

PURPLE MARTIN MONITORING AFTER A WILDFIRE IN THE LINCOLN  
NATIONAL FOREST, NEW MEXICO – 2007 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 point count surveys in four years following the fire (2002-2005), we documented Purple Martins among the species using snags in burned areas of the forest. With funding support from the USDA Forest Service and the Purple Martin Conservation Association, we began a monitoring study in the Lincoln Forest in 2006, finding four colonies and counting 34 Purple Martins. We returned in 2007 to determine any changes in the number of Purple Martin colonies and individuals between years, and further evaluate habitat characteristics and specifications of snags used by Purple Martins for perching and nesting.

We found eight active colonies and counted 57 Purple Martins in the Lincoln National Forest in 2007, substantially more than in 2006. Because we monitored colonies on slightly different dates and used a second observer, we can not be certain that an actual population increase occurred between years. However, discovery of several new colonies in areas considered vacant in 2006 indicates that colonization is probably still occurring seven years after the fire.

Based on measurements of 16 nest trees and 68 perching snags, Purple Martins usually nested and perched high above the ground in large snags. Average diameter at breast height for nest trees and perching snags in 2007 was  $38.1 \pm 7.1$  cm and  $34.3 \pm 4.9$  cm, respectively; average nest cavity height was  $10.6 \pm 1.8$  m. We encourage the USDA Forest Service to preserve known Purple Martin nesting sites in the Lincoln National Forest and to consider protecting at least some areas with clusters of large snags when drafting future post-fire management plans.

## 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; western colonies 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 high-elevation coniferous forest in the Lincoln National Forest in south-central New Mexico. During point count surveys in four years following the fire (2002-2005), we documented Purple Martins among the species using snags in burned areas of the forest (Hawks Aloft 2005). 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 that a general lack of post-fire salvage of snags allowed colonies to establish 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 habitat characteristics and types of snags the birds were using.

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. In a one-week visit to the forest in July 2006, we found four colonies and counted 34 Purple Martins. We returned for another one-week visit in July 2007 to 1) determine any changes in the number of colonies and Purple Martins between years, and 2) further evaluate habitat characteristics and specifications of snags used by Purple Martins for perching and nesting. Continued monitoring is intended to help the USDA Forest Service protect current nesting sites in the Lincoln National Forest, determine how long Purple Martins will use post-fire habitat at this site, and identify potential post-fire salvage and snag management provisions that could enhance Purple Martin populations. 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 (Fig. 1). We searched for and monitored Purple Martin colonies in several burned canyons where we conducted seasonal 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 (*P. 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 was regular in the afternoons during our visits in July of 2006 and 2007.

## METHODS

We searched for and monitored Purple Martin colonies from 6-9 July 2007, a few days earlier than our schedule in 2006. We selected early July because we considered that Purple Martins would be feeding nestlings at that time, rather than incubating, and thus be easier to detect. We revisited the four active colonies monitored in 2006 and searched for additional colonies. Our search area was similar to 2006 and included several canyons and specific locations where we suspected colonies might exist, based on point count observations from 2002-2005. We used the same observer in 2006 and 2007, but this observer was assisted by a second person in 2007.

When an active Purple Martin colony was found, we monitored it. We considered a colony to be active when we observed one or more Purple Martins entering one or more cavities, or lingering near a cavity opening. Immediately upon determining a colony was active, we selected an inconspicuous observation point and quietly watched the colony for a 60-min 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 determined the maximum number of martins tallied during any one count within that hour. We present the number of active colonies found and our cumulative estimate of Purple Martins. We compare 2007 results with 2006.

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, 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 using 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. We compare averages for 2006 and 2007. For nest snags, we also estimated the height of each active cavity above the ground and recorded Universal Transverse Mercator (UTM) coordinates (North American Datum 27). We present the number of active cavities observed and the average height of cavities. 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.



We identified perching and nesting snags while observing each colony.



We measured perching and nesting snags after a one-hour observation period.

## RESULTS

We found eight active Purple Martin colonies in the Lincoln National Forest in 2007, twice as many as we found in 2006. Two of the colonies from 2006 (1 and 2) were also active in 2007; colonies 3 and 4 from last year were apparently inactive when we visited in 2007 (Table 1). Colonies 3 and 4 might have been active earlier in the season before we monitored them. Six active colonies (5-10) were documented for the first time in 2007 (Table 1). All but one of these new colonies were in areas searched in 2006.

Table 1. Summary of Purple Martin colonies found and monitored in the Lincoln National Forest, New Mexico in 2006 and 2007.

