until you come to sign for "Barney Lake". Take trail at this sign. Eventually, you will come to a small orange USFS boundary mark sign on right side of trail. At this sign, walk straight to creek. Point is on one of 2 Willows on edge of creek, and right next to a 2.5m and 3" DBH Jeffrey Pine. Across creek is a slightly open grassy area with an Aspen on bank –Aspen has most of its leaves growing in a ball at the top of tree.
Point 2: Head back to trail and continue upstream. Pass Wilderness Information sign. At ≈200m, trail takes an almost 90 degree turn to right. Leave trail and head into meadow ahead of you and then almost immediately down to creek. At creek edge, there will be an open meadow of mostly Horsetail and 2 very large Cottonwoods in middle. Point on downstream end of this Horsetail meadow at the conifer edge, on 20cm DBH Juniper. A log lays nearly perpendicular to creek at this point. There is water trickling under your feet and you cannot see water of main creek because it is bordered by Willow and Dogwood.
Point 3: Go back to trail and head upstream. When trail very narrowly passes between a Jeffrey Pine and a 6m long granite boulder, head back to creek at a very slight downstream angle just to left of another similarly shaped but gray boulder. Enter SW corner of same meadow of last Point. Point at this corner, on 8m Jeffrey Pine whose lower branches are mostly dead and between a 4m Juniper and a 2m Aspen. Flag is 3.5m high in tree. Don't cross stream! Point at edge of Aspens and conifers.
Point 4: Continue up trail until you reach a patch of *Artemesia*, when you will head straight to creek. Point 15m from edge of creek. Across creek is a large granite outcrop. Point on old dead and mangled Aspen next to 2m White Fir. A large Jeffrey Pine snag is on ground and in 2 pieces right next to Point. Another snag lies along rim of creek, nearly parallel to Jeffrey Pine snag, and there is an open area between the 2. Alternatively (if you have a compass), ≈40m past Sage look left for a very large Jeffrey Pine (≈1.75m DBH) ≈40m off trail. Go to this tree, then proceed 65m at 174 degrees (magnetic).
Point 5: Head back to trail. At ≈230m, you will exit a large *Artemesia* meadow and reenter a grove of mixed conifer. At 250m, you will reach a rock water bar in trail, 3m before a 0.8m DBH Jeffrey Pine on left side (going up). Go to creek. Point in patch of small and dying Pine and Fir trees ≈20m from creek. It is on a 1' DBH 2.2m snag next to 3 boulders in ground that are in a line and point to creek. At creek in line with Point, a large Jeffrey Pine snag makes a bridge and across creek from Point is a patch of Willow and Dogwood.
Point 6: Continue up trail. At 200m, you will enter an area of open Aage. At 250m, 2 Pines –1 on either side of trail- and also on right there will be a 4m long granite boulder. Go to creek, through a patch of Aspens, just downstream from a similar patch of Pines. Enter downstream end of a meadow. Point on 2m Geyer's Willow clumped together with a stump, a 3m Jeffrey Pine, a 5.5 m Lodgepole and a Shiny Willow. Point is adjacent to a pile of logs.
Point 7: Continue upstream along meadow/*Artemesia* edge. At 200m, you will pass a patch of 5 *Ribes* followed by a grove of Aspens. At 250m, Point on Geyer's Willow with *Ribes* at its base.
Point 8: Continue through meadow upstream. When you enter a field of large boulders and before reaching another grove of Aspens, head down into center of Willows toward a group of 4 alive and 2 snag Lodgepole Pines. Point on 4m Lodgepole next to a 20m Lodgepole and a 2m pointy stump.
Point 9: Head up through Aspen and through an *Artemesia* patch to again meet up with trail. At 240m, trail will enter Aspens. At 250m, head toward creek, passing a 1m DBH White Fir ≈35m from trail. Point on 5m Juniper next to a dead Aspen with many carvings, 1 of which is a circled "4" ≈2m from ground and facing north. Point ≈50m from trail and ≈15m (at 175 degrees, magnetic) from large White Fir.
Point 10: At 200m, exit another Aspen grove and a 4m Juniper immediately follows on right side of trail. At 250m, head into Aspens toward creek, passing a Jeffrey Pine. Point ≈35m from creek on 1 of 3 Aspens (2 –1' DBH, 1 - 6" DBH) that form a triangle at edge of a row of White Firs. Point is more or less in line with Jeffrey Pine that you passed and a large white boulder out in Sage ≈100m beyond Jeffrey.
Point 11: Continue up trail. At 250m, there is a Juniper very close to left side of trail. Head to creek and meadow passing root wad of a fallen snag. Point on edge of creek just downstream from a short waterfall. It is on a Lodgepole next to a 3" DBH snag.
Point 12: Continue up trail. At Hoover Wilderness sign, go down to creek through grass, keeping grove of Aspens on your left. Head down stream a bit, crossing over group of ≈10 Aspen snags that have fallen and point east. Point on 2m Shiny Willow, 30m upstream from a 15m Aspen snag, and ≈12m upstream from a small beaver pond.

