

**Distribution and Status of Breeding Birds in the Sky Islands of
Northern Sonora, Mexico**

2011 Annual Report

Prepared by:

Aaron D. Flesch¹, Carlos González Sánchez, and Richard L. Hutto
Avian Science Center
Division of Biological Sciences
University of Montana
32 Campus Drive
Missoula, MT 59812
Office: 406-243-6499

¹aaron.flesch@umconnect.umt.edu

Prepared for:

Nancy Wilcox
Chiricahua National Monument
12856 East Rhyolite Creek Rd
Willcox, AZ 85643
520-366-5515
Nancy_wilcox@nps.gov



Oak woodland in the Sierra San Antonio

December 2011

INTRODUCTION

The Madrean Sky Islands region includes more than 30 distinct mountain ranges located at the northern end of the Sierra Madre Occidental and is bisected by the U.S.-Mexico border (McLaughlin 1995, Warshall 1995). The Sky Islands support isolated stands of montane vegetation dominated by pines (*Pinus* sp.) and oaks (*Quercus* sp.) that arise from lowland “seas” of desert scrub and grassland (Heald 1993). The Sky Islands region occupies portions of a broad transition zone between the Nearctic and Neotropical faunal realms and supports flora and fauna with affinities to the Madrean, Petran (Rocky Mountain), Chihuahuan, Sinaloan, and Sonoran biogeographic provinces. Despite high diversity, little information is available to guide management and conservation planning in the Sky Islands of Mexico because knowledge of plant and animal distribution and ecological factors that drive distribution and diversity are limited (White 1948, Marshall 1957, Lomolino et al. 1989, Flesch 2008).

In 2008, the National Park Service sponsored researchers at University of Arizona (UA) and University of Montana (UM) to work in collaboration with Comisión Nacional de Áreas Naturales Protegidas (CONANP) to describe bird communities and bird-habitat relationships throughout the Sky Islands region of northern Mexico. CONANP manages Reserva Forestal Nacional y Refugio de Fauna Silvestre Sierras de los Ajos-Bavispe that is approximately 180,000 ha in area and includes portions of seven major Sky Islands. Soon after, Sky Island Alliance (SIA), a Tucson-based NGO focused on conservation of the Sky Islands region, was sponsored by the Veolia Environment Foundation of France to gather and synthesize data on plant and animal occurrence and to build capacity for conservation and management in the region. Because both projects included similar goals, we meet in January 2009 to coordinate and increase the capacity of our efforts.

In May 2009, UA and UM biologists began field work in the Sky Islands with the assistance of two Mexican biologists and CONANP. During our first field season, we surveyed 30 transects in six Sky Islands and detected 119 species of birds, 91% of which were presumably breeding in montane vegetation communities (Flesch et al. 2009). In 2010, we more than doubled that effort by surveying 63 transects in ten Sky Islands and detecting 135 species, 89% of which were at least presumably breeding (Flesch et al. 2010). In 2011, we implemented a short field season with the goal of conserving much of our remaining resources in the hopes they would be supplemented by additional support. That support was granted by the U.S. Fish and Wildlife Service in 2011 and will enable us to expand our efforts, visit virtually all Sky Islands in Sonora and the adjacent Sierra Madre Occidental, and complete field work in July 2012. In 2011, we surveyed 23 transects in four Sky Islands and detected 123 species of birds. This annual report summarizes our field efforts and accomplishments during the 2011 field season.

