Gray Vireo Status and Distribution on Fort Bliss: 2007

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INTRODUCTION

Fort Bliss is a 445,154-hectare army installation straddling the Texas-New Mexico border due east-northeast of El Paso, Texas. Preservation of biodiversity and maintenance of functional ecosystems are fundamental goals of the Fort Bliss natural resources program and require planning level surveys (ACE 2001).

A 1994 survey (Mehlhop et al. 1994) for sensitive species in the Organ Mountains of Fort Bliss detected the presence of the state threatened (NMDGF 2008) Gray Vireo (*Vireo vicinior*). Recent systematic surveys in several parts of New Mexico have detected numerous previously unknown populations and clarified the status of this species in the State, including areas adjacent to Fort Bliss, such as the Guadalupe Mountains (DeLong and Williams 2006). These new data, recent incidental observations of breeding Gray Vireos in areas not previously known to be occupied by the species in the San Andres and Oscura mountains (pers. obs.), and existing knowledge of the species' presence in the Sacramento and Organ mountains (DeLong and Williams 2006, Mehlhop et al. 1994, B. Locke pers. comm.) suggested a need for an extensive systematic survey.

A survey focusing on the distribution and habitat preferences of the Gray Vireo within the New Mexico counties of Dona Ana and Otero on Fort Bliss was conducted in 2007. The survey was intended to fill in some of the current distributional data gaps and assist land managers in making decisions regarding the management of training areas within the installation.

METHODS

Prior to the initiation of surveys for Gray Vireos on Fort Bliss, researchers utilized literature reviews, known historical locations, aerial photography, and on-the-ground reconnaissance to identify areas with potential habitat. Surveys were then conducted according to DeLong and Williams (2006) from 1 May to 3 August 2007 by researchers that were trained in the identification of Gray Vireos by sight and sound.

The vireo's primary advertisement song was broadcasted at points spaced 200 m apart while traveling through potential habitat. The song was played twice for 30 sec and was preceded and separated by listening and observation periods of one to two min. On each territory, locations of all detected vireos were recorded in field notebooks and using Garmin Global Positioning System (GPS) units, along with sex, age, and behavior when possible. Vegetation communities and abiotic characteristics of territories and nest-site characteristics were also noted.

Emphasis was placed on determining the distribution of the species and locating the maximum number of occupied territories in the area versus determining reproductive productivity on each territory. An occupied territory was identified on the basis of at least a single territorial male on site.

Observed vireos were followed within territories for as long as possible and GPS tracks and points were used to map the territory extent. The accuracy of territory mapping varied according to effort and GPS reading accuracy. We calculated the total area surveyed by buffering survey points by 200 m, which is the expected minimum range at which vireos could detect our playbacks. Locations where no vireos were detected generally were not revisited except incidentally while traveling to new areas. Known occupied territories were revisited opportunistically in order to identify the presence of pairs, nests, and young.

RESULTS

The survey effort resulted in locating 51 occupied territories and 104 Gray Vireos (Table 1). A total of 17 nests was located, as well as two

TABLE 1. Gray Vireos (*Vireo vicinior*), territories, nests, and young detected in the Organ and Sacramento mountains on Fort Bliss, New Mexico in 2007.

	Organ Mountains	Sacramento Mountains	Total
EFFORT			
Survey points	298	722	1020
Surveyor-days	44	78	122
Coverage (km^2)	15.7	54.1	69.8
TERRITORIES			
Number	14	37	51
Elevation range (m)	1719–2096	1630–1941	
Mean elevation ± standard deviation (m)	1837 ± 39	1781 ± 60	
Median elevation (m)	1830	1784	
Size range (m^2)	16206–67751	4067–113162	
Mean estimated size ± standard deviation (m^2)	41354 ± 15835	40033 ± 26875	
DEMOGRAPHICS			
Adults	24	58	82
Fledglings (minimum)	0	20	20
Nestlings (minimum)	0	2	2
Total Gray Vireos (minimum)	24	80	104
Nests	4	13	17
Incubating females	1	8	9
Territories with young (minimum)	1	12	13
Territories with ≥ 1 fledglings	0	5	5
Territories with ≥ 2 fledglings	0	6	6
Territories with ≥ 3 fledglings	0	1	1

nestlings and 20 fledglings.