Colony	Site	Easting	Northing	2006 Count	2007 Count
1	Potato-Pepper	438276	3624711	16	9
2	Woods	432712	3622098	11	13
3	Woods	433408	3622452	4	0
4	Woods	433126	3621695	3	0
5	Pendleton	441958	3626287	-	6
6	Pendleton	442914	3636727	-	4
7	Potato-Pepper	441377	3626947	-	6
8	Potato-Pepper	437144	3623872	-	8
9	Potato-Pepper	436274	3623820	-	6
10	Potato-Pepper	438809	3624484	-	5
				34	57

We counted 57 Purple Martins in 2007, an increase over the 34 counted in 2006. Our largest colony the previous year was at Potato-Pepper, where we counted a minimum of 16 Purple Martins. We counted only 9 at this colony in 2007, but found three other smaller colonies (five to eight birds) within a few kilometers along the same canyon.

Among the eight colonies, we documented 16 active nest trees containing at least 19 active nest cavities (Appendix 1). Some of the nest trees and cavities were also used in

2006, whereas some nest sites were apparently different in 2007. Average DBH for nest trees was 38.1 cm ( $\pm 7.1$ , 95% confidence interval), and the average height of cavities was  $10.6 \pm 1.8$  m. We measured 68 snags used as perches by Purple Martins in the colonies. Purple Martins often perched in snags close to nest trees. Average DBH for perching snags was  $34.3 \pm 4.9$  cm. Average DBH for nesting and perching snags was similar to 2006 ( $37.2 \pm 8.4$  cm and  $33.2 \pm 4.5$  cm, respectively, in 2006). Average cavity height was slightly higher in 2007 than in 2006 ( $8.5 \pm 1.1$  m in 2006).

Aside from an association with large snags, Purple Martin colonies had variable characteristics. Ground cover and understory at some colonies contained mostly grass and thistle; other colonies contained elderberry, oak, or locust, sometimes at high density. Some colonies contained adjacent unburned trees, whereas other colonies were greater than 300 m from unburned forest. Purple Martin colonies ranged from 2,402-2,807 m (7,881-9,209 ft) in elevation. These colonies are among the highest, if not the highest, known Purple Martin breeding colonies (see Brown 1984, 1997).

We observed three competitive interactions between Purple Martins and other birds or wildlife. At colony 7, a male Purple Martin swiped at a Western Bluebird that landed on the trunk of a nest tree below the martin cavity. At colony 8, eight Purple Martins were observed chasing an American Kestrel (*Falco sparverius*) for several minutes. At colony 10, we watched five Purple Martins attack a squirrel near the top of a snag. Other cavity nesters observed in Purple Martin colonies included Western Bluebird, House Wren (*Troglodytes aedon*), Hairy Woodpecker, Violet-green Swallow, Acorn Woodpecker (*Melanerpes formicivorus*), Northern Flicker (*Colaptes auratus*), and Williamson Sapsucker (*Sphyrapicus thyroideus*).



Purple Martins, like this male, often perched near nest cavities when feeding young.

## DISCUSSION

We observed approximately 60% more Purple Martins in 2007 than in 2006, but we are not certain that an actual population increase occurred. Purple Martin colonies were not bigger in 2007 – 7.1 birds per colony, compared to 8.5 in 2006 – we simply encountered more colonies. A slight difference in the seasonal timing of searches, and the use of an extra observer in 2007, possibly contributed to our discovery of more colonies. Because Purple Martin young often leave colonies soon after fledging (Brown 1997) and assemble elsewhere with other martins (Cater 1944, Woodbury 1946), we might miss some colonies by visiting in early July. Our visits in 2007 were only a few days earlier than in 2006, but this might have improved our chances of observing martins, especially at colony 5 at Pendleton, where martins seemed surprisingly absent in 2006. The extra

observer in 2007 allowed us to monitor more colonies, but did not provide much extra coverage during searches. With the exception of extending our coverage at Pendleton, and facilitating the discovery of colony 6, we covered the same search area as the previous year, using one observer at each. Nevertheless, we can not confirm a population increase; we suggest only that the Purple Martin population in this portion of the Lincoln National Forest is not in decline, and that colonization might still be increasing.

Population trends for Purple Martins in the Lincoln National Forest are probably best evaluated over a longer period than the two years we have monitored. Purple Martins historically have been limited by the availability of nest cavities (Brown 1997). Because nest cavities and perching snags are currently abundant in the Lincoln National Forest, we can expect an increase in colonization, even if not necessarily a growth in colony sizes. As snags gradually fall and become unsuitable, we can expect increased competition with other secondary cavity-nesting species for remaining cavities and eventual local Purple Martin declines and colony extinctions. Seven years after the fire, Purple Martins appear to still be in the colonization phase. Future monitoring will help determine when the martin population reaches a peak and when colonies abandon the burned portion of the Lincoln National Forest.

