

PURPLE MARTIN MONITORING AFTER A WILDFIRE IN THE LINCOLN
NATIONAL FOREST, NEW MEXICO – 2006 RESULTS



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EXECUTIVE SUMMARY

In 2000, a wildfire burned approximately 6,500 ha of coniferous forest in the Lincoln National Forest in south-central New Mexico. During general point count surveys in four years following the fire (2002-2005), Hawks Aloft documented Purple Martins among the species using snags in burned areas of the forest. In 2006, Hawks Aloft received funding support from the USDA Forest Service and the Purple Martin Conservation Association to locate and monitor Purple Martin colonies. Based on previous detections of Purple Martins, we searched ten select areas to 1) identify Purple Martin colony sites, 2) determine specifications of snags used by Purple Martins, and 3) establish an easily repeated framework for determining temporal trends in Purple Martin numbers.

We found four active Purple Martin colonies and a cumulative total of 34 Purple Martins. Among the colonies, we documented 10 active nest trees containing at least 15 active nest cavities. Purple Martins usually nested and perched high above the ground in large snags. Average diameter at breast height for nest trees was 37.2 ± 8.4 cm (95% confidence interval), and average nest cavity height was 8.5 ± 1.1 m. We measured 44 snags used as perches by Purple Martins. Average diameter at breast height for perching snags was 33.2 ± 4.5 cm. We encourage the USDA Forest Service to preserve known Purple Martin nesting sites in the Lincoln National Forest and to protect at least some areas with clusters of large snags when considering future post-fire management plans. We recommend revisiting each colony and maintaining a consistent search effort in future years to determine temporal changes for Purple Martins in burned portions of the Lincoln National Forest.

INTRODUCTION

The Purple Martin (*Progne subis*) is a popular and widespread summer resident swallow in North America, yet there are marked differences between martin populations occurring in the western versus the eastern United States (Brown 1997). Purple Martins in the eastern United States nest almost exclusively in artificial birdhouses erected near human habitation, whereas most western populations have not made that conversion from natural nest sites, and still use old woodpecker holes or other natural cavities (Banks and Orr 1965). Eastern populations generally avoid mountainous areas, whereas many local populations in the west are in high-elevation coniferous forests. Purple Martins in the east almost always form large colonies associated with apartment-style birdhouses; colonies in the west may also be large, but they sometimes consist of just one solitary pair. Because western Purple Martins are less common, more local in distribution, and still rely heavily on natural nest sites, there have been fewer research and monitoring programs aimed at conserving western Purple Martin colonies (Stutchbury 1991).

In 2000, a wildfire burned approximately 6,500 ha of coniferous forest in the Lincoln National Forest in south-central New Mexico. During general point count surveys in four years following the fire (2002-2005), Hawks Aloft (2005) documented Purple Martins among the species using snags in burned areas of the forest. We recorded a yearly increase in detections during our monitoring, but none of the detections occurred in unburned forest. Therefore, we considered that the fire probably created suitable habitat, and the lack of post-fire salvaging of snags allowed colonies to become established and perhaps grow. Because Purple Martins were usually detected at a considerable distance from survey points, we knew little about the colonies. It was

unclear how many colonies existed, how many birds comprised each colony, and what types of snags the birds were using. We considered that establishing a monitoring study could provide that information, as well as provide temporal trends in a western landscape with at least a temporary surplus of nesting habitat.

In 2006, Hawks Aloft partnered with the USDA Forest Service and the Purple Martin Conservation Association to locate and monitor Purple Martin colonies in burned portions of the Lincoln National Forest. We pursued three objectives in a week-long summer visit to the forest: 1) identify Purple Martin colony sites, 2) determine specifications of snags used by Purple Martins for perching and nesting, and 3) establish an easily repeated framework for determining temporal trends in local Purple Martin numbers. Our results are intended to help the Forest Service protect current nesting sites in the Lincoln National Forest and to contribute to future post-fire salvage and snag management plans. Our results are also intended to help the Purple Martin Conservation Association continue to promote Purple Martin awareness and conservation in western landscapes.