In the Organ Mountains, 298 points covering a survey area of 15.7 km² were surveyed over 44 surveyor/days (Table 1). In the Sacramento Mountains, 722 points covering a survey area of 54.1 km² were surveyed over 78 surveyor/days (Table 1).

In the Organ Mountains (Table 1), nine territories were located in Soledad Canyon proper, two in a southern tributary of Soledad Canyon west of Beasley Canyon, one at the confluence of Soledad and North canyons, and two in Fillmore Canyon. A total of 24 adult Gray Vireos and no confirmed young were found.

Occupied territories in the Organ Mountains were generally localized along, and frequently at the base of, individual slopes within broad, east-west oriented, granitic/rhyolitic canyon systems. The elevation of occupied territories ranged from 1719 to 2096 m with a median and mean elevation of 1830 and 1837 m, respectively. The mean estimated territory size here was 41,354 m² (Table 1).

Only four nests were found during the Organ Mountains survey effort (Table 2). All nests were built in alligator juniper (*Juniperus deppeana*). The primary nest construction materials were mostly sideoats grama (*Bouteloua curtipendula*) with occasional leaves, conifer needles, and finer grass inflorescences as lining.

Open woodland dominated by alligator juniper was characteristic of these Organ Mountain territories. Subdominant components included gray and Sonoran scrub oak (*Quercus grisea* and *Q. turbinella*, respectively) along drainages and twoneedle piñon (*Pinus edulis*) along slopes. Apache plume (*Fallugia paradoxa*) dominated the understory along drainages, with mountain mahogany (*Cercocarpus montanus*) on mid- to upper slopes. The groundcover featured a lush cover of perennial grasses, primarily sideoats grama, and patches of forbs and sub-shrubs.

In the Sacramento Mountains (Table 1), we located one territory in West McAfee Canyon, six in El Paso Canyon, six in lower Culp Canyon, and 24 in the Grapevine Canyon complex. A minimum of 80 Gray Vireos were found, including 58 adults and 22 young. Occupied territories in the Sacramento Mountains occurred between 1630 and 1941 m with median and mean elevations of 1784 and 1781 m, respectively. The mean estimated

TABLE 2. Nesting substrate of Gray Vireo (*Vireo vicinior*) on Fort Bliss, New Mexico in 2007.

Scientific Name	Common Name	Nest Occurrences
Pinus edulis	Twoneedle piñon	4
Juniperus deppeana	Alligator juniper	4
Juniperus monosperma	Oneseed juniper	3
Cercocarpus montanus	Mountain mahogany	2
Fraxinus cuspidate	Fragrant ash	2
Rhus virens	Evergreen sumac	1
Garrya wrightii	Wright's silktassel	1

territory size in the Sacramento Mountains was 40,033 m².

Occupied territories were primarily in and along narrow to moderately broad, sinuous, limestone canyons. Nests were built in a variety of tree species (Table 2). Nest materials consisted primarily of perennial grasses with a few non-grass leaves, conifer needles, and bits of juniper bark. Vireos exhibited a preference for placing nests on or near the downhill side of the nest tree. Nest trees included twoneedle piñon, alligator and oneseed juniper, mountain mahogany, fragrant ash (*Fraxinus cuspidata*), evergreen sumac (*Rhus virens*), and Wright's silktassel (*Garrya wrightii*). Nest tree height ranged from approximately 2 to 8 m with a mean height of 2.4 m (Table 3). Nest heights ranged from 2 to 4 m. Nests averaged 0.22 m from the outer edge of the canopy.

Occupied territories featured vegetation that was heterogeneous and stratified with respect to landscape position. Territories found in the Grapevine Canyon complex and lower Culp Canyon area in the Sacramento Mountains featured three major vegetation components stratified by their position and aspect within the landscape (canyon bottom, xeric slope, and mesic slope).