Appendix 2. Point count transect descriptions, 2001.

Robinson Creek continued.

Point 13: Walk out along meadow upstream keeping Aspens on your left. At 250m, you will come to a group of 4 White Firs, 1 is 14m, other 3 ≈7m. A *Ribes* is upslope from these Firs. Go to creek through Aspens, before these Firs. At creek, look for a large Jeffrey Pine that has fallen and forms a bridge and has 50cm boulders among its roots. Root points directly to Point that is 13m away from creek on a 2.2m tall, 2" DBH White Fir.
Point 14: Continue along trail. At 230m, trail crosses a dry creek drainage and at 250m, there is a 5m, 22cm DBH Whiter Fir just on left side of trail. Fir has a red scar that faces trail and is surrounded by *Ceanothus*. Directly across trail is a Manzanita. Point on White Fir. Just past Point, trail runs through a solid patch of *Ceanothus* and takes a left turn.
Point 15: Continue up through a set of switchbacks. Point on trail where on right there is a stump and on left is a small Juniper out in the *Ceanothus* and Manzanita, 5m after passing through 2 granite boulders (black on left, white on right).

Appendix 2. Point count transect descriptions, 2001.

STATION: Silver Creek (SILV) **POINT MARKER:** Orange flagging and standard metal tagging.
INTERVALS BETWEEN POINTS: 250m with GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: This is a steep one(380M drop). Points run in order from upstream (1) to downstream (15). If done in conjunction with wolf creek, a recommendation would be to drop one person at point #1 at Wolf, then drive back down to point 15 on Silver, leaving car at RD 023 and doing the transect upstream. The Wolf person will then walk to the car (using the GPS to point 15) and drive up to pick up Silver person at point 1. Census points are located on the north side of the creek until the road crosses the creek at point 9. Then they are on the south until you cross the road 1 more time at the last point, which is on the north again. **ACCESS:** Recommendation: Drive into Wolf #1 the night before and camp. Head north on hwy395 past Bridgeport. At Sonora Junction, take a left onto hwy108. After about 3.5 miles take a right at the USMC Mountain Warfare Training Center. As you cross a paved crossroad your road will turn to gravel. About a mile up the road you will come to a fork with RD023. Stay left and continue to switchback up RD053. Your next fork will be with RD042 (the road to Wolf creek). This time stay right. One last major fork will confront you. This time stay left on RD059A (not RD059). This road ends in a parking circle in a meadow. Park here. **Access to pt 15:** Follow access directions above until you pass the military center. Take the first right fork, RD 023. After a couple hundred yards the road crosses the creek. Pt 15 is about 40 m downstream from the road. The rest of the points are upstream. Pt 15 is on river-left, pts 14-9 are on river-right, pts 8-1 are on river-left again.