STUDY AREA

We conducted the study in the Lincoln National Forest, Sacramento Ranger District, approximately 30 km southeast of Cloudcroft, in central Otero County, New Mexico. We searched for Purple Martin colonies in several burned canyons where we conducted seasonal sets of point count surveys from 2002-2005: Pendleton, Potato-Pepper, Seep, Wayland, and Woods (Hawks Aloft 2005). Although these sites were within the boundary of the 2000 fire, they contained both burned and unburned forest

patches of varying sizes. Dominant tree species included Douglas-fir (*Psuedotsuga menziesii*), white fir (*Abies concolor*), southwestern white pine (*Pinus strobiformis*), quaking aspen (*Populus tremuloides*), and ponderosa pine (*Pinus ponderosa*). Burned areas contained numerous snags and successional understory plants, including gambel oak (*Quercus gambelii*), New Mexico locust (*Robinia neomexicana*), and elders (*Sambucus* spp.). Plentiful cavities in snags provided nest sites for a variety of avian species, the most abundant being Violet-green Swallow (*Tachycineta thalassina*), Western Bluebird (*Sialia mexicana*), and Hairy Woodpecker (*Picoides villosus*). The search areas contained considerable slope with relatively flat areas on hilltops and in small valleys. Elevation ranged from 2,200 m to just over 2,800 m. Extreme drought conditions forced the closure of the Lincoln National Forest to all public access from early May through June 2006, but monsoon season rainfall shortly thereafter allowed the forest to be reopened in time for our scheduled July monitoring visit.

METHODS

Our search for Purple Martin colonies was based on observation data from point count surveys, narrowed to ten potential areas (Table 1). The observations representing these areas were not all necessarily birds associated with colonies. Therefore, we visited each potential area from 10-14 July 2006 to first determine the presence of an active Purple Martin colony. We selected July, because we considered that Purple Martins might be feeding nestlings at this time, rather than incubating, and thus be easier to detect (Stutchbury 1991). We considered an active colony to be one or more Purple Martins seen entering one or more cavities, or lingering near a cavity opening. We spent a

minimum of one hour at a potential site. If we did not observe Purple Martins during that time, we expanded our spatial coverage for another hour or more to include adjacent slopes or canyons. If we observed Purple Martins and determined the presence of an active colony, we recorded Universal Transverse Mercator (UTM) easting and northing coordinates (Zone 13, North American Datum 27) to document the location. We used one observer and conducted searches during all daylight hours; however, afternoon lightning storms curtailed field work on some days.

Immediately upon documenting an active Purple Martin colony, we selected an inconspicuous observation point and quietly watched the colony for a 60-min period. If our presence appeared to disturb the Purple Martins, we moved to a more remote location and restarted the observation period. During the observation, we repeatedly counted the minimum number of Purple Martins visible, excluding any nestlings visible at cavity openings. For each colony, we present the maximum number of martins tallied during any one count within that hour. During our observation, we also recorded the elevation of the colony (using a hand-held Garmin GPS unit), noted active nest cavities and perches, documented the presence of other cavity-nesting species and any interactions with martins, and noted the habitat. Our habitat description included general indications of snag density, the proximity of unburned forest, and identification of understory plants.

At the end of the 60-min observation period, we measured the snags that we had observed Purple Martins use as perches or nest sites. We measured the diameter of each snag at breast height (DBH) using metal calipers. We present an average DBH for both perching snags and nesting snags, for each colony and for all colonies combined. We also estimated the height of each active cavity above the ground and the minimum number of

young visible in cavities. We present the number of active cavities observed and the average height of cavities, for each colony and for all colonies combined. We provide a list of UTM coordinates for all nest trees in Appendix 1 and a list of all bird species encountered during field work at the sites in Appendix 2.

RESULTS

We found active Purple Martin colonies in four of the ten areas searched in 2006 (Table 1, Fig. 1). We expected to find an active colony at Pendleton, having observed Purple Martins in a grove of burned aspens during point count surveys in three of the last four years; however, we observed no martins in this area in 2006. A probable colony in a burned ravine at Seep in 2005 also did not appear active in 2006. At Wayland, we observed two Purple Martins flying high overhead, but they were clearly not associated with any active colony in the area.