Drainage bottoms in the Grapevine-Culp canyons area included a sparse to low cover of oneseed juniper (*J. monosperma*) and twoneedle piñon with some combination of Sonoran scrub oak, fragrant ash, alligator juniper, netleaf hackberry (*Celtis reticulata*), and evergreen sumac. A dense cover of shrubs dominated by Apache plume, but including a variety of other shrubs, typically lined the drainages. Viscid acacia (*Acacia neovernicosa*), ocotillo (*Fouquieria splendens*), and common sotol (*Dasylirion wheeleri*) often dominated the xeric slopes. Mountain mahogany overwhelmingly dominated the mesic slopes with a variable cover by piñon and oneseed Juniper. The mesic slopes usually also included a lush grassy groundcover dominated primarily by New Mexico feathergrass (*Hesperostipa neomexicana*).

The vegetation of the El Paso Canyon territories in the Sacramento Mountains was less stratified. The piñon-juniper woodland was open, but denser than the Grapevine-Culp canyons area. This woodland was continuous along the mesic side of the canyon bottom and extended variably onto mesic slopes and up the side drainages of xeric slopes. Apache plume was dominant along drainages, but other shrubs were featured as well. The shrub species found on the slopes included mountain mahogany (dominant) and soaptree yucca (*Yucca elata*). Xeric slopes had a smaller shrub component, but a denser, continuous and uniform

TABLE 3. Gray Vireo (*Vireo vicinior*) nest site characteristics observed on Fort Bliss, New Mexico in 2007. All values shown but ranges are mean ± standard deviation.

	Organ Mountains (n = 4)	Sacramento Mountains (n = 13)
Substrate height (m)	5.75 ± 2.25	4.9 ± 2.18
Substrate height range (to nearest m)	4–9	2–8
Nest height (m)	3.0 ± 2.04	2.4 ± 0.97
Nest height range (m)	1.5–6	1–4
Distance to canopy edge (m)	0.28 ± 0.19	0.22 ± 0.09
Habitat slope (%)	14.25 ± 4.35	43 ± 20
Slope aspect (degrees)	124 ± 83	261 ± 106
Nest aspect (degrees)	143 ± 133	179 ± 124
Nest-slope aspect difference (degrees)	39 ± 63	29 ± 22

cover of grass.

Discussion

Gray Vireos detected on Fort Bliss in 2007 utilized a range of habitats that reflected the variety of habitats occupied in southern New Mexico, ranging from dry, limestone canyons featuring varying amounts of piñon-juniper overstory and desert scrub to open juniper savanna, occurring at the base of slopes.

The average mapped territory size of 4.1 and 4.0 ha for the Organ and Sacramento mountains (Table 1), respectively, fell within the range of 2–10 ha reported by Barlow et al. (1999), but below the 8.0 ha reported by DeLong and Cox (2005). Inconsistent territory mapping effort might account for this difference.

The statewide review of DeLong and Williams (2006) estimated a minimum population size for Gray Vireos in New Mexico of between 549 and 827 birds and at least 418 territories. These authors calculated their lower minimums based on actual observations, their upper minimums by adding one for the assumed mate of each lone territorial male, and their maximum territories by dividing the upper minimum number of birds by two. Following this method and based on their numbers plus those of Wickersham and Wickersham (2007), we believe that the Fort Bliss survey has increased the known number of territories statewide by 8.2%, the lower minimum number of birds by 10.0%, and the upper minimum number of birds by 8.3%. Organ Mountain territories either overlap with historical locations or might have shifted and do not necessarily represent an increase in the known population. Due to these uncertainties in the Organ Mountains, the above estimate of increases in the known statewide population only includes those territories and birds we found in the Sacramento Mountains.

Acknowledgments

We would like to thank Dr. Brian Locke for initiating this investigation. Additionally, we would like to thank Doug Burkett and Matt Hartsough of White Sands Technical Services, as well as Justin Hobert of Zia Engineering and Environmental Consultants for their constant support, advice, and fellowship throughout this project. We wish them the best of luck during the 2008 field season and look forward to reading the results.