Point#1: From the tire in the middle of the parking circle walk straight toward the creek(90m @310degrees). Pt is on a small lonely willow bush on the creeks edge 3m upstream from a logjam.
Point#2: Walk downstream along the left side of the creek. You will come to a 4m dia. squarish boulder and a sharp oxbow bend with 2 large logs laying paralell in the stream. These 2 logs point to the flag, which is in a willow bush. There is a large clump of willow across the creek.
Point#3: Just past the 2nd fire ring, there is a 1m dbh pine snag that is broken off at 3m tall. The pt is 7m downstream, 10m from the creek, in a 10cm dbh lodgepole pine that is broken off at 1.8m tall.
Point#4: @ 250m (as the crow flies) you will come to a place where 2 40cm dia. logs have fallen across the creek. The pt is 8m upslope on a 15cm dia, 4.5m tall Juniper.
Point#5: Continue down stream as the gradient steepens. Soon after the creek flattens out you will cross a small tributary. The point is about 40m downstream on the creeks edge, on a 10 cm dbh lodgepole pine which is leaning @ a 60degree angle toward the creek. There is a meadow across the creek.
Point#6: Continue to a chainsaw thinned area that has fire hose wrapped around a couple of the trees(to hitch horses to, I think). The pt is 12m from the stream, in a gnarly 5cm dbh, 2m tall lodgepole pine next to a 50cm dbh, 1.5m tall stump.
Point#7: @ 250 m you will come to 2 1m dbh pines, that are 4m apart in a line perpendicular to the creek.. The pt is 4m past these on a pair of small pines(5cm&10cm dbh). The creek is 14m away through some aspen.
Point#8: Walk along the edge of the steep walled ravine until you come to the road @ 210m. The road makes a sharp bend to the left here and 50m down the road there are 2 large junipers along the right edge of the road. Just before these junipers walk into the ravine angling somewhat upstream. The pt is 205degrees from these 2 large junipers in a small clump of 4m tall aspen sandwiched between sagebrush uphill and a large willow patch downhill.
Point#9: Cross the bridge@ about 230m so that **pts are on the south side of the creek**. The pt is about 20m downstream from the bridge, in a small pine 2m upstream from 3 25cm dbh aspen trunks growing from the same point on the right bank
Point#10: Walk along the road past a wide pullout @ 210m. 10m before the next orange deep-snow –road-marker-post, cut toward the creek on a faint trail. Follow the top edge of the ravine to the pt which is on a 25cm dbh, 8m tall lodgepole pine, sandwiched between ceanothus uphill and a large willow patch downhill. There is a steep grassy bank across the creek.
Point#11: Walk down the road again until you reach the far end of the fork. Here your travels become more adventurous, as you head downhill through the Ceanothus. Head for the Easternmost corner of the flowery meadow on a shelf above the creek. Here the creek plummets down a booming waterfall, and the adjacent ground slopes steeply again to the southeast. The pt is at the top edge of this slope, 10m from the top of the falls, on a 20cm dbh, 4.5m tall Jeffrey pine.
Point#12: Follow the steep right bank staying close to the deafening stream. You will pass a particulary steep section of creek (a waterfall). Just downstream a huge semi-vegetated log lies lengthwise in the creek. The right slope opens up and is dominated by prunus, snowberry, and aspen saplings. The pt is on a shelf 10m uphill from the bottom of the huge river log, in a 1.5 m tall prunus shrub next to ceanothus and snowberry.
Point#13: From here I think it is easiest to follow the more open and gently sloping terrain 50-80m upslope from the creek. At 200m, on the left edge of the gentler terrain, you will pass 2 huge Jeffrey pine trunks leaning apart in a V-shape, the right one being shorter and more crooked. 10m before the next huge(>1m dbh) Jeffrey pine, there is a pair of 15cm dbh Whitebark Pines. The pt is on the forking Jeffrey pine 10 m downslop from these locally unique pines. But stand near the whitish pines for better detection of birds and personal safety.
Point#14: Follow the left edge of the open gentle terrain until it runs out @230m. Angle down thru prunus shrubs and then thru a cow parsnip thicket(lots of equisetum too). Pt is 13m from the creek in the alder just downslope from the cow parsnip.
Point#15: Charge through 70m of streamside thicket, to more open piney terrain. @ 100m there is a road on River left and the creek veers right. @190m cross the road and the creek **(the last pt is on the north)**. Pt is on an alder 10m from the creek 3m past a giant (1m dbh) red snag broken off @ 4m tall.

Appendix 2. Point count transect descriptions, 2001.

STATION: Upper West Walker River (UWWR) **POINT MARKER:** Orange flagging and standard metal tagging.
INTERVALS BETWEEN POINTS: 250m with GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: All points are on the West side of the creek and run downstream (#1) to upstream (#15). You will cross 3 side channels and get your feet wet. **Points 10, 11 and 12 are in a grassy meadow with very little other vegetation. The flagging marks a reference point for the actual point.**
ACCESS: Take 395 NE out of Bridgeport and 108 toward Sonora Pass. 6.6 miles west of the 395/108 junction, turn left into Leavitt Meadows campground. At 1st choice (ignoring the do not enter sign), go left and immediately park on the right in the DAY USE parking lot. Head down trail past bathrooms toward the creek and turn left at the campground road. Point is between Sites #6 and #8.

