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## 5-Year Review: Summary and Evaluation of Black-capped Vireo (*Vireo atricapilla*)

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**Black-capped Vireo**  
*(Vireo atricapilla)*

**5-Year Review:  
Summary and Evaluation**

**U.S. Fish and Wildlife Service  
Arlington, Texas**

**June 19, 2007**

**.5-YEAR REVIEW**  
Species reviewed: black-capped vireo (*Vireo atricapilla*)

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## **5-YEAR REVIEW**

### **black-capped vireo (*Vireo atricapilla*)**

#### **I. GENERAL INFORMATION**

##### **A. Methodology used to complete the review**

The U.S. Fish and Wildlife Service (Service) initiated a 5-year review of the black-capped vireo to address new information on the species' distribution, threats, status, and management throughout its range available since its listing. While some assessments of the species' status involving significant portions of its range have been completed subsequent to its original listing, a 5-year review has not been completed, and therefore, this document serves as the first formal review. A notice soliciting information pertinent to the review was published in the Federal Register on February 2, 2005 (70 FR 5460-5463).

The Service contracted Texas A&M University to accumulate, summarize, and evaluate the current available information on the species. The product was a report consolidating the current information on the distribution, population trends, and threats to the species. The method involved a project team, led by Dr. Neal Wilkins, and an eight-member review panel consisting of scientists and stakeholders. The project team collected, catalogued, and summarized the existing scientific and commercial data related to the status of the species and its known threats. The eight-member review panel attended two meetings and critically reviewed drafts of the evaluations and conclusions of the report. Meeting notes, deliberations, comments and suggestions were recorded for the administrative record. The final report includes a bibliography of over 370 articles and was reviewed by three academic professionals whose comments were addressed and/or incorporated. The completion of this review was based largely on the information within this report, as well as other available information. The complete report is available from the Southwest Region Electronic Library at <http://www.fws.gov/southwest/es/>.

Following the receipt of the final draft report on February 13, 2006, the Arlington Field Office assembled an internal review team, which consisted of the Project Leader and three biologists, to evaluate the report and make a preliminary decision on the status of the species. Comments from the cooperating Field Offices were received through teleconference on May 1, 2006. The review team of the Arlington Field Office considered comments and recommendations from the cooperating offices, completed the review analysis, and developed a recommendation on the appropriate classification of the species.

##### **B. Reviewers**

**Lead Region:** Southwest Region - 2  
Wendy Brown, Recovery Coordinator (505) 248-6664

**Lead Field Office:** Arlington, Texas Field Office  
Tom Cloud, Field Supervisor (817) 277-1100

**Cooperating Field Offices:** Austin, Texas Field Office  
Robert Pine, Field Supervisor (512) 490-0057

Tulsa, Oklahoma Field Office  
Jerry Brabander, Field Supervisor (918) 581-7458

## **C. Background**

### **1. FR Notice announcing initiation of this review:**

February 2, 2005. 5-year review of lesser long-nosed bat, black-capped vireo, Yuma clapper rail, Pima pineapple cactus, gypsum wild-buckwheat, Mesa Verde cactus, and Zuni fleabane. 70 FR 5460-5463.

### **2. Species' Recovery Priority Number at start of review: 2C**

### **3. Species status: Stable (2005 TESS Report)**

### **4. Recovery achieved: 2 (26% - 50% [2005 TESS Report])**

### **5. Listing history**

Original Listing: October 6, 1987. Determination of the black-capped vireo to be an endangered species. Species listed throughout entire range (USA: Kansas, Oklahoma, Texas; Mexico) without critical habitat, effective November 5, 1987. 52 FR 37420-37423.

No other listing actions have been made regarding the black-capped vireo.

### **6. Review History**

There have been no formal status reviews of the black-capped vireo since it was listed. However, in 1996, the Service published the "Black-capped Vireo Population and Habitat Viability Assessment Report", that summarized the species' status at that time. In 2004, the Service completed a programmatic consultation on the 2002 Farm Bill, which included an evaluation of the environmental baseline for the black-capped vireo throughout its range in Texas. Both of these documents were used in the most recent evaluation of the status of the species by Wilkins et al. (2006), conducted as part of this 5-year review.

### **7. Recovery Plan or Outline**

Black-capped vireo (*Vireo atricapillus*) Recovery Plan, issued September 30, 1991.

## II. REVIEW ANALYSIS

### A. Application of the 1996 Distinct Population Segment (DPS) policy

#### 1. Is the species under review listed as a DPS?

The black-capped vireo was not listed as a DPS.