Table 1. List of ten areas searched for Purple Martin colonies at Pendleton (PE), Potato-Pepper (PP), Seep (SE), Woods (WO), and Wayland (WA) in the Lincoln National Forest, New Mexico in 2006. We indicate search centers in Universal Transverse Mercator easting and northing coordinates (North American Datum 27)

Date	Site	Easting	Northing	# Martins Before 2006	# Martins In 2006	2006 Colony?
07/11/06	PE	441961	3626573	17	0	No
07/11/06	PP	439382	3625387	2	0	No
07/11/06	PP	438191	3624998	17	16	Yes
07/11/06	PP	437644	3624229	1	0	No
07/12/06	SE	449595	3626799	3	0	No
07/12/06	SE	448634	3627433	6	0	No
07/13/06	WO	432806	3621893	16	11	Yes
07/13/06	WO	433081	3622124	8	4	Yes
07/13/06	WO	433126	3621695	5	3	Yes
07/14/06	WA	439015	3623958	2	2	No

We observed a total of 34 Purple Martins at the four active colonies in 2006. Most of the martins (N=27) were observed at colonies 1 and 2; we observed only four martins at colony 3 and three martins at colony 4. Among the four colonies, we documented 10 active nest trees containing at least 15 active nest cavities. We observed eight nestling Purple Martins at cavity entrances, although we noted parental feeding visits to all 15 cavities. Average DBH for nest trees was 37.2 ± 8.4 cm (95% confidence interval) (range = 26.4 – 73.1 cm), and the average height of cavities was 8.5 ± 1.1 m (range = 5.2 – 12.2 m). We measured 44 snags used as perches by Purple Martins in the colonies. Average DBH for perching snags was 33.2 ± 4.5 cm (range = 16.3 – 80.0 cm). Below, we present data and observations specific to each colony.



This male was one of 34 Purple Martins observed in active colonies in 2006.

Colony 1 (438276-3624711)

Colony 1 contained 16 Purple Martins using snags in the bottom of Potato-Pepper canyon, more than 300 m from the nearest unburned patch. We located two nest snags (73.1 and 30.0 cm DBH), with one and five active nest cavities each (average height for all six cavities = 10.0 ± 5.5 m). We observed Purple Martins perching on seven different snags, with an average DBH of 31.8 ± 12.9 cm. The understory contained mostly elder about 2 m in height, with some locust and woody debris from fallen snags. Several Violet-green Swallows and Western Bluebirds were present along the periphery of the colony, and one swallow was seen briefly chasing a Purple Martin. The elevation at colony 1 was 2,616 m.



In colony 1, one of the large snags in the center contained five active nest cavities.

Colony 2 (432712-3622098)

Colony 2 contained 11 Purple Martins using snags along a burned hillside in Woods canyon; a portion of this colony bordered an unburned patch of forest. We found six nest snags clustered in two locations about 100 m apart. We found only one active nest cavity per snag, except for one snag which contained two cavities. Average DBH for nest snags in colony 2 was 33.6 ± 4.7 cm and average cavity height was 7.3 ± 1.3 m. We observed Purple Martins perching on 20 different snags, with an average DBH of 33.8 ± 6.7 cm. The understory was mostly bare with woody debris in the northern section, whereas the southern section contained a thick locust understory. Violet-green



Purple Martins in colony 2 visit a cavity (right) while two other martins perch nearby.

Swallows, and a few Northern Rough-winged Swallows (*Stelgidopteryx serripennis*), nested within the colony. The elevation at colony 2 was 2,794 m; this might rank as the highest known Purple Martin breeding colony, surpassing the upper limit of records (2,770 m) reported by Brown (1997) in a species review (see also Brown 1984).

Colony 3 (433408-3622452)

Colony 3 contained four Purple Martins (two males and two females) using an area of high snag density along a large meadow in Woods canyon, approximately 100 m from unburned forest. At least three of the martins visited a single nest cavity in a snag (38.5 cm DBH) about 7.5 m above the ground. The Purple Martins ranged widely over the meadow in flight but consistently perched in six snags (37.1 ± 18.5 cm average DBH) close to the nest. The understory was mostly bare aside from numerous downed snags. Violet-green Swallows nested in the area, but the only interspecific interaction observed was a male Purple Martin briefly chasing a Red-tailed Hawk (*Buteo jamaicensis*) over the meadow. The elevation for colony 2 was 2,765 m.