METHODS

We used several field methods to estimate the presence and abundance of birds in the Sky Islands during the breeding season between early May and mid July. To estimate abundance, we used distance sampling at point-count stations that we surveyed for 8 minutes and placed 200-300 m apart along transects of 5-10 points (Buckland et al. 2001). Distance sampling involves

measuring distances to all birds that are detected during the count period, which allows estimates of abundance to be adjusted for variation in detection probability (Thomas et al. 2005). We placed transects along canyon bottoms and on slopes and ridges in representative areas across a range of vegetation communities. Along each point transect, we simultaneously estimated the total number of individuals, pairs, or flocks of each species that we detected and included observations made before, during, and after point-count surveys. This method is similar to that used by Marshall (1957) to survey birds in the region in the 1950s and will allow comparisons between studies. We also noted species that were detected incidentally away from transects and used all observations to compile species lists for each Sky Island. To classify breeding status, we used standardized techniques (North American Ornithological Atlas Committee 1990) and our knowledge of bird distribution in the region (Russell and Monson 1998, Flesch 2008). To estimate occupancy of nocturnal species, we broadcasted recorded vocalizations at night along transects and in camp on an opportunistic basis. To describe the structure and composition of vegetation and habitat, and the type and intensity of land use and natural disturbance, we measured a range of environmental variables including density of trees and snags, plant species composition and physiognomy, vegetation volume, and other variables at each station. These methods will be described in greater detail in the future.

EFFORT

Between 2 May and 6 June 2011, we surveyed birds and habitat in four Sky Islands: Sierra San Antonio, Sierra Elenita, Sierra Pan Duro, and Sierra San Luis (Fig. 1). In 2011, we surveyed 165 stations along 23 transects totaling approximately 30.1 km of effort (Table 1). Stations were located between 1,410 and 2,480 m elevation and covered most montane vegetation communities that were present in these ranges. Effort was higher in large mountain ranges that supported a variety of vegetation communities (Sierra San Juan) and lower in small mountain ranges that supported mainly oak woodland (Sierra San Antonio). Effort in the Sierra San Antonio was limited to areas in the southern portion of the range; access to higher elevations will be requested in 2012. In the Sierra Elenita, we expanded efforts that began in 2009 by surveying pine forest and pine-oak woodland on and near the summit. Together with effort during 2009 and 2010 (Flesch et al. 2009, 2010), we have surveyed 804 points along 115 transects in 17 Sky Islands.

RESULTS

We detected 123 species of birds during the 2011 field season including 88 (72%) that were at least presumably breeding and 6 that we confirmed breeding (Table 2, Appendix 1). We also observed 39 species that were either migrating or potentially breeding at lower elevations outside the study area. Detection of a higher proportion of non-breeders than during past seasons was a result of late migration and because surveys ended in early June when large numbers of migrants were still moving through the region. Breeding species richness was highest in Sierra San Luis (73) and Sierra Pan Duro (57), which are the largest Sky Islands we surveyed in 2011.

During point-count surveys, we detected a total of 2,268 individuals, pairs, or flocks of 112 species and an average of 13.7 ± 0.4 (\pm SE) individuals, pairs, or flocks per point count.