Point 1: Walk down the drainage between the two campground sites. Point is on a Ribes about 5m updrainage from the Black Cottonwoods and 15m from the River.
Point 2: Walk upstream out of campground and across small tributary. Drop to creek just after passing the group of old buildings into a "corral" (group of Lodgepoles with webbing around the trunks for tying up horses and mules). At the upstream end of this "corral", point is on a 4m Black Cottonwood, 8m from the River.
Point 3: Continue along fisher folk path. Point on 4m Yellow Willow right on edge of River and in line with the southernmost boulder lining the upslope parking lot.
Point 4: Continue along trail. Point is where the trail and a barbed-wire fence meet, next to a wooden "H" post, on a 5m Yellow Willow.
Point 5: Follow along trail. Point is on a 4.5m willow, 26m downstream from a side channel, about 20?m from the River.
Point 6: Continue along trail until you reach a line of conifers. Point is on a 3m Geyer's Willow, 5m from a Juniper that is the 6th away from the River in the line of conifers, and 35m west of the trail.
Point 7: Head SW across a patch of Artemisia and into the willows, toward the only Black Cottonwoods in sight. Point is on a 3m Geyer's Willow, 35m from the creek and 30m SE of the Cottonwoods.
Point 8 (250m @ 143 degrees from Point 7): Head southeast-ish, cross an open grassy area, and pass through line of trees at edge of this area. Continue through another open dry area to a 2nd line of trees. Point is on 6m Yellow Willow 30m from River on western edge of an *Artemisia* patch.
Point 9: Head SE toward a group of tall Lodgepole and Jeffrey Pines, keeping your sites on the tallest of the bunch that leans to the east. Point is on a Juniper in this group of pines, 10m from 3 Junipers on the edge of the River.
Point 10: Point is 27m upriver from the last (and marked) willow on the edge of the River. It is ½ way between this last willow and the next willow upstream, in the grass, unmarked.
Point 11: Point is on the grass/River edge, 17m upstream from a side channel of low growing willows. One of these willows is marked with the flagging and tagging, as a reference point.
Point 12: When you reach a large sandy/gravel patch down in the River Channel, walk across it. Point is on the River edge of the sand/gravel bar, across the River from 3m Juniper and 7 degrees (True) and 22m from a flagged Red Willow (northernmost of 3, 3m Red Willows in the middle of the wash).
Point 13: Head across the sage toward a 35m scraggly Lodgepole Pine with loose top branches. The point is on the southern edge of a side drainage on a 2.5m Yellow Willow, 17m toward the River from the scraggly Lodgepole and 33m from the River/side channel junction.
Point 14: Cut across oxbow, staying in line with a 30m Black Cottonwood in the distance, staying about 30m from the River. Point is on a 3m Yellow Willow on the west edge of a rocky wash. A root of an 11m downed Cottonwood snag points right to the point. Point ~ 30m from River edge.
Point 15: Continue upstream, but at 200m follow a "stringer" of side willows to the south west instead of following the main River channel. Stay on the southern edge of the willow "stringer". Point is on a 3m Willow clump, 7m from the base of the southern bank, and 25m "upstream" from a 5m Jeffrey Pine on the south bank.

Appendix 2. Point count transect descriptions, 2001.

STATION: Virginia (VIRG) **POINT MARKER:** Orange flagging and silver tree tags
INTERVALS BETWEEN POINTS: 250m, using GPS (as a crow flies) **TOTAL # POINTS:** 15

NOTES: All points are on the NW or W side of the creek, and no crossing of the creek is necessary. Points are 15 to 40 m off the creek. The route can be easily done in either direction, but points were set up from 1-15 (higher elevation to lower elevation). A bike could be left at either end and the surveyor could then ride back to Mono City, which is almost entirely downhill!
ACCESS: Drive up Virginia Creek road at Conway summit until you reach the "leaving National Forest" sign on left side. Park here. **To find point 15 as a starting point**, drive up the Virginia Creek road at Conway Summit to 100m before the Toiyabe National Forest sign. There is a solitary lodgepole between stands of young aspen. Go downhill to creek.

POINT # 1: From this sign, walk downhill, perpendicular to the road, to the creek. Point is on a reddish T-stake with white top at stream edge.

POINT # 2: 25 m downstream from a relatively large pale boulder on the stream edge. Point is in the first lodgepole group past the boulder, about 30m upstream from a smaller creek joining from NW.

POINT # 3: 20 m downstream from metal fire ring, 50 m upstream from fork in creek, between the campground road and the stream, near a 90 degree bend in the road. A tree adjacent to point has "LG" and a face carved in it.

POINT # 4: 30 m downstream from end of campground road and another metal fire ring, in lodgepole group. Point is in the middle of a gentle eastward slope, about 30 m from stream (so you can hear!).

POINT # 5: Along another dirt road, 45 m upstream from a place where young aspens are on both sides of road. Point is on a 2.25 m lodgepole adjacent to a much larger one.

POINT # 6: Following the road, 15 m upstream from the farthest-upstream camping area in this camping area. Point is on a 2 m aspen at edge of road.

POINT # 7: Follow the road through the camping areas and then stay with stream side-channel when road diverges to NW. Follow until 10m upstream from where the side channel connects with main stream. Point is 25 m from stream and 6 m from side channel.