Colony 4 (433126-3621695)

Colony 4 contained three Purple Martins (two males and one female) using snags in a shallow ravine with bare understory in Woods canyon, approximately 200 m from unburned forest. We located a single nest snag (28.4 cm DBH) with one cavity about 8.5 m above the ground. We observed the martins perching on nine different snags, with an average DBH of 30.9 ± 5.8 cm. Western Bluebirds were abundant near the colony, with several adults feeding fledglings. The elevation of colony 3 was 2,744 m.



Colony 3 contained a high snag density bordering a meadow.



Colony 4 contained a more moderate snag density, like colonies 1 and 2.

DISCUSSION

Our observations indicate that Purple Martins are local breeders in burned portions of the Lincoln National Forest; however, martins are not nearly as widespread and abundant as other cavity nesting species in the forest, particularly Violet-green Swallow and Western Bluebird. We estimated 200 Violet-green Swallows in one active colony on 11 July and found this species in nearly all of the areas we searched. Likewise, Western Bluebirds were observed in nearly all of the areas we searched.

It is unclear how Purple Martin colonies in the Lincoln National Forest might change in the future. Purple Martins historically have been limited by the availability of nest cavities (Brown 1997). If nest cavities are a limiting factor for Purple Martins in the Lincoln National Forest, colonies could persist, expand, and even appear in new areas during the next few years. Despite competition with other secondary cavity-nesting species and the imminent promise that suitable snags will gradually fall and become unsuitable, the expanse of high-density snag habitat over several thousand hectares appears sufficient for considerable growth.

Population growth might be difficult to verify by annually monitoring colony sizes. In western populations, many Purple Martins nest solitarily (Stutchbury 1991). We observed two small colonies, with three and four birds each, and these colonies might preferentially remain small, even if additional cavities are plentiful. Also, colonies might shift. We observed Purple Martins at Pendleton in recent years, but did not find birds at this location in 2006. Members of this apparent colony might have moved to another site or succumbed to predation (e.g., owls, Brown 1997). It is also possible this colony fledged young before our July visit and departed to assemble with other martins (see

Cater 1944, Woodbury 1946). Population growth in the Lincoln National Forest, then, might manifest itself most via an aggregate estimate of individuals over a consistent search area and the appearance of new colonies in previously unoccupied areas.

Post-fire snag management can play a critical role in determining the presence and persistence of Purple Martins in the Lincoln National Forest, and elsewhere in western forests. Although a variety of taxa benefit from snags, we do not necessarily suggest that land managers avoid removing snags entirely; we recognize the economic and public safety concerns that should be balanced with wildlife management. Our results can serve as a guideline for the Lincoln National Forest, Sacramento District, to protect current areas of use (i.e., burned forest extending west from Woods Canyon, and near the confluence of Potato and Pepper Canyons), current nest sites (Appendix 1), and preserving at least some snags that meet a profile of Purple Martin use.

Our profile of snags used by Purple Martins is based on four colonies and should be considered preliminary; however, data in 2006 indicate patterns of use that might be more specific than other secondary cavity nesters. Purple Martins were mostly observed on large snags near the base of a slope or ravine bottom. Purple Martins nested in cavities averaging 8.5 m above the ground, and no cavity was observed lower than 5.2 m. By comparison, we observed Western Bluebirds and Violet-green Swallows using cavities at a variety of heights; one swallow pair selected a cavity in an old fallen snag on the ground. Although there is relatively little information on cavity heights for western Purple Martin populations, our average and range was similar to the 7.4 m (range 4.7-10.4) reported by Stutchbury (1991) for a site in Arizona. Purple Martins perched high above the ground in fairly large snags (average DBH 33.2 cm), often close to a nest

cavity. We observed no apparent association with areas close to unburned forest or with a particular understory type. A post-fire strategy of preserving select areas of medium to high snag density, especially with a cluster of large and tall snags, might benefit Purple Martins (and a suite of common cavity-nesting species) while not entirely compromising salvage operations.

