

2007 GRAY VIREO MONITORING IN THE
GUADALUPE MOUNTAINS OF SOUTHEASTERN NEW MEXICO



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1 November 2007

TABLE OF CONTENTS

EXECUTIVE SUMMARY1

INTRODUCTION2

STUDY AREA3

METHODS4

RESULTS6

DISCUSSION8

ACKNOWLEDGMENTS11

LITERATURE CITED12

TABLES

1. Summary of 13 Gray Vireo territories monitored in the Guadalupe Mountains of southeastern New Mexico in 20076

2. Summary of nine Gray Vireo nests found in the Guadalupe Mountains of southeastern New Mexico in 20077

FIGURES

1. Location of 13 Gray Vireo territories monitored in the Guadalupe Mountains of southeastern New Mexico in 200713

APPENDICES

1. Photographs of nine Gray Vireo nest sites located in the Guadalupe Mountains of southeastern New Mexico in 200714

2. List of 76 bird species observed incidentally during Gray Vireo monitoring in the Guadalupe Mountains of southeastern New Mexico from 2005-200719

EXECUTIVE SUMMARY

The Gray Vireo (*Vireo vicinior*) is a species of conservation concern that inhabits pinyon-juniper woodland in the southwestern United States. Despite concerns over Gray Vireo populations, there have been relatively few population monitoring studies. In 2005, we began an annual monitoring study of a small Gray Vireo population in the Guadalupe Mountains of southeastern New Mexico. Our objectives are to identify temporal changes, if any, in the number of Gray Vireo pairs within a consistent search area, and to evaluate levels of nest parasitism and productivity. In 2007, we located 13 Gray Vireo territories, one less than the number found in the same search area in 2006, and three more than in 2005. Monitoring efforts at nine Gray Vireo nests in 2007 support previous indications of high nest parasitism and low nest success for this population. However, this pattern has not yet had an apparent effect on the number of vireo pairs at the site. Future monitoring could determine if any long-term effects ensue, or if this is a sink population supported by the immigration of Gray Vireos from a source population. Even if classified as a sink, this population is worth continued conservation interest, especially considering the state-threatened status of Gray Vireo in New Mexico and threats of development and habitat alteration associated with many other sites in the state.

INTRODUCTION

The Gray Vireo (*Vireo vicinior*) is a species of conservation concern that inhabits pinyon-juniper woodland in the southwestern United States (Barlow et al. 1999). The U.S. Fish and Wildlife Service (2002) includes Gray Vireo on National and Southwest Region lists of Birds of Conservation Concern. The New Mexico Department of Game and Fish (2004) lists Gray Vireo as a threatened species in the state of New Mexico. Although Gray Vireos often occur in remote areas, their habitat is subject to several human-associated threats. Management treatments, particularly juniper reduction, are widely employed in open pinyon-juniper woodland for perceived restoration, water conservation, or forage production benefits. Woodland in northwestern New Mexico is also subject to alteration or fragmentation for oil and gas development (Wickersham and Wickersham 2006). Another threat, at least for some populations, is nest parasitism by Brown-headed Cowbirds (*Molothrus ater*) (Hanna 1944, Barlow et al. 1999).

Recent surveys have greatly expanded knowledge of Gray Vireo distribution in New Mexico (e.g., Reeves 1999), but there is still a general lack of monitoring for known populations. DeLong and Williams (2006) provided a status report and biological review of the Gray Vireo in New Mexico, identifying the Guadalupe Mountains of southeastern New Mexico as one of the three major centers of Gray Vireo distribution in the state. They recommend improved monitoring of target populations and studies investigating the effects of Brown-headed Cowbird brood parasitism on Gray Vireo productivity and site-selection. The New Mexico Department of Game and Fish (2007) released a Gray Vireo recovery plan in May 2007, also emphasizing the importance of gathering information on Gray Vireo biology and natural history to improve the success of recovery efforts.

In 2005, we began an annual monitoring study of a small Gray Vireo population in the Guadalupe Mountains. We located and monitored 15 Gray Vireo territories in two areas that year, and documented relatively high nest parasitism and low productivity (Hawks Aloft 2006). With funding support from the USDA Forest Service, we continued monitoring in the larger of the two areas in 2006 and 2007. Our objectives were to 1) identify temporal changes, if any, in the number of Gray Vireo pairs within a consistent search area, and to 2) further evaluate levels of nest parasitism and productivity. Information on annual Gray Vireo numbers and nesting parameters can help determine the effects of cowbird parasitism on this population, and perhaps formulate management recommendations appropriate for the Sacramento and Guadalupe Ranger Districts in southern New Mexico. In this report, we provide results of monitoring in 2007.