When we proposed this research in 2006, we envisioned that Purple Martin trends could be determined by counting adults during annual visits to known colonies. Our experience in 2006 and 2007 granted us a realization that revisiting known colonies would not be enough to determine trends. In the west, many Purple Martins nest solitarily or in small groups. If colonies in the Lincoln National Forest preferentially remain small, documenting population growth would require discovery of new colonies in previously

unoccupied habitat. Some small colonies also might shift locations, making a simple return to previous breeding sites insufficient for evaluating the population. Population growth in the Lincoln National Forest, then, would manifest itself best via an aggregate estimate of individuals over a consistent search area. Although our current coverage requires only a week or less per year, the cost of searches, monitoring, and reporting might be prohibitive on an annual basis. A more efficient option would be to conduct searches and monitoring every two or three years.

The specifications of Purple Martin nesting and perching snags were similar between years, and they indicate that Purple Martins might be more selective than other more common secondary cavity nesters in the Lincoln National Forest. Purple Martins were mostly observed on large snags along a slope or ravine bottom. Purple Martins nested in cavities averaging greater than 8.5 m above the ground (10.6 m in 2007), and no cavity was observed lower than about 5 m. By comparison, we observed Western Bluebirds and Violet-green Swallows using cavities at a variety of heights; one swallow pair was observed in 2006 using 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 slightly greater than the 7.4 m (range 4.7-10.4) reported by Stutchbury (1991) for a site in Arizona. Purple Martins usually perched high above the ground, 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 clusters of large, tall snags, might benefit Purple Martins (and a suite of cavity-nesting species) while not entirely compromising salvage operations.



The nest snag for colony 10, like most other nest snags, was large and on a slope.

Post-fire snag management can play an important 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. We recommend that the Lincoln National Forest, Sacramento District, avoid impacts to documented nest sites (Appendix 1) and current areas of use (i.e., burned forest extending west from Woods Canyon, Pepper Canyon and near Pendleton Canyon), and in future post-fire management plans, allow the preservation of at least some snags that meet a profile of Purple Martin use.

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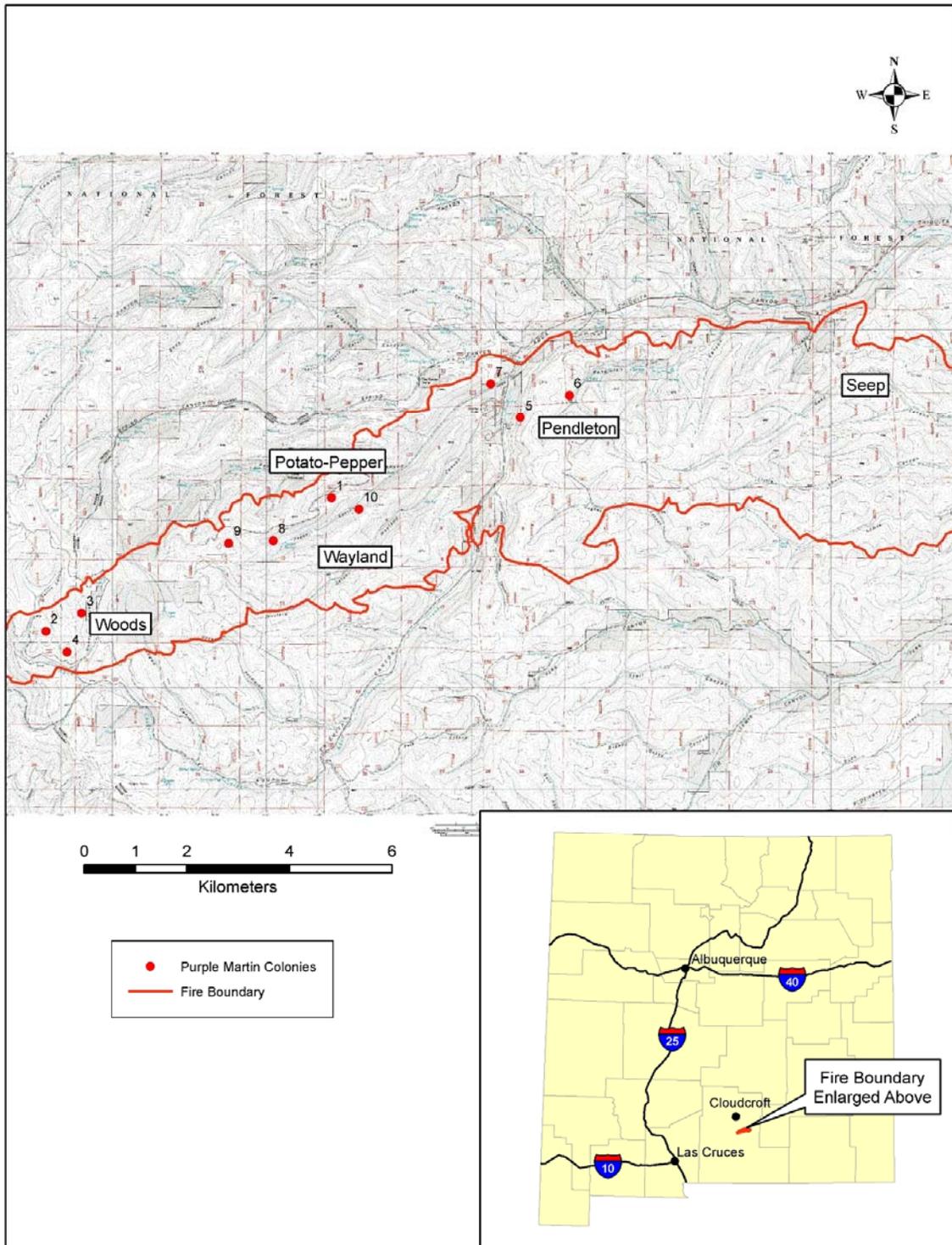