#### 2. Is there relevant new information that would lead you to consider listing this species as a DPS in accordance with the 1996 policy?

There is no new information relevant to designation of the black-capped vireo as a DPS.

### B. Recovery Criteria

#### 1. Does the species have a final, approved recovery plan containing objective, measurable criteria?

The final recovery plan for the black-capped vireo was approved on September 30, 1991. The recovery plan contains an interim objective of downlisting to threatened status, pending new information on the feasibility of delisting and development of delisting criteria. Four criteria are included to meet the downlisting objective.

#### 2. Adequacy of recovery criteria.

##### a. Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat?

The black-capped vireo recovery plan does not reflect the best currently available information on the biology of the species and its habitat needs. Thus, the recovery criteria are not based upon the most up-to-date information on the species. The plan acknowledges the uncertainty of the prospect of complete recovery of the species at the time it was written in 1991. As such, preliminary criteria were developed that would meet the interim objective of downlisting the species to threatened status. Explicitly, the plan is intended to protect and enhance the known populations (at that time), while evaluating the possibility of recovery and developing the necessary delisting criteria if recovery is found to be feasible. In light of the preliminary nature of the downlisting criteria, the plan notes that revisions would be necessary based on new information. Since the publication of the plan, several of the recovery tasks have been addressed, including research and information tasks.

In 1995, the Service held a black-capped vireo Population and Habitat Viability Assessment workshop, which was attended by 36 biologists representing 26 agencies, organizations, consulting firms, and universities. The stated goal of the workshop was the development of “*recommendations, through consensus-building by participants, that could be used by individuals, or groups of landowners and land managers, to develop and implement conservation strategies for the black-capped vireo*” (USFWS 1996). The workshop culminated in a report that addressed the distribution, status, and threats to the species, as well as made recommendations on management, outreach, future information needs, and recovery plan revisions. The recommendation on recovery plan revisions consisted of the reorganization of recovery regions described in the plan and directly related to recovery criterion number two (see section below).

In 2001, the Service recognized the need to revise the Recovery Plan based on new information and formed a Recovery Team to begin the revision process. However, due to budget shortfalls and workload issues, the revision process stalled and the Recovery Team was eventually disbanded in 2005.

**b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?**

The recovery plan includes four recovery criteria that, if attained, would be sufficient to consider the black-capped vireo for downlisting to threatened status. The four criteria are 1) all existing populations are protected and maintained, 2) at least one viable breeding population exists in each of the following six locations: Oklahoma, Mexico and four of the six Texas regions, 3) sufficient and sustainable area and habitat on the winter range exists to support the breeding populations outlined in (1) and (2), and 4) all of the above have been maintained for at least 5 consecutive years and available data indicate that they will continue to be maintained. However, the criteria are brief and lack adequate detail to discern a direct application to most of the five listing factors. In a broad sense, it appears all five listing factors are addressed in the first criterion, which requires the protection and maintenance of existing populations. The term “protection” is not further described, thus it could easily be applied to each listing factor, since these factors are threats from which the species may need protection. The only factor that may be considered to be specifically addressed by the criteria is factor A, *present or threatened destruction, modification or curtailment of its habitat or range*. All four recovery criteria at least partially address this threat. Criterion number three is directed toward the vireo’s wintering habitat, for which threats were not identified at the time of listing.

For the reasons listed in this section, the Service has determined the Recovery Plan to be out-of-date and in need of revision. Therefore, the recovery criteria listed in the plan were not used to guide the completion of this 5-year review.

## C. Current Species Status and Updated Information

### 1. Biology and Habitat

The black-capped vireo is a small (10 to 12 cm long), insect-eating, migratory songbird. Mature males are olive green above and white below with faint greenish-yellow flanks. The crown and upper half of the head is black with a partial white eye-ring. The iris is brownish-red and the bill black. The plumage of the female is duller than the male. Females have a dark slate gray head.

Black-capped vireos arrive in Texas from mid-March to mid-April, while those in Oklahoma arrive approximately 10 days later. They nest from Oklahoma south through central Texas to the Edwards Plateau, then south to the northern portion of Mexico. Breeding habitat is quite variable across its range, but is generally shrublands with a distinctive patchy structure. The shrub vegetation is mostly deciduous and generally extends from the ground to about six feet above ground and covers about 30 to 60% of the total area. Open grassland separates the clumps of shrubs. In the eastern portion of the vireo's range, the shrub layer is often combined with an open, sparse to moderate tree canopy. Black-capped vireos may live for more than five years, and usually return year after year to the same territory. They begin to migrate to the wintering grounds on Mexico's western coast in July and are gone from Texas by mid-September.