STUDY AREA

We conducted the study on USDA Forest Service land in the Guadalupe Ranger District of the Lincoln National Forest, in western Eddy County, New Mexico. We located and monitored Gray Vireo territories along Highway 137, approximately 10 km east of Queen near the east boundary of the National Forest (Fig. 1). In previous years, we located a few territories at a remote site approximately 12 km to the northwest (called Red Bluff), but we discontinued monitoring at this site during 2006. Gray Vireo habitat occurred on both the north and south sides of Highway 137, but most vireos were found along rocky canyon slopes near Thayer Hill (elevation 1,690 m). Habitat consisted of oak (*Quercus* spp.) and juniper (*Juniperus* spp.) scrub, with scattered pinyons (*Pinus edulis*). Suitable habitat for Gray Vireos in the eastern foothills of the Guadalupe Mountains

likely extends along a 1,500-1,700-m elevational zone to the northwest and south. Lower elevations to the east contained sparse desert vegetation, whereas higher elevations to the west contained higher density woodland with reduced scrub oak and a greater prevalence of pinyon; habitat in both directions was generally unsuitable for Gray Vireos.



We found many of our Gray Vireos in rocky canyons in the Guadalupe Mountains.

METHODS

We searched for Gray Vireo territories during the first week in May (30 April – 4 May). Most Gray Vireo territories at this site are usually established by this time (M. Stake, personal observation). We initiated our search a few days later than in previous years, hoping to find pairs that had already begun nest building. We located Gray Vireos

by listening for song and call vocalizations while walking slowly through appropriate habitat. Many of the territories from previous years were located along canyon bottoms or on north or northwest facing slopes, where ample vegetation was more likely to occur. We paused for 30 minutes or more in areas where territories were monitored in 2006. Upon initial discovery of a Gray Vireo, usually a singing male, we recorded Universal Transverse Mercator (UTM) coordinates (Zone 13, North American Datum 27). We then passively followed singing males to ascertain general territory boundaries and apparent centers of activity. We assigned a territory number and revisited territories periodically to determine pair status and nesting activity.

We monitored Gray Vireo territories as often as possible (usually once per two weeks) from the start of May through mid-July. We observed the behavior of vireos to ascertain pair status and locate nests. Although we did not mark birds with identifying leg bands, the spacing of territories and nests, along with observations of territorial disputes, made us fairly certain that we were monitoring the same individuals on consecutive visits. We considered a male vireo to be paired if we observed a female during any visit or evidence of nesting in the territory (e.g., an active nest or fledged young attended by an adult). Female vireos were often easily found when singing males traveled with them prior to nest building. Nests were located by watching the male or female deliver nesting material or approach the nest to incubate. Vireos sometimes sang near or on the nest, further assisting our efforts to find nests.

Upon locating nests, we examined the contents, recorded UTM coordinates, and photographed the site (Appendix 1). We chose not to flag nest locations, relying instead on the coordinates and digital photographs to relocate nests. We monitored nests during

each subsequent visit to the site, making an effort to visit on the anticipated fledge date. We estimated Gray Vireo fledge dates based on 13-day incubation and 13-day nestling stages (Ehrlich et al. 1988). We report parasitism as the percentage of nests containing at least one cowbird egg or nestling while the nest was active. We determined the fate of nests as successful, failed, or unknown (e.g., nests not monitored to completion). We define a successful nest as a nest fledging at least one Gray Vireo. For successful nests, we report the number of vireo young observed to fledge. We provide a list of all bird species encountered at the site during monitoring from 2005-2007 in Appendix 2.

RESULTS

We located 13 Gray Vireo territories in 2007, one less than the total found in the same search area in 2006, and three more than in 2005. We observed females or evidence of nesting in all 13 territories, for a pair success of 100% (Table 1).

Table 1. Summary of 13 Gray Vireo territories monitored in the Guadalupe Mountains of southeastern New Mexico in 2007. Universal Transverse Mercator easting and northing coordinates are provided in North American Datum 27.