POINT # 8: In willow clump 40m N of steam, 15m before a 5m lodgepole and 35m from the willow/grass edge. There's a 2m long flat rock 5m before the point.

POINT # 9: Walk through meadow. Point is 7m downstream from stream convergence with side channel in 1.5 m lodgepole at downstream end of lodgepole stand.

POINT # 10: In clearing, on fairly isolated lodgepole, 25m from stream near some larger rocks, 70m upstream from a log crossing the creek, and 20 m downstream from a 12m, flat-topped lodgepole.

POINT # 11: In wet meadowy area 1m downstream from where small side stream joins main creek. Point is on a 1.75m lodgepole, at "S" turn in creek.

POINT # 12: Just upstream from sage clearing with aspens to N and NW. Point is 20 m north of stream in lodgepole with a couple of stumps between point and stream. A small, flat rock that looks like a boot is right next to the tree (on downstream side).

POINT # 13: Follow the sage meadow until you reach a large greenish boulder, then turn 90 degrees and go towards creek. Point is in lodgepole towards creek from boulder at the pine/sage edge.

POINT # 14: In small grassy meadow where stream makes relatively large turn to W and then goes back to NE. Point on a willow on the W edge of the meadow, 20m upstream from a sagebrush break.

POINT # 15: On clump of willows 20m downstream from convergence of 2 stream channels, 60m upstream from road bridge, 25m down slope from a stand of young Aspens.

Appendix 2. Point count transect descriptions, 2001.

STATION: Wolf Creek = WOLF
POINT MARKER: Orange flagging and silver tree tags
INTERVALS BETWEEN POINTS: 250m, using GPS (as a crow flies)
TOTAL # POINTS: 15

NOTES: The first 10 points are easily paced, but keep in mind measurements are as the crow flies(ie. As the GPS measures) and depending on how straight the walk is you may have to pace farther than 250m. The terrain is fairly flat and there is not much vegetation so the points are pretty obvious. The remaining points drop down into a ravine and will involve traversing the steep slope. There is a road leading from pt. 14 out to the main rd. This is very useful for the shuttle when done in conjunction with SILV. When finished, either walk from WOLF 15(via small rd to R turn on Main rd to next L on RD023) to car parked at SILV15 (~30min.); Or park at WOLF 14, do this transect backwards and have SILV person walk from SILV 15 to WOLF 14.
ACCESS: Head north on hwy395 past Bridgeport. At Sonora Junction, take a left onto hwy108. After about 3.5 miles take a right at the 2nd turn at the USMC Mountain Warfare Training Center. Don't forget to set your watch to military time, and watch out for snipers. As you cross a paved crossroad your road will turn to gravel. About a mile up the road you will come to a fork with RD023. Stay left and continue to switchback up RD053. Your next fork will be with RD042. Take a left. Continue up this road until it ends (continues as a really bad 4x4 dirt track) at a campsite. Park at turnaround just before the campsite.
To start at point 15 drive past RD023 and then take your first left down a small rd which ends at a parking lot at point 14.