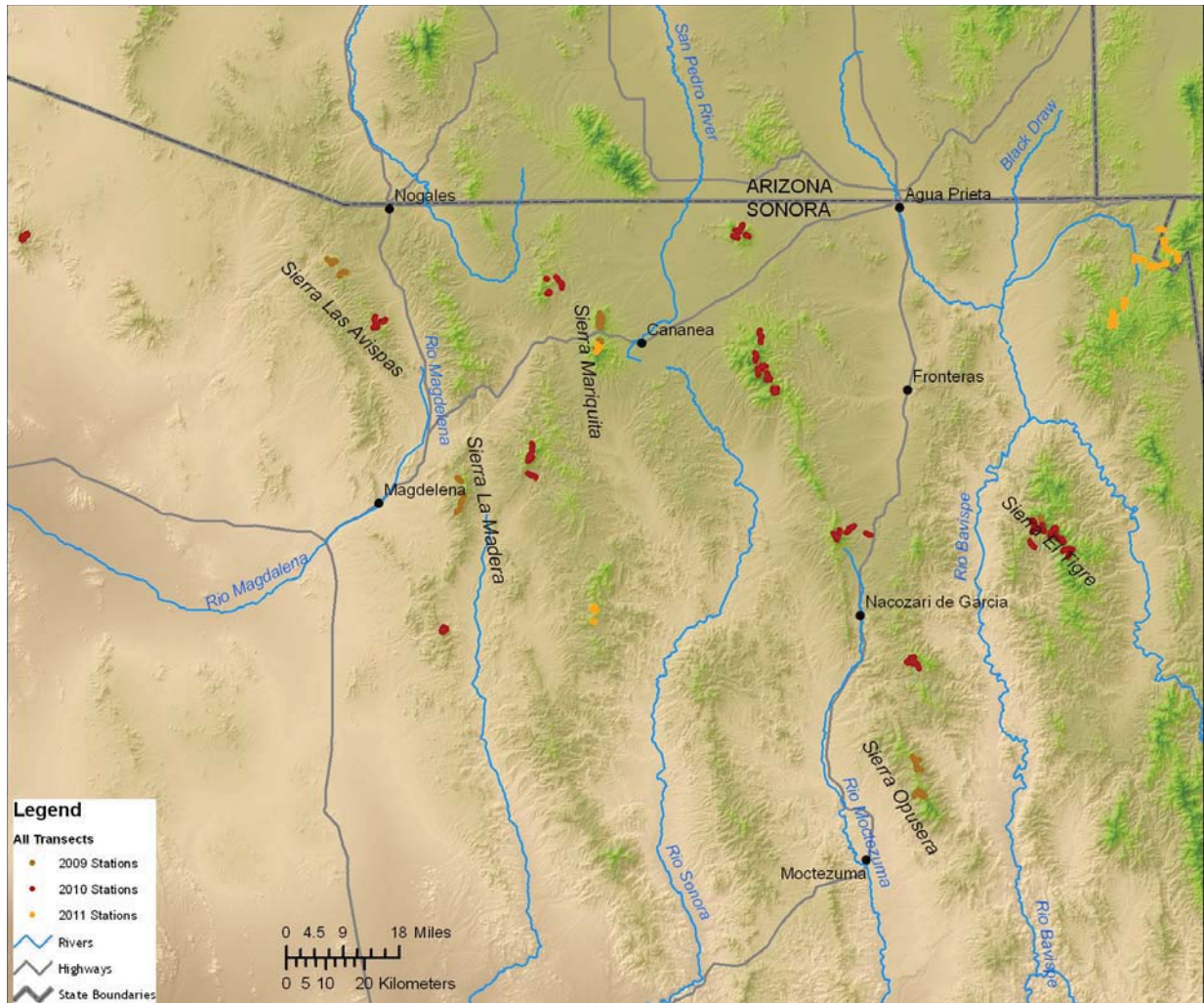


Figure 1: Study area and location of transects surveyed for birds and habitat in the Sky Islands of Sonora, Mexico 2009-2011. Map provided by Louise Misztal of SIA.

During transect surveys, we detected an average of 41 ± 2 species (range 23-59) and 144 ± 10 individuals, pairs, or flocks (range 76-236) per transect or an average of 11.5 ± 1.1 bird encounters per 100 m of transect effort.

Table 1: Location, timing, and effort during bird and vegetation surveys in the Sky Islands of Sonora, Mexico, 2011.

Sky Island	Dates	No. of Transects	Elevation minimum (m)	Elevation maximum (m)
Sierra San Antonio	5/2 to 5/4	3	1,420	1,970
Sierra Elenita	5/5 to 5/6	3	1,950	2,480
Sierra Pan Duro	5/19 to 5/24	6	1,630	2,170
Sierra San Luis	5/13 to 5/18 and 6/3 to 6/6	11	1,410	2,320

Table 2: Richness and breeding status of birds detected during surveys in four Sky Islands in Sonora, Mexico, May-June 2011. Observed species were detected outside of breeding habitat or were spring passage migrants. We used the criteria of the North American Ornithological Atlas Committee (1990) to classify breeding status.