Territory	Easting	Northing	Paired?	Visits	Nests Found
1	533863	3562296	Yes	7	2
2	534466	3562275	Yes	7	1
3	534914	3562319	Yes	4	1
4	534735	3561851	Yes	3	1
5	534574	3561285	Yes	5	0
6	534788	3560902	Yes	6	0
7	534352	3560980	Yes	5	0
8	534083	3561351	Yes	5	0
9	534009	3561826	Yes	6	2
10	533528	3561904	Yes	9	0
11	533634	3561520	Yes	3	0
12	531369	3562418	Yes	5	2
13	531467	3562090	Yes	4	0

We located nine Gray Vireo nests in 2007 (Table 2, Appendix 1). Six nests were found in oaks and three nests were found in junipers. The average height of nests was approximately six feet above the ground. In addition to the nine nests we located, we observed male vireos in territories 7 and 10 delivering nesting material to shrubs and apparently beginning the building process. These potential nests were not completed. We determined that four of the nine nests were parasitized. Because one nest failed before we could verify a full clutch, we consider the level of nest parasitism to be 50% (four of eight nests) in 2007. Five nests failed and at least one nest was successful, fledging three Gray Vireos (Table 2). Three nests were still active during our last monitoring visit on 18 July, and their fate is unknown. Two of these nests were parasitized and in the incubation stage during this visit; the other was non-parasitized and in the mid-nestling stage.

Table 2. Summary of nine Gray Vireo nests found in the Guadalupe Mountains of southeastern New Mexico in 2007. Universal Transverse Mercator easting and northing coordinates are provided in North American Datum 27.

Nest	Easting	Northing	Substrate	Height (ft)	Parasitized?	Outcome
1.1	533925	3562367	Oak	6.0	No	Failed
1.2	533863	3562296	Oak	7.0	Unknown	Failed
2.1	534219	3562341	Oak	6.5	Yes	Unknown
3.1	534903	3562319	Oak	7.5	Yes	Unknown
4.1	534776	3561820	Juniper	4.0	No	Fledged 3
9.1	534037	3561826	Juniper	3.5	No	Failed
9.2	534190	3562062	Oak	6.0	No	Unknown
12.1	531352	3562418	Juniper	6.0	Yes	Failed
12.2	531460	3562322	Oak	8.0	Yes	Failed

Three territories fledged Gray Vireo young, one territory fledged only a Brown-headed Cowbird, and nine territories either failed to produce young or produced young after our monitoring season concluded. We observed a total of six Gray Vireo fledglings, half of them in two territories where nests were not found.



A Gray Vireo fledgling from territory 4 rests in a juniper soon after leaving the nest.

DISCUSSION

We observed no substantial changes in the number of Gray Vireo pairs within a consistent search area from 2005-2007, despite apparent high nest parasitism and low productivity. Our best indication of high parasitism and low productivity came in 2005, when we found that 71% of nests were parasitized and only 6 of 19 nests fledged vireo young (Hawks Aloft 2006). Our reduced sample in 2006 was insufficient for evaluating parasitism and productivity, but extreme drought conditions and a general lack of observed nesting activity indicate that productivity was probably low during that year also. Results in 2007 support the previous pattern of high parasitism and low productivity. Nevertheless, we have observed no obvious effect on the number of Gray

Vireos since 2005. Future monitoring could determine if long-term effects ensue. If Gray Vireo territory numbers remain stable in future years, despite low productivity, this population might be a sink requiring the immigration of birds from a source population to maintain itself. Classifying the population as a sink would not necessarily diminish its importance; the state-threatened status of Gray Vireo and its irregular regional distribution are reasons to continue prioritizing management of this population.

Managing avian populations requires information on local habitat selection and potential threats; for both categories, this Gray Vireo population might be unique. In 2007, we concurrently monitored 11 Gray Vireo nests in northwestern New Mexico near Bloomfield. These nests were located almost exclusively in junipers (one was in a pinyon) and averaged nine feet above the ground. For 32 nests in the Guadalupe Mountains from 2005-2007, junipers (N=17, 53%) and oaks (N=13, 41%) were both frequently used. Those nests averaged only about six feet above the ground. Nest parasitism might be a greater threat at our site in the Guadalupe Mountains (16 of 26 eligible nests, 62%) than at our northwestern site (1 of 9 eligible nests, 11%), although a greater sample is needed for a more robust comparison. In the northwestern site, alteration of pinyon-juniper woodland associated with oil and gas development and widespread juniper control, might be the greatest threats to Gray Vireos.