Point #1: From the Lodgepole Pine in the middle of the turnaround loop go 50m at 70 degrees. This will take you downstream and towards the creek to a Lodgepole Pine. From this tree head straight to the creek and the point is on a willow 2m from creek.
Point #2: Pace out 250m along the creek. You will pass a group of willows and you will see a large rock 50m in front of you. The point is on a sage brush on the creek bank.
Point #3: Continue through grass. You will pass a lone Pine and a lone Willow stand in the grass. ~50m past that Willow the point is on a Willow in the stream bank.
Point #4: Pace out 250m. The point is on a *Ribes* at the top of the bank, ~10m past the campsite.
Point #5: Walk along the creek, staying left of the Willows. Make your way through breaks in the Willows (well above the creek). At 250m there is a clearing. Point is on Lodgepole Pine 10m from creek.
Point #6: Continue downstream, keeping dense willows between you and the creek. At 250m there is a grove of Lodgepole Pines. Point is on a Willow down by the creek in line with the far end of the pines (it's before the Aspens).
Point #7: Pace your way through the sagebrush. At 250m there is a meadow with a Lodgepole Pine on its edge. The point is on a willow down at the creek 20m into the meadow.
Point #8: Follow your friend the creek for 250m. After passing Aspen, stay close to the water. Point is on a Lodgepole Pine where the creek makes a sudden U.
Point #9: Keep on the side of the bank where there is a faint path. Pass a gnarled Lodgepole Pine (~17m tall). Point is on 1.5m high, 1in diameter Fir tree ~5m from the creek. In the creek is a dead fallen pine.
Point #10: Head up the bank (for easier walking) and follow the creek across the road. Pass the bridge and the point is on the wall of willows in front of you. Pt is 5M from the boulders in the creek.
Point #11: Make your way through the Aspen grove (there is a faint path) and stay on top of the bank. At ~230m the creek veers right. Head down toward the creek at the huge Juniper? that is among the Aspen. Point is just past the huge Juniper on a small (4in diameter) Lodgepole Pine.
Point #12: Go back up to the rim. Go downstream and toward the creek through a grove of small Aspen (follow faint path). Head back to the rim and stay along the bank. At 250m go straight down the bank toward the creek. The point is on a *Ceanothus*, at the west edge of a Ceanothush thicket, 40M from the creek, and 30M from the top of the bluff, where the bank drops off into the canyon. To the west of the point is a large patch of mostly unvegetated dirt with a 2M diameter, very rotten and charred stump in the middle of it.
Point #13: Walk back up the bank to where you can traverse along the side (not all the way up to the rim), Head toward the creek whenever possible, following a faint path. At 110m go through the *Ceanothus* and head down toward the creek. Keep going along staying ~20m above the creek. At 210m ignore all the orange flagging. Our point is on a 10-12 m tall Fir, 15M from the top of the bluff, 20M from the creek. There is a nice rock to do the point at on the E side of the tree. 15M NE of the point is a 1M dbh snag broken off at 5Mtall. There are black cottonwoods just downstream from the pt.
Point #14: Go back up to the rim and make your way downstream staying fairly close to the canyon. At 140m head downstream and towards the creek (the rim veers). Find a faint path and continue along the side of the bank. Go down towards the creek at 250m via path. Point is on Jeffery Pine overlooking a bare, rocky parking area. This point may be closer to 260m.
Point #15: Head down toward creek. Stay near creek on faint path (don't take the road). Head up the bank a bit to avoid a slide area and stay along the rim. At 230m, at a group of willows, head to the creek. Point is on a 1ft diameter Cottonwood, 5M from the creek and cottonwood log which lies across the creek. A huge (1m diameter)Jeffery Pine), stands 25M upslope from the point. I don't recommend doing this point from the Cottonwood because the river is so loud. Try staying up near the Pine.

Appendix 2. Breeding status of all bird species observed at all sites, May 26 - August 8, 2001.

Common name	Latin name	LLIM	SILV	WOLF	UWWR	LIWA	BYDA	BUCK	ROBC	VIRG	GREU
California Gull	*Larus californicus*	~	~	~	~	0	0	~	~	~	~
Common Merganser	*Mergus merganser*	~	~	~	3	~	~	~	3	~	~
Mallard	*Anas platyrhynchos*	~	~	~	2	~	~	~	~	~	~
American Green-winged Teal	*Anas crecca*	~	~	~	3	~	~	~	~	~	2
Common Snipe	*Gallinago gallinago*	~	~	~	3	~	~	~	2	~	~
Spotted Sandpiper	*Actitis macularia*	~	~	~	1	3	~	3	2	~	2
Killdeer	*Charadrius vociferus*	~	~	~	3	~	~	~	~	~	~
California Quail	*Callipepla californica*	3	~	~	2	2	~	~	~	~	~
Mountain Quail	*Oreortyx pictus*	~	2	3	~	~	3	1	3	~	~
Blue Grouse	*Dendragapus obscurus*	3	~	3	~	~	~	~	3	~	~
Mourning Dove	*Zenaida macroura*	2	~	~	2	2	~	~	~	~	2
Turkey Vulture	*Cathartes aura*	0	~	~	~	0	0	~	0	0	~
Cooper's Hawk	*Accipiter cooperii*	~	~	~	~	~	2	~	~	~	~
Northern Goshawk	*Accipiter gentilis*	~	~	2	~	~	~	~	~	~	~
Red-tailed Hawk	*Buteo jamaicensis*	~	2	1	~	3	1	~	~	2	~
Red-shouldered Hawk	*Buteo lineatus*	~	~	~	2	~	~	~	~	~	~
Golden Eagle	*Aquila chrysaetos*	2	~	~	~	~	~	~	~	~	~
American Kestrel	*Falco sparverius*	~	~	~	~	2	~	2	~	~	~
Great Horned Owl	*Bubo virginianus*	~	~	2	~	~	~	~	~	~	~
Belted Kingfisher	*Ceryle alcyon*	~	~	~	~	~	~	2	2	~	~
White-headed Woodpecker	*Picoides albolarvatus*	~	~	~	~	~	~	~	2	2	~
Hairy Woodpecker	*Picoides villosus*	1	3	3	~	2	3	3	3	2	1
Red-breasted Sapsucker	*Sphyrapicus ruber*	2	2	3	3	3	1	1	1	3	1
Williamson's Sapsucker	*Sphyrapicus thyroideus*	~	1	~	~	~	1	~	~	~	~
Lewis' Woodpecker	*Melanerpes lewis*	~	~	~	~	~	2	~	~	~	~
Northern Flicker	*Colaptes auratus*	2	3	3	3	3	3	2	1	3	3
Common Poorwill	*Phalaenoptilus nuttallii*	~	~	2	~	~	~	2	~	~	~
Common Nighthawk	*Chordeiles minor*	3	~	~	2	~	~	~	~	~	~
Anna's Hummingbird	*Calypte anna*	~	~	~	2	~	~	~	~	~	~
Rufous Hummingbird	*Selasphorus rufus*	~	~	~	~	0	0	~	0	0	~
Calliope Hummingbird	*Stellula calliope*	3	3	3	3	~	~	~	3	~	3
Black Phoebe	*Sayornis nigricans*	2	~	~	~	2	~	~	~	~	~
Olive-sided Flycatcher	*Contopus cooperi*	~	3	2	~	~	3	3	2	~	~
Western Wood-Pewee	*Contopus sordidulus*	1	3	3	3	1	3	3	1	3	3