Island Name	Unknown Status	Migratory or Non-breeding	Presumed Breeding	Confirmed Breeding	Breeding Richness	Total Richness
Sierra San Antonio	1	22	42	0	42	65
Sierra Elenita	1	18	47	2	49	68
Sierra Pan Duro	2	21	57	0	57	80
Sierra San Luis	4	24	70	3	73	101
All Sierras	3	39	88	5	88	123

We gathered several noteworthy observations of birds during the 2011 field season. For example, we observed a Northern Saw-whet Owl in potential breeding habitat during the breeding season in the Sierra San Luis on 3 June, which is the first potential breeding locality for this species in Sonora and only the second known record in the state. We observed an agitated pair of Northern Goshawks in the Sierra Pan Duro in tall pine-oak woodland and observed a nest of this species with sign of recent occupation (feathers and scat) in tall pine forest on the north side of the Sierra Elenita. We observed one singing Black-chinned Sparrow in dense cover of shrubs and short trees in the Sierra San Luis, which is only the second potential breeding locality for this species in Sonora. We observed a pair of Pine Siskins exhibiting courtship behavior at the edge of a high montane meadow in the Sierra Elenita suggesting the species may breed there; this is the only suggestive evidence of breeding by this species in Sonora. Also of note, we detected Wild Turkey, Short-tailed Hawk, and Spotted Owl in three of the four Sky Islands we surveyed during the 2011 field season (Appendix A).

OUTREACH

With salary support from SIA, we hired and trained a Mexican biologist, Francisco Javier Valenzuela Amarillas during the 2011 field season. Javier assisted with field surveys by completing vegetation and habitat measurements at bird survey stations. Through this experience Javier developed his knowledge of the region's flora and fauna and gained experience using survey techniques to describe bird and vegetation communities. Training and salary support for Javier and other Mexican biologists that we have worked with during the past three field seasons enabled us to provide outreach to local biologists in the Sky Islands region of Sonora and to help build capacity for conservation and research in northern Mexico.

ACKNOWLEDGMENTS

We thank Larry Norris and Nancy Wilcox of the National Park Service for supporting this effort. We are especially grateful to our field technicians David Kramer and Francisco Javier Valenzuela Amarillas for their efforts. For assistance in 2011, we thank Valer Austin, Ruben Ruiz, and Jose Franco for granting us access to their private land and assisting with logistics in

the Sierras San Luis and Pan Duro. In the Sierra San Antonio we thank Jesús Elías-Pellat of Rancho La Ciéneguita for granting us access. During past years, we thank landowners too numerous to list for assisting with access and logistics. We are grateful to our partners in Mexico, Rosa Elena Jimenez Maldonado, Luis Portillo, and Mario Cirett Galán of CONANP for facilitating our efforts and for providing us with information and logistical support across the region. Trevor Hare, Tom Van Devender, Acasia Berry, Sky Jacobs, Melanie Emerson, and Sergio Avila of Sky Island Alliance provided invaluable administrative or logistical support and Louise Misztal of Sky Island Alliance provided Fig. 1 and assisted with GIS.