Because we are not aware of any imminent development or juniper treatments at our Guadalupe Mountains site, we offer few management recommendations specific to the Lincoln National Forest. Maintaining junipers (Schlossberg 2006) and shrub oak (Barlow et al. 1999) is important, and continued wildfire prevention would support this goal. Future vegetation growth could eventually render habitat at this site unsuitable, but

succession processes for Gray Vireos are unclear. We recommend that any controlled burns or other habitat treatments be preceded by data indicating Gray Vireo declines or evidence that vireos would respond positively to such a treatment. Gray Vireos in the Lincoln National Forest could benefit from a reduction in cattle grazing or relocation of cattle away from occupied Gray Vireo habitat. Limiting cattle grazing or increasing the distance from cowbird feeding areas (i.e., cattle) to nesting areas would likely reduce levels of nest parasitism (Barlow et al. 1999); however, the effects of parasitism on this Gray Vireo population remain unclear.

We recommend continued monitoring of this Gray Vireo population. The release of a Gray Vireo recovery plan by the New Mexico Department of Game and Fish (2007), and their establishment and support of a Gray Vireo Recovery Team, have prompted efforts to draft management guidelines. Such guidelines require current information on regional populations. Gray Vireos in southeastern New Mexico appear to have different habitat requirements and potential threats than vireos elsewhere in the state, and these issues should be fully represented in any forthcoming guidelines. Because Hawks Aloft is based in Albuquerque nearly 300 miles from the site, we are challenged by travel expenses and logistics; these concerns limited our monitoring season in 2007 and compromised our ability to determine several nest fates. We encourage the USDA Forest Service to continue, and perhaps increase funding support for this project to further evaluate temporal trends in numbers, potential threats, and management options for this threatened species in the Lincoln National Forest.

ACKNOWLEDGMENTS

Funding for this project provided by the USDA Forest Service. We thank Danney Salas, Sacramento Ranger District, for administrative support. We thank Larry Paul, Guadalupe Ranger District, for facilitating access. Mike Stake and Devin Bosler, of Hawks Aloft, conducted field work. This report was written by Mike Stake and reviewed by Gail Garber, Executive Director of Hawks Aloft.