Recent efforts to characterize genetic heterozygosity and population structuring in the black-capped vireo found surprising variability, considering the apparent limited dispersal between isolated populations, within four geographically isolated populations in Texas and Oklahoma (Fazio 1994, Fazio et al. 2004). Within-population heterozygosity was high relative to other species within the family Vireonidae (Johnson et al 1988) and comparable to the mean for birds (Ward et al. 1992).

The specific epithet of the black-capped vireo's scientific name was recently changed from *atricapillus* to *atricapilla*, to conform to rules established for scientific nomenclature (David and Gosselin 2002). There have been no changes in the taxonomy of the black-capped vireo since it was listed.

The following discussion is taken from the conclusions drawn from Wilkins et al. (2006) relevant to new information about the species and its habitat. It is important to note that, while a substantial amount of information has been generated since listing, it is not possible to understand the complete population

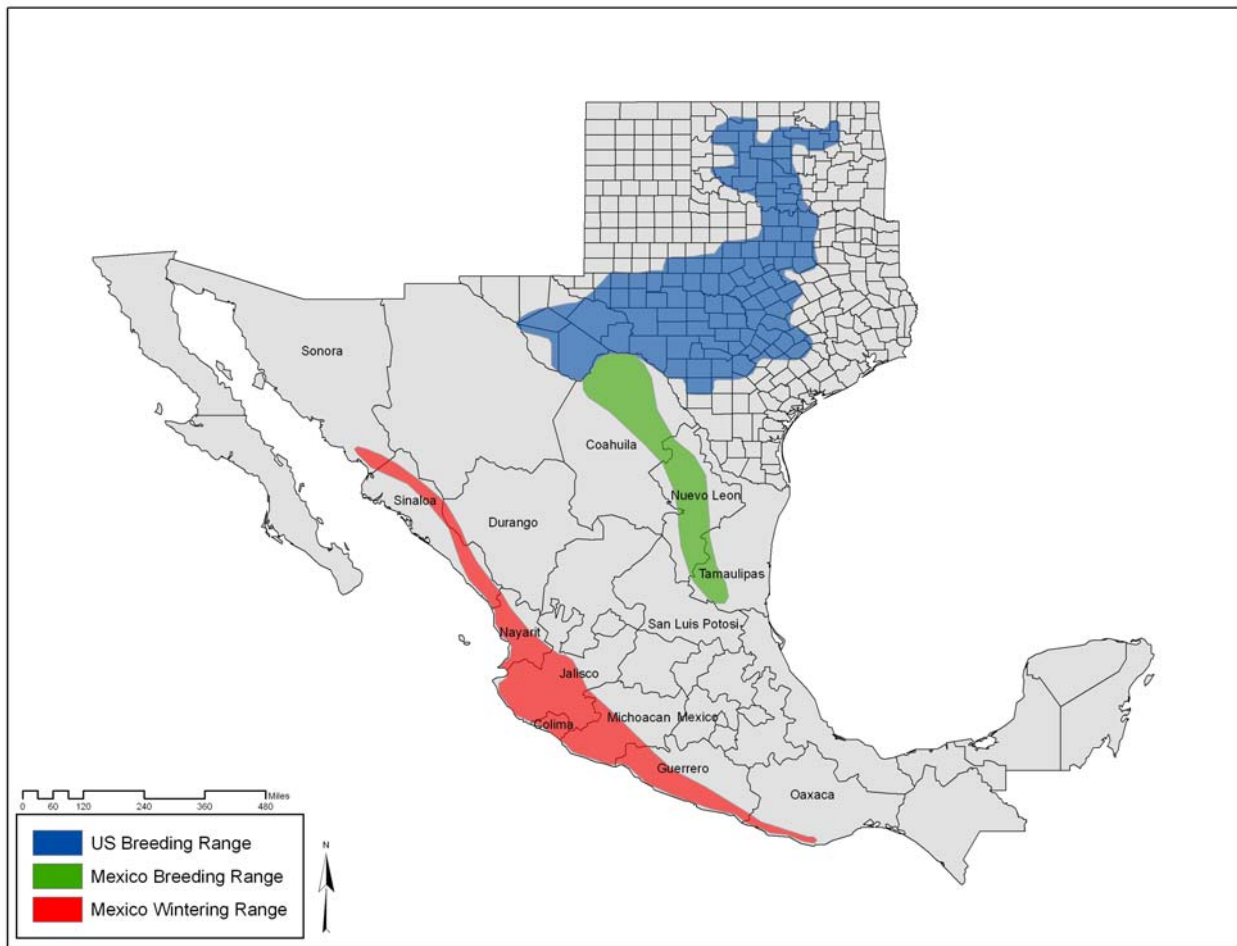


status of the species. This is due largely to the paucity of information available from Mexico and to Texas being approximately 97% privately owned or otherwise controlled. It is also acknowledged that the quality of the available data, from which these conclusions are made, varies with geography and topic. Nevertheless, the data collected in Wilkins et al. (2006) represents the best commercial and scientific information available to date.