LITERATURE CITED

- Buckland, S. T., D. R. Anderson, K. P. Burnham, J. L. Laake, D. L. Borchers, and L. Thomas. 2001. *Introduction to Distance Sampling: Estimating Abundance of Biological Populations*. Oxford University Press, Oxford, England.
- Flesch, A. D. 2008. Distribution and status of breeding landbirds in northern Sonora, Mexico. *Studies in Avian Biology* 37:28-45.
- Flesch, A. D., M. D. Larson, and R. L. Hutto. 2009. Distribution and status of breeding birds in the Sky Islands of northern Sonora. 2009 Annual Report to National Park Service. See: http://avianscience.dbs.umt.edu/projects/documents/SkyIslandBirdsAnnualReport2009_Fleschetal..pdf
- Flesch, A. D., R. Stone, and R. L. Hutto. 2010. Distribution and status of breeding birds in the Sky Islands of northern Sonora. 2010 Annual Report to National Park Service. See: http://avianscience.dbs.umt.edu/projects/documents/SkyIslandBirdsAnnualReport2010_Fleschetal..pdf
- Heald, W. F. 1993. *The Chiricahua Sky Island*. Bantlin Press, Tucson, Arizona.
- Lomolino, M. V., Brown, J. H., Davis, R. 1989. Island biogeography of montane forest mammals in the American Southwest. *Ecology* 70:180-194.
- Marshall, J. T. Jr. 1957. Birds of pine-oak woodland in southern Arizona and adjacent Mexico. *Pacific Coast Avifauna* 32:1-125.
- McLaughlin, S. P. 1995. An overview of the flora of the Sky Islands, southeastern Arizona: Diversity, affinities, and insularity. Pp. 60-70 in L.F DeBano et al. (editors). *Biodiversity and management of the Madrean Archipelago*. Gen. Tech. Rep. RM-GTR 264. Fort Collins, CO: U.S. Department of Agriculture, Forest Service.
- North American Ornithological Atlas Committee. 1990. Handbook for atlasing North American breeding birds: <http://www.bsc-eoc.org/norac/atlascont.htm>.
- Russell, S. M. and G. Monson. 1998. *The birds of Sonora*. University of Arizona Press, Tucson, Arizona.

Thomas, L., J. L. Laake, et al. 2005. Distance 5.0. Release Beta 5. Research unit for wildlife population assessment, University of St. Andrews, U.K. <http://www.ruspa.st-and.ac.uk/distance>.

Warshall, P. 1995. The Madrean Sky Island Archipelago: a planetary overview. Pp. 7-18 *in* L. F. DeBano et al. (editors). Biodiversity and management of the Madrean Archipelago. USDA Forest Service General Technical Report RM-GTR 264. USDA Forest Service, Rocky Mountain Research Station, Ft. Collins, Colorado.

White, S. S. 1948. The vegetation and flora of the region of the Río Bavispe in northeastern Sonora, Mexico. *Lloydia* 11:229-302.

Appendix 1: Distribution and status of 123 bird species detected during surveys in four Sky Islands in Sonora, Mexico May-June 2011. Status is classified as unknown (?), non-breeding (O), presumed breeding (P), or confirmed breeding (C).