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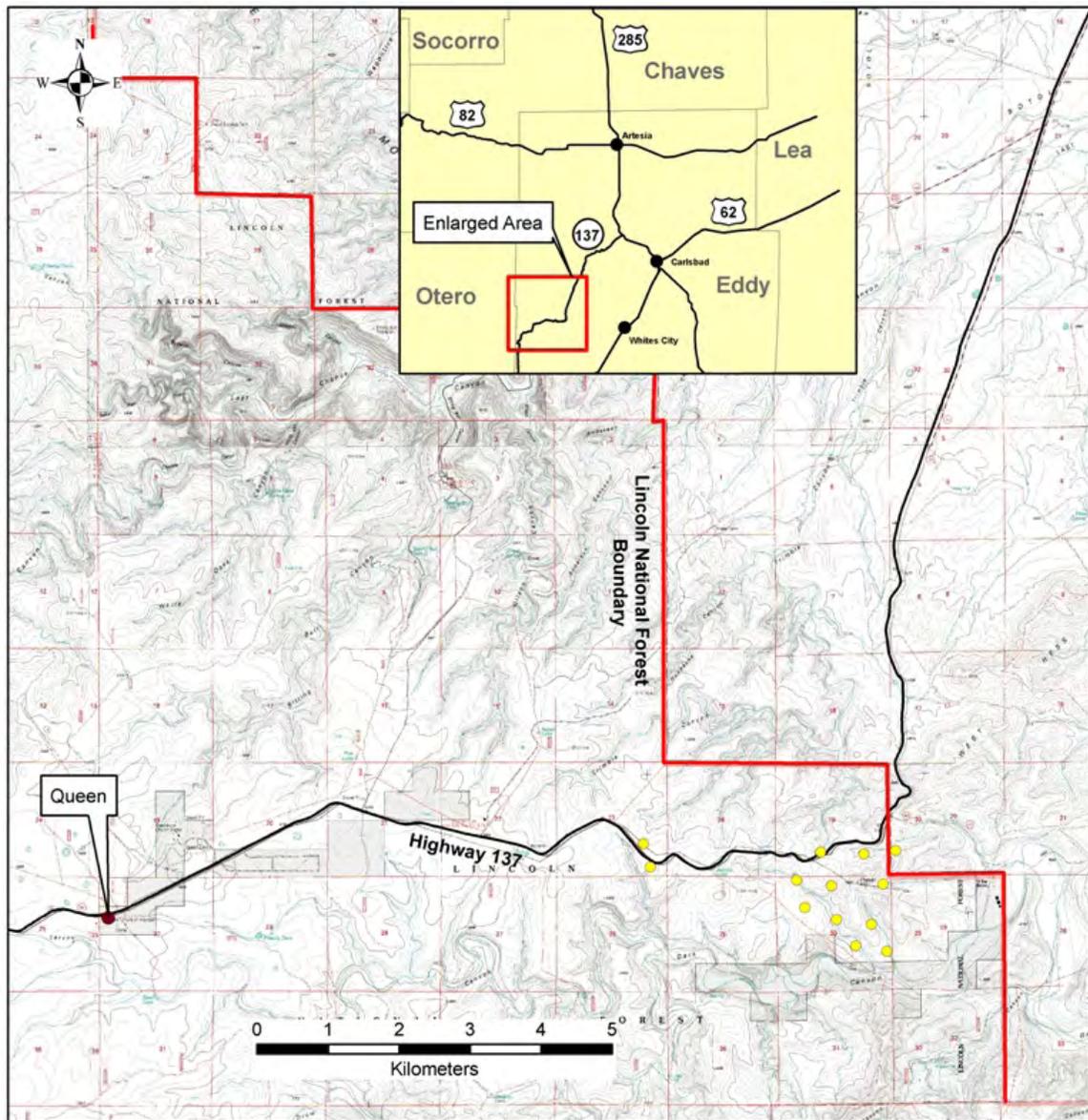
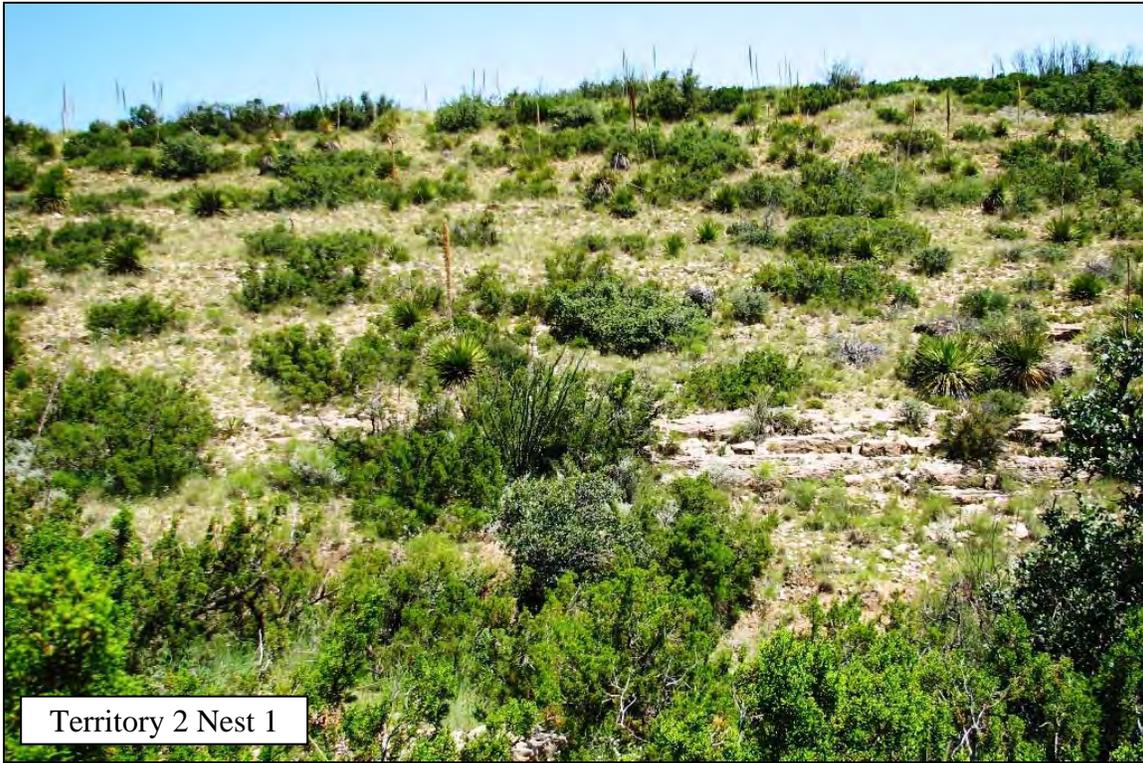


Figure 1. Location of 13 Gray Vireo territories monitored in the Guadalupe Mountains of southeastern New Mexico in 2007. Area shown is an enlarged portion of the Queen and Red Bluff, New Mexico USGS Quadrangle Maps. Territories are indicated in yellow.