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

Appendix 2. Breeding status of all bird species observed at all sites, May 26 - August 8, 2001.

Common name	Latin name	LLIM	SILV	WOLF	UWWR	LIWA	BYDA	BUCK	ROBC	VIRG	GREU
Cordilleran Flycatcher	*Empidonax occidentalis*	~	~	~	~	~	~	~	~	~	3
Western Flycatcher	*E. occidentalis* or *difficilis*	~	~	2	~	~	~	~	3	~	~
Hammond's Flycatcher	*Empidonax hammondii*	~	~	0	~	~	~	~	~	~	~
Dusky Flycatcher	*Empidonax oberholseri*	~	3	3	3	~	3	~	2	3	3
Steller's Jay	*Cyanocitta stelleri*	3	3	3	3	3	1	3	3	3	3
Common Raven	*Corvus corax*	~	2	~	3	2	2	~	~	2	2
Clark's Nutcracker	*Nucifraga columbiana*	2	2	2	2	2	2	2	2	2	2
American Magpie	*Pica hudsonia*	~	~	~	2	3	~	~	~	~	~
European Starling	*Sturnus vulgaris*	~	~	~	1	3	~	~	2	~	~
Brown-headed Cowbird	*Molothrus ater*	3	2	2	3	1	2	3	3	2	3
Red-winged Blackbird	*Agelaius phoeniceus*	2	~	~	3	1	~	3	1	3	3
Western Meadowlark	*Sturnella neglecta*	~	~	~	~	2	~	~	~	~	~
Bullock's Oriole	*Icterus bullockii*	~	~	2	~	~	~	~	~	~	~
Brewer's Blackbird	*Euphagus cyanocephalus*	1	~	2	1	1	~	3	1	3	1
Cassin's Finch	*Carpodacus cassinii*	1	3	3	3	2	3	3	3	1	3
House Finch	*Carpodacus mexicanus*	~	~	~	~	~	3	~	~	2	~
Red Crossbill	*Loxia curvirostra*	~	2	~	~	~	~	~	~	2	~
Lesser Goldfinch	*Carduelis psaltria*	~	~	~	~	2	2	2	~	~	~
Pine Siskin	*Carduelis pinus*	2	2	3	~	~	2	3	2	3	3
Vesper Sparrow	*Pooecetes gramineus*	~	~	~	~	2	~	~	~	~	~
Savannah Sparrow	*Passerculus sandwichensis*	~	~	~	~	2	~	~	~	~	~
Mtn. White-crowned Sparrow	*Zonotrichia leucophrys oriantha*	~	~	1	~	1	3	~	~	1	~
Chipping Sparrow	*Spizella passerina*	2	1	2	~	~	2	1	2	2	~
Brewer's Sparrow	*Spizella breweri*	~	3	3	3	2	3	~	~	3	3
Oregon Junco	*Junco hyemalis thurberi*	1	1	1	3	1	1	3	3	1	3
Song Sparrow	*Melospiza melodia*	1	3	2	3	3	3	1	1	3	1
Lincoln's Sparrow	*Melospiza lincolnii*	~	2	2	~	~	~	~	~	2	~
Fox Sparrow	*Passerella iliaca*	~	3	1	2	2	1	2	3	3	3
Spotted Towhee	*Pipilo maculatus*	1	3	2	~	2	~	3	2	~	~
Green-tailed Towhee	*Pipilo chlorurus*	3	3	2	3	1	1	3	1	3	2
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	~	~	~	~	~	~	~	~	~	0
Black-headed Grosbeak	*Pheucticus melanocephalus*	2	1	~	2	1	2	2	3	~	2
Lazuli Bunting	*Passerina amoena*	~	2	2	~	~	3	~	~	~	2
Western Tanager	*Piranga ludoviciana*	1	2	2	2	2	2	1	3	3	3