RECOMMENDATIONS FOR FUTURE RESEARCH

Revisiting the four Purple Martin colonies and covering a consistent search area in future years would yield valuable information on temporal changes for Purple Martin populations in the Lincoln National Forest. We recommend one of two options for establishing a consistent search area: 1) revisit all 2006 search sites on an annual basis, or 2) establish a greater search area covering the entire burned area or an increased portion of the burned area. Choosing the first option and maintaining an annual week-long search effort would be cost-effective and still provide information on currently known colonies and other high-potential sites, such as Seep and Pendleton. We would still be able to present a cumulative count over a consistent area as a basis for determining temporal changes. Choosing the second option and increasing the search area would provide a more thorough inventory of Purple Martin colonies in the Lincoln National Forest and provide a more robust profile of habitat required by martins. Increasing coverage of the burned area would also be more costly. Although widespread and not recognized as a threatened or endangered species, the local distribution of western Purple Martins and the relative lack of information on habitat requirements, might warrant an increased financial interest in this unique, high-elevation population.

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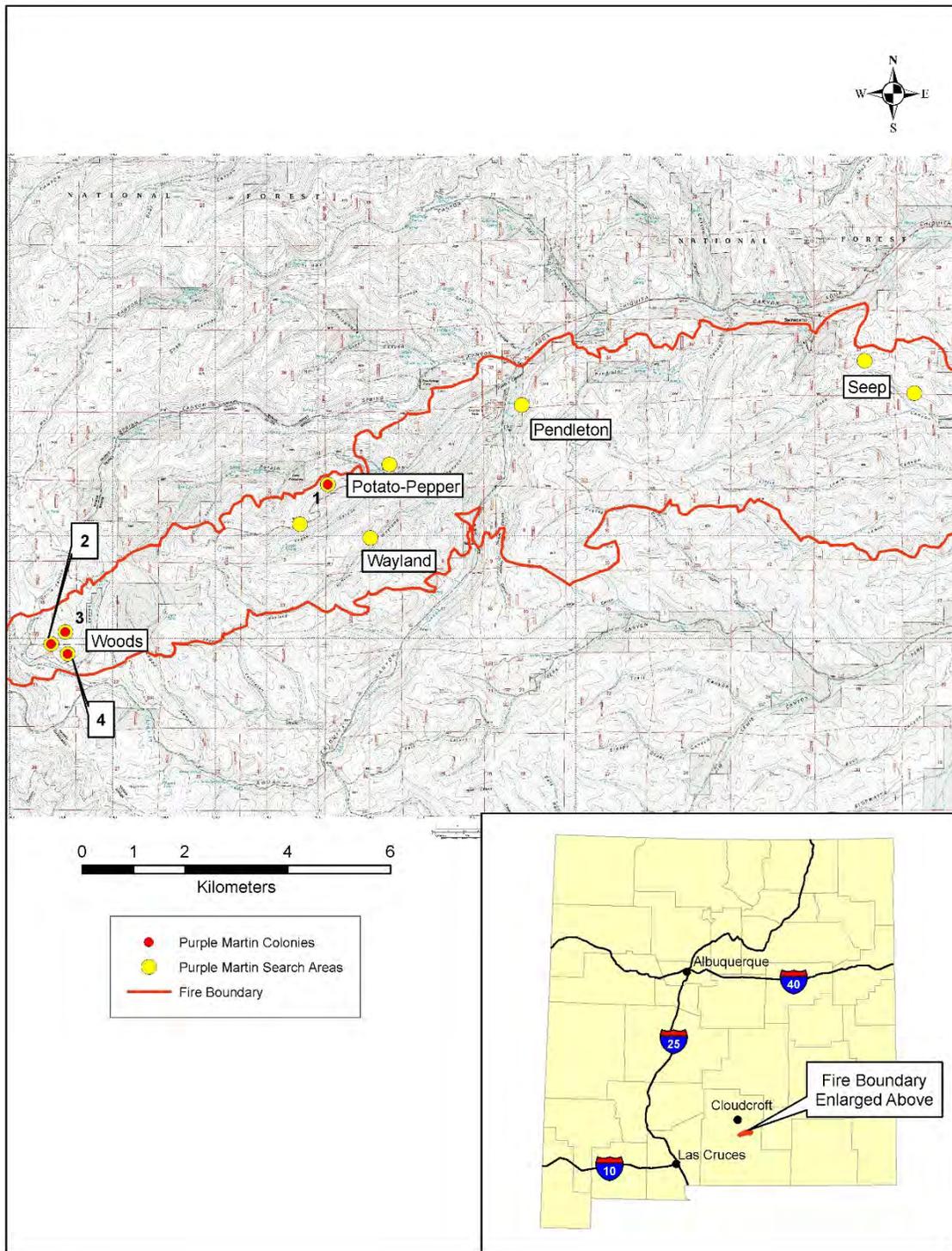