Appendix 1. Photographs of nine Gray Vireo nest sites located in the Guadalupe Mountains of southeastern New Mexico in 2007.





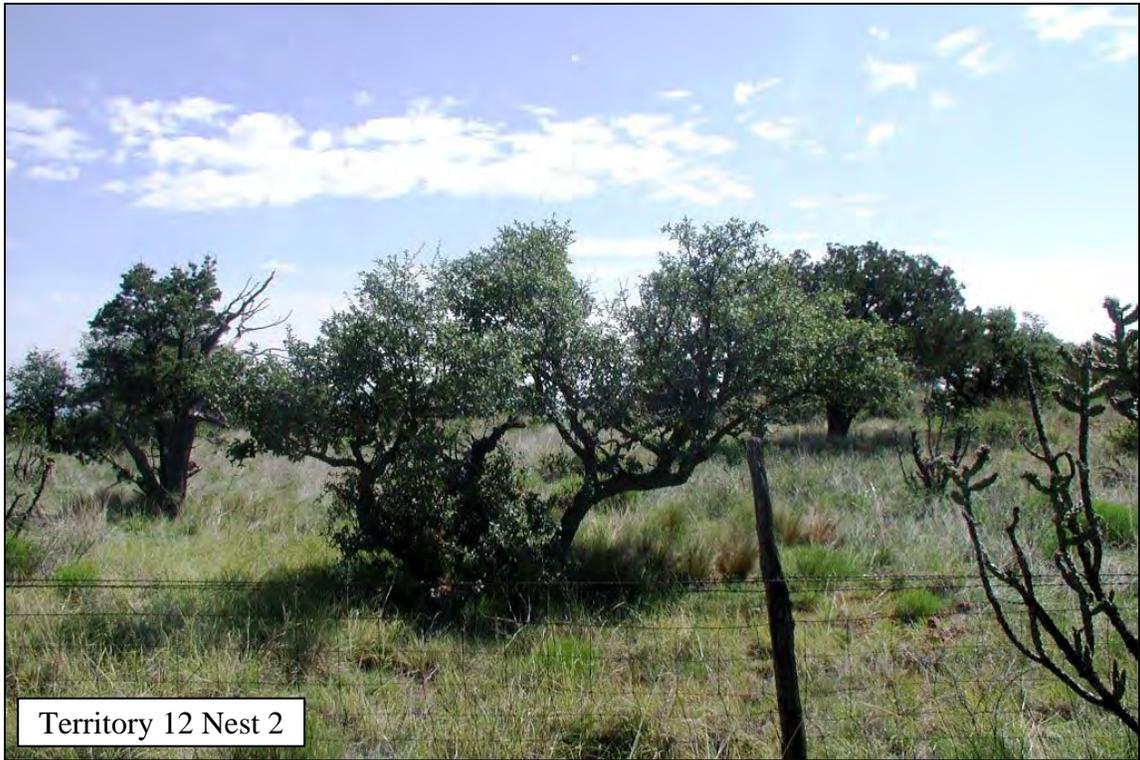




Territory 9 Nest 2



Territory 12 Nest 1



Appendix 2. List of 76 bird species observed incidentally during Gray Vireo monitoring in the Guadalupe Mountains of southeastern New Mexico from 2005-2007.