Common Name	Scientific Name	San Antonio	Elenita	Pan Duro	San Luis
Mallard	<i>Anas platyrhynchos</i>			O	
Gambel's Quail	<i>Callipepla gambelii</i>				P
Montezuma Quail	<i>Cyrtonyx montezumae</i>	P	P	P	P
Wild Turkey	<i>Meleagris gallopavo</i>	P		P	P
Turkey Vulture	<i>Cathartes aura</i>	O	O	O	O
Sharp-shinned Hawk	<i>Accipiter striatus</i>		P		P
Cooper's Hawk	<i>Accipiter cooperii</i>		P	P	C
Northern Goshawk	<i>Accipiter gentilis</i>		C	P	
Gray Hawk	<i>Buteo nitidus</i>	P			
Short-tailed Hawk	<i>Buteo brachyurus</i>		P	P	P
Zone-tailed Hawk	<i>Buteo albonotatus</i>	P	P	P	P
Red-tailed Hawk	<i>Buteo jamaicensis</i>	P	P	P	C
Peregrine Falcon	<i>Falco peregrinus</i>				P
Band-tailed Pigeon	<i>Patagioenas fasciata</i>			P	P
White-winged Dove	<i>Zenaida asiatica</i>	P			O
Mourning Dove	<i>Zenaida macroura</i>			P	P
Common Ground-Dove	<i>Columbina passerina</i>			P	
Greater Roadrunner	<i>Geococcyx californianus</i>	P	P	P	P
Western Screech-Owl	<i>Megascops kennicottii</i>			P	
Whiskered Screech-Owl	<i>Megascops trichopsis</i>	P		P	P
Great Horned Owl	<i>Bubo virginianus</i>				P
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>	P	P	P	P
Elf Owl	<i>Micrathene whitneyi</i>				P
Spotted Owl	<i>Strix occidentalis</i>	P	P		P
Northern Saw-whet Owl	<i>Aegolius acadicus</i>				?
Common Poorwill	<i>Phalaenoptilus nuttallii</i>		P		P
Whip-poor-will	<i>Caprimulgus vociferus</i>		P	P	P
Vaux's Swift	<i>Chaetura vauxi</i>	O			
White-throated Swift	<i>Aeronautes saxatalis</i>	P	P	P	P
Broad-billed Hummingbird	<i>Cyananthus latirostris</i>	P			P
Blue-throated Hummingbird	<i>Lampornis clemenciae</i>			P	
Black-chinned Hummingbird	<i>Archilochus alexandri</i>	O			
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>	O	P	P	P
Elegant Trogon	<i>Trogon elegans</i>	P	P		P
Acorn Woodpecker	<i>Melanerpes formicivorus</i>	P	P	P	P
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>			O	O
Ladder-backed Woodpecker	<i>Picoides scalaris</i>	P			
Hairy Woodpecker	<i>Picoides villosus</i>		P		P
Arizona Woodpecker	<i>Picoides arizonae</i>	P	P	P	C
Northern Flicker	<i>Colaptes auratus</i>		P	P	P
Greater Pewee	<i>Contopus pertinax</i>		P	P	P
Western Wood-Pewee	<i>Contopus sordidulus</i>	O	P	P	P

Common Name	Scientific Name	San Antonio	Elenita	Pan Duro	San Luis
Willow Flycatcher	<i>Empidonax traillii</i>				O
Hammond's Flycatcher	<i>Empidonax hammondii</i>	O	O	O	O
Gray Flycatcher	<i>Empidonax wrightii</i>	O		O	O
Dusky Flycatcher	<i>Empidonax oberholseri</i>	O	O	O	O
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	O	O		O
Cordilleran Flycatcher	<i>Empidonax occidentalis</i>			P	P
Buff-breasted Flycatcher	<i>Empidonax fulvifrons</i>		P	P	P
Black Phoebe	<i>Sayornis nigricans</i>			P	
Dusky-capped Flycatcher	<i>Myiarchus tuberculifer</i>	P	P	P	P
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	P			P
Sulphur-bellied Flycatcher	<i>Myiodynastes luteiventris</i>				P
Cassin's Kingbird	<i>Tyrannus vociferans</i>	P	P	P	P
Gray Vireo	<i>Vireo vicinior</i>				?
Plumbeous Vireo	<i>Vireo plumbeus</i>	O	P	O	P
Hutton's Vireo	<i>Vireo huttoni</i>	P	P	P	P
Warbling Vireo	<i>Vireo gilvus</i>	O	O	O	O
Steller's Jay	<i>Cyanocitta stelleri</i>	?	P	P	P
Western Scrub-Jay	<i>Aphelocoma californica</i>				P
Mexican Jay	<i>Aphelocoma ultramarina</i>	P	P	P	P
Common Raven	<i>Corvus corax</i>	P	P	P	P
Violet-green Swallow	<i>Tachycineta thalassina</i>	O	O	?	O
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>			O	O
Mexican Chickadee	<i>Poecile sclateri</i>			P	P
Bridled Titmouse	<i>Baeolophus wollweberi</i>	P	P	P	P
Bushtit	<i>Psaltriparus minimus</i>	P	P	P	P
White-breasted Nuthatch	<i>Sitta carolinensis</i>	P	P	P	P
Brown Creeper	<i>Certhia americana</i>		P	P	P
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>	P			
Rock Wren	<i>Salpinctes obsoletus</i>			P	P
Canyon Wren	<i>Catherpes mexicanus</i>	P	P	P	P
Sinaloa Wren	<i>Thryothorus sinaloa</i>	P			
Bewick's Wren	<i>Thryomanes bewickii</i>	P	P	P	P
House Wren	<i>Troglodytes aedon</i>	O	P	?	P
Ruby-crowned Kinglet	<i>Regulus calendula</i>	O	O	O	O
Blue-gray Gnatcatcher	<i>Poliophtila caerulea</i>	P	P	P	P
Eastern Bluebird	<i>Sialia sialis</i>		P		
Western Bluebird	<i>Sialia mexicana</i>			P	P
Townsend's Solitaire	<i>Myadestes townsendi</i>		O		
Swainson's Thrush	<i>Catharus ustulatus</i>				O
Hermit Thrush	<i>Catharus guttatus</i>	O	O	O	O
American Robin	<i>Turdus migratorius</i>		P	P	P
Northern Mockingbird	<i>Mimus polyglottos</i>				P
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>	P			
Crissal Thrasher	<i>Toxostoma crissale</i>			P	