Figure 1. Location of Purple Martin colonies and other areas searched in the Lincoln National Forest, New Mexico in 2006.

Appendix 1. Universal Transverse Mercator easting and northing coordinates (North American Datum 27) for snags used as nest sites by Purple Martins in the Lincoln National Forest, New Mexico in 2006. We indicate diameter of nest snags at breast height (DBH) and estimate nest cavity heights (converted from feet to meters).

Colony	Nest Tree	Easting	Northing	DBH (cm)	Cavity	Cavity Height (m)
1	1	438243	3624677	73.1	1	8.5
	2	438249	3624663	30.0	2	7.0
					3	9.1
					4	12.2
					5	12.2
					6	10.7
2	3	432697	3622173	33.1	7	7.9
	4	432697	3622175	26.4	8	9.1
	5	432634	3622275	36.6	9	5.2
	6	432667	3622288	42.0	10	7.9
					11	9.1
	7	432646	3622287	36.2	12	5.8
8	432670	3622314	27.5	13	6.1	
3	9	433426	3622463	38.5	14	7.6
4	10	433122	3621713	28.4	15	8.5

Appendix 2. List of 53 bird species observed during 2006 Purple Martin monitoring in the Lincoln National Forest, New Mexico.

Common Name	Scientific Name
Turkey Vulture	<i>Cathartes aura</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
American Kestrel	<i>Falco sparverius</i>
Wild Turkey	<i>Meleagris gallopavo</i>
Mourning Dove	<i>Zenaida macroura</i>
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>
Common Nighthawk	<i>Chordeiles minor</i>
Common Poorwill	<i>Phalaenoptilus nuttallii</i>
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>
Acorn Woodpecker	<i>Melanerpes formicivorus</i>
Northern Flicker	<i>Colaptes auratus</i>
Downy Woodpecker	<i>Picoides pubescens</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Olive-sided Flycatcher	<i>Contopus cooperi</i>
Western Wood-Pewee	<i>Contopus sordidulus</i>
Dusky Flycatcher	<i>Empidonax oberholseri</i>
Cordilleran Flycatcher	<i>Empidonax occidentalis</i>
Say's Phoebe	<i>Sayornis saya</i>
Cassin's Kingbird	<i>Tyrannus vociferans</i>
Western Kingbird	<i>Tyrannus verticalis</i>
Plumbeous Vireo	<i>Vireo plumbeus</i>
Warbling Vireo	<i>Vireo gilvus</i>
Steller's Jay	<i>Cyanocitta stelleri</i>
Common Raven	<i>Corvus corax</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>
Purple Martin	<i>Progne subis</i>
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Bushtit	<i>Psaltriparus minimus</i>
Brown Creeper	<i>Certhia americana</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
Pygmy Nuthatch	<i>Sitta pygmaea</i>
House Wren	<i>Troglodytes aedon</i>
Rock Wren	<i>Salpinctes obsoletus</i>
Western Bluebird	<i>Sialia mexicana</i>
Hermit Thrush	<i>Catharus guttatus</i>
American Robin	<i>Turdus migratorius</i>
Virginia's Warbler	<i>Vermivora virginiae</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
MacGillivray's Warbler	<i>Oporornis tolmiei</i>

Common Name	Scientific Name
Western Tanager	<i>Piranga ludoviciana</i>
Green-tailed Towhee	<i>Pipilo chlorurus</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Chipping Sparrow	<i>Spizella passerina</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Blue Grosbeak	<i>Guiraca caerulea</i>
Indigo Bunting	<i>Passerina cyanea</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Pine Siskin	<i>Carduelis pinus</i>
Lesser Goldfinch	<i>Carduelis psaltria</i>