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

Appendix 2. Breeding status of all bird species observed at all sites, May 26 - August 8, 2001.

Common name	Latin name	LLIM	SILV	WOLF	UWWR	LIWA	BYDA	BUCK	ROBC	VIRG	GREU
Cliff Swallow	*Petrochelidon pyrrhonota*	2	~	~	3	~	~	~	~	~	~
Tree Swallow	*Tachycineta bicolor*	~	~	~	2	1	2	~	1	~	2
Violet-green Swallow	*Tachycineta thalassina*	~	3	~	3	3	2	3	2	3	3
Bank Swallow	*Riparian riparia*	~	~	~	2	~	~	~	~	~	~
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	~	~	~	3	~	~	2	~	~	~
Cedar Waxwing	*Bombycilla cedrorum*	~	~	~	~	~	~	0	~	~	~
Warbling Vireo	*Vireo gilvus*	3	3	3	1	1	3	3	1	3	3
Cassin's Vireo	*Vireo cassinii*	3	~	~	2	2	2	~	~	~	~
Nashville Warbler	*Vermivora ruficapilla*	~	~	2	~	~	~	~	~	~	2
Orange-crowned Warbler	*Vermivora celata*	2	2	3	2	~	2	2	2	2	2
Yellow Warbler	*Dendroica petechia*	~	~	~	1	1	3	1	3	3	3
Audubon's Warbler	*Dendroica coronata audubonii*	1	1	1	2	2	3	1	3	1	3
Townsend's Warbler	*Dendroica townsendi*	~	~	~	~	~	~	~	~	0	~
Ovenbird	*Seiurus aurocapillus*	~	~	~	~	~	~	~	0	~	~
Northern Waterthrush	*Seiurus noveboracensis*	~	~	~	~	~	~	~	0	~	~
Mac Gillivray's Warbler	*Oporornis tolmei*	3	1	3	~	1	3	2	2	3	3
Common Yellowthroat	*Geothlypis trichas*	~	~	~	2	~	~	~	~	~	~
Wilson's Warbler	*Wilsonia pusilla*	~	~	2	~	~	2	~	~	~	2
American Dipper	*Cinclus mexicanus*	~	3	3	3	2	~	3	1	2	1
Rock Wren	*Salpinctes obsoletus*	~	~	~	~	~	2	~	~	~	~
Bewick's Wren	*Thryomanes bewickii*	~	~	~	~	~	2	~	~	~	~
House Wren	*Troglodytes aedon*	3	2	2	1	3	3	3	3	~	3
Winter Wren	*Troglodytes troglodytes*	~	~	~	~	~	~	~	2	~	~
Brown Creeper	*Certhia americana*	3	3	3	3	3	1	1	3	2	3
White-breasted Nuthatch	*Sitta carolinensis*	~	~	~	1	2	3	3	2	~	~
Red-breasted Nuthatch	*Sitta canadensis*	2	~	~	~	~	2	~	2	~	~
Mountain Chickadee	*Poecile gambeli*	1	3	3	1	1	3	3	3	3	3
Golden-crowned Kinglet	*Regulus satrapa*	~	2	~	~	~	~	~	3	3	2
Ruby-crowned Kinglet	*Regulus calendula*	~	3	~	~	~	~	~	~	3	~
Blue-gray Gnatcatcher	*Polioptila caerulea*	~	~	~	~	~	~	~	2	~	~
Townsend's Solitaire	*Myadestes townsendii*	1	3	3	1	~	3	3	2	2	2
Swainson's Thrush	*Catharus ustulatus*	~	~	~	~	~	~	~	2	~	~
Hermit Thrush	*Catharus guttatus*	~	3	3	~	~	~	~	~	3	~
American Robin	*Tudus migratorius*	1	1	1	1	1	1	1	1	1	1
Mountain Bluebird	*Sialia currucoides*	~	~	~	~	3	2	~	~	~	~

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