Common Name	Scientific Name
Scaled Quail	<i>Callipepla squamata</i>
Turkey Vulture	<i>Cathartes aura</i>
Sharp-shinned Hawk	<i>Accipiter striatus</i>
Cooper's Hawk	<i>Accipiter cooperii</i>
Swainson's Hawk	<i>Buteo swainsoni</i>
Zone-tailed Hawk	<i>Buteo albonotatus</i>
Red-tailed Hawk	<i>Buteo jamaicensis</i>
White-winged Dove	<i>Zenaida asiatica</i>
Mourning Dove	<i>Zenaida macroura</i>
Greater Roadrunner	<i>Geococcyx californianus</i>
Western Screech-Owl	<i>Megascops kennicottii</i>
Great Horned Owl	<i>Bubo virginianus</i>
Common Nighthawk	<i>Chordeiles minor</i>
Common Poorwill	<i>Phalaenoptilus nuttallii</i>
White-throated Swift	<i>Aeronautes saxatalis</i>
Black-chinned Hummingbird	<i>Archilochus alexandri</i>
Broad-tailed Hummingbird	<i>Selasphorus platycercus</i>
Ladder-backed Woodpecker	<i>Picoides scalaris</i>
Olive-sided Flycatcher	<i>Contopus cooperi</i>
Western Wood-Pewee	<i>Contopus sordidulus</i>
Gray Flycatcher	<i>Empidonax wrightii</i>
Dusky Flycatcher	<i>Empidonax oberholseri</i>
Say's Phoebe	<i>Sayornis saya</i>
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>
Cassin's Kingbird	<i>Tyrannus vociferans</i>
Gray Vireo	<i>Vireo vicinior</i>
Plumbeous Vireo	<i>Vireo plumbeus</i>
Western Scrub-Jay	<i>Aphelocoma californica</i>
Common Raven	<i>Corvus corax</i>
Violet-green Swallow	<i>Tachycineta thalassina</i>
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>
Juniper Titmouse	<i>Baeolophus ridgwayi</i>
Bushtit	<i>Psaltiriparus minimus</i>
Cactus Wren	<i>Campylorhynchus brunneicapillus</i>
Rock Wren	<i>Salpinctes obsoletus</i>
Canyon Wren	<i>Catherpes mexicanus</i>
Bewick's Wren	<i>Thryomanes bewickii</i>
House Wren	<i>Troglodytes aedon</i>
Ruby-crowned Kinglet	<i>Regulus calendula</i>
Blue-gray Gnatcatcher	<i>Polioptila caerulea</i>
Townsend's Solitaire	<i>Myadestes townsendi</i>
Hermit Thrush	<i>Catharus guttatus</i>

Common Name	Scientific Name
Northern Mockingbird	<i>Mimus polyglottos</i>
Curve-billed Thrasher	<i>Toxostoma curvirostre</i>
Phainopepla	<i>Phainopepla nitens</i>
Orange-crowned Warbler	<i>Vermivora celata</i>
Virginia's Warbler	<i>Vermivora virginiae</i>
Yellow-rumped Warbler	<i>Dendroica coronata</i>
Black-throated Gray Warbler	<i>Dendroica nigrescens</i>
Townsend's Warbler	<i>Dendroica townsendi</i>
MacGillivray's Warbler	<i>Oporornis tolmiei</i>
Wilson's Warbler	<i>Wilsonia pusilla</i>
Hepatic Tanager	<i>Piranga flava</i>
Summer Tanager	<i>Piranga rubra</i>
Western Tanager	<i>Piranga ludoviciana</i>
Green-tailed Towhee	<i>Pipilo chlorurus</i>
Spotted Towhee	<i>Pipilo maculatus</i>
Canyon Towhee	<i>Pipilo fuscus</i>
Cassin's Sparrow	<i>Aimophila cassinii</i>
Rufous-crowned Sparrow	<i>Aimophila ruficeps</i>
Chipping Sparrow	<i>Spizella passerina</i>
Brewer's Sparrow	<i>Spizella breweri</i>
Black-chinned Sparrow	<i>Spizella atrogularis</i>
Vesper Sparrow	<i>Pooecetes gramineus</i>
Lark Sparrow	<i>Chondestes grammacus</i>
Black-throated Sparrow	<i>Amphispiza bilineata</i>
White-throated Sparrow	<i>Zonotrichia albicollis</i>
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>
Dark-eyed Junco	<i>Junco hyemalis</i>
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>
Blue Grosbeak	<i>Passerina caerulea</i>
Brown-headed Cowbird	<i>Molothrus ater</i>
Scott's Oriole	<i>Icterus parisorum</i>
House Finch	<i>Carpodacus mexicanus</i>
Pine Siskin	<i>Carduelis pinus</i>
Lesser Goldfinch	<i>Carduelis psaltria</i>