Common Name	Scientific Name	San Antonio	Elenita	Pan Duro	San Luis
Olive Warbler	<i>Peucedramus taeniatus</i>		P	P	P
Orange-crowned Warbler	<i>Vermivora celata</i>				O
Lucy's Warbler	<i>Vermivora luciae</i>	P			
Audubon's Warbler	<i>Dendroica coronata auduboni</i>		O	O	O
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>	O	P	P	P
Townsend's Warbler	<i>Dendroica townsendi</i>	O	O	O	O
Hermit Warbler	<i>Dendroica occidentalis</i>	O	O		
Grace's Warbler	<i>Dendroica graciae</i>		C	P	P
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	O	O		O
Wilson's Warbler	<i>Wilsonia pusilla</i>	O	O	O	O
Red-faced Warbler	<i>Cardellina rubrifrons</i>			P	P
Painted Redstart	<i>Myioborus pictus</i>	P	P	P	P
Rufous-capped Warbler	<i>Basileuterus rufifrons</i>	P			
Yellow-breasted Chat	<i>Icteria virens</i>				O
Green-tailed Towhee	<i>Pipilo chlorurus</i>		O		O
Spotted Towhee	<i>Pipilo maculatus</i>	P	P	P	P
Canyon Towhee	<i>Pipilo fuscus</i>	P			P
Rufous-crowned Sparrow	<i>Aimophila ruficeps</i>	P	P	P	P
Five-striped Sparrow	<i>Aimophila quinquestriata</i>			O	
Chipping Sparrow	<i>Spizella passerina</i>				?
Black-chinned Sparrow	<i>Spizella atrogularis</i>				P
Lark Sparrow	<i>Chondestes grammacus</i>				P
Dark-eyed Junco	<i>Junco hyemalis</i>			O	
Yellow-eyed Junco	<i>Junco phaeonotus</i>		P	P	P
Hepatic Tanager	<i>Piranga flava</i>	P	P	P	P
Summer Tanager	<i>Piranga rubra</i>				P
Western Tanager	<i>Piranga ludoviciana</i>	O	O	O	?
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	P	P	P	P
Lazuli Bunting	<i>Passerina amoena</i>	O	O	O	O
Great-tailed Grackle	<i>Quiscalus mexicanus</i>			O	
Brown-headed Cowbird	<i>Molothrus ater</i>			P	P
Hooded Oriole	<i>Icterus cucullatus</i>	P		O	P
Bullock's Oriole	<i>Icterus bullockii</i>		O		O
Scott's Oriole	<i>Icterus parisorum</i>	P	P	P	P
House Finch	<i>Carpodacus mexicanus</i>	P		P	P
Pine Siskin	<i>Spinus pinus</i>		?	O	O
Lesser Goldfinch	<i>Spinus psaltria</i>				P