Figure 1. Location of 10 Purple Martin colonies and canyons searched in the Lincoln National Forest, New Mexico in 2006 and 2007.

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 2007. We indicate diameter of nest snags at breast height (DBH) and estimate nest cavity heights in meters.

Colony	Nest Tree	Easting	Northing	DBH (cm)	Cavity	Cavity Height (m)
1	1	438324	3624715	23.7	1	12
	2	438295	3624688	30.7	3	5
	3	438247	3624635	23.3	4	10
2	4	432803	3621957	29.4	5	8
	5	432695	3622175	27.8	7	7
	6	432633	3622272	37.2	9	9
	7	432670	3622314	26.9	10	6
	8	441920	3626255	26.1	11	7
3	-	-	-	-	-	-
4	-	-	-	-	-	-
5	8	441920	3626255	26.1	11	7
6	9	442849	3626723	71.2	12	8
7	10	441366	3626995	66.4	13	11
	11	441261	3626988	67.0	14	20
8	12	437113	3623795	37.2	15	20
	13	437111	3623813	28.2	16	9
	14	437175	3623802	34.0	17	13
9	15	436163	3623934	39.8	18	9
10	16	438798	3624480	40.4	19	13

Appendix 2. List of 54 bird species observed during 2007 Purple Martin monitoring in the Lincoln National Forest, New Mexico.

Common Name	Scientific Name
Wild Turkey	<i>Meleagris gallopavo</i>
Turkey Vulture	<i>Cathartes aura</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
American Kestrel	<i>Falco sparverius</i>
Band-tailed Pigeon	<i>Patagioenas fasciata</i>
Mourning Dove	<i>Zenaida macroura</i>
Flammulated Owl	<i>Otus flammeolus</i>
Northern Pygmy-Owl	<i>Glaucidium gnoma</i>
Common Nighthawk	<i>Chordeiles minor</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>
Acorn Woodpecker	<i>Melanerpes formicivorus</i>
Williamson's Sapsucker	<i>Sphyrapicus thyroideus</i>
Downy Woodpecker	<i>Picoides pubescens</i>
Hairy Woodpecker	<i>Picoides villosus</i>
Northern Flicker	<i>Colaptes auratus</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>
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>
Purple Martin	<i>Progne subis</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Barn Swallow	<i>Hirundo rustica</i>
Mountain Chickadee	<i>Poecile gambeli</i>
Bushtit	<i>Psaltriparus minimus</i>
Red-breasted Nuthatch	<i>Sitta canadensis</i>
White-breasted Nuthatch	<i>Sitta carolinensis</i>
Pygmy Nuthatch	<i>Sitta pygmaea</i>
House Wren	<i>Troglodytes aedon</i>
Western Bluebird	<i>Sialia mexicana</i>
Mountain Bluebird	<i>Sialia currucoides</i>
Townsend's Solitaire	<i>Myadestes townsendi</i>
Hermit Thrush	<i>Catharus guttatus</i>
American Robin	<i>Turdus migratorius</i>

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Common Name	Scientific Name
Orange-crowned Warbler	<i>Vermivora celata</i>
Virginia's Warbler	<i>Vermivora virginiae</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Grace's Warbler	<i>Dendroica graciae</i>
MacGillivray's Warbler	<i>Oporornis tolmiei</i>
Western Tanager	<i>Piranga ludoviciana</i>
Green-tailed Towhee	<i>Pipilo chlorurus</i>
Chipping Sparrow	<i>Spizella passerina</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Red-winged Blackbird	<i>Agelaius phoeniceus</i>
Pine Siskin	<i>Carduelis pinus</i>

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