### Geographic Range

At the time of listing, the historic breeding distribution was thought to include an area stretching from Kansas southward through central Oklahoma and through west-central Texas, with a southern limit in central Coahuila, Mexico. While the overall survey effort has increased since listing, the effort has not been evenly applied across the species' potential breeding range. Even though the resulting data provide incomplete knowledge of the species breeding range, the accumulated results do provide some insight into the conservation status of the species. These results are summarized below.

- When listed in 1987, the black-capped vireo was known to have breeding populations distributed across 21 counties in Texas, four counties in Oklahoma and in Coahuila, Mexico. Survey efforts since 2000 have confirmed that there are occupied breeding habitats in 38 counties in Texas, three counties in Oklahoma, and three states in Mexico. Since listing, cumulatively, breeding populations have been documented in 49 Texas counties, five Oklahoma counties and three Mexican states.
- The current black-capped vireo breeding range no longer appears to extend northward past central Oklahoma, and the species has not been documented in Kansas since the 1950s (Figure 1).
- Recent survey results confirm that the black-capped vireo's breeding range extends substantially farther south in Mexico than was known at the time of listing. The recent discovery of the southernmost breeding populations of the species in southern Coahuila, Nuevo Leon, and Tamaulipas significantly expands the known breeding range.
- Given recent observations in the wintering range of the species, black-capped vireos are now known to migrate to wintering habitats located along a narrow range stretching from approximately 16 to 27 degrees North latitude along the mountainous Pacific coast of Mexico (Figure 1). Recent observations suggest that most of the birds winter in the northern two-thirds of this area.



*Figure 1. Currently known breeding and wintering ranges of the black-capped vireo. Ranges are generalized for known locations since 1985.*

### Habitat Availability

As identified when the species was listed, the amount and distribution of suitable breeding habitat was a major factor contributing to the species' endangerment. However, at the landscape level, the amounts and distribution of suitable breeding habitat were unknown at the time of listing. Despite some significant progress in refining species-habitat relationships and in estimating the area of potential breeding habitat, there is not yet an inventory that would make it possible to reliably estimate trends in suitable breeding habitat.

- Analysis of extensive roadside surveys conducted in 1996-1998 resulted in an estimate of 1.45 million acres of potential breeding habitat in 53 counties across the species' range in Texas. This amounts to 3.3 percent of the total land area within the counties considered. Due to sampling issues, this estimate lacks reliability and is of limited utility for assessing the species' status.

- The suitability of rangeland as breeding habitat for black-capped vireos largely depends on the composition and structure of woody shrubs and small trees. Habitat alteration by invasive junipers appears to be a major limitation in the maintenance and development of suitable breeding habitats in many portions of the species range.
- The influence of prescribed fire in maintaining habitat suitability in the eastern portion of the species' range appears to be more important than was generally expressed at the time of listing. Although the absence of wildfire "under natural conditions" was acknowledged in the listing decision as a factor in the successional advancement of suitable habitats, the successful application of prescribed fire in managing for black-capped vireos was not well documented or generally acknowledged at the time of listing.
- Fire interacts with a region's physical features and climate to produce different outcomes. Fire appears to contribute to the development of suitable breeding habitats in Oklahoma and the eastern portion of the species' Texas range. However, in the western portion of the species' breeding range in Texas and in Mexico, fire is not as important in maintaining habitat suitability.

#### Population Status

Population surveys for the black-capped vireo over the years have been inconsistent, making data gathered from such efforts limited for use in determining changes in status over time. The following estimates are from reports of the *known* population over a certain time period. While the comparison of such data does not represent a trend in abundance over time, it is valuable in that it represents the minimum number of known individuals over a certain period.

At the time of listing, the population status of black-capped vireos was largely established from survey efforts that yielded a known population of 191 pairs (Marshall et al. 1985). Extrapolating from their surveys, Marshall et al. (1985) expanded their survey results to estimate that there were more than 20 pairs in Oklahoma, 188 to 374 pairs in Texas, and 48 to 131 pairs in Mexico. By 1996, about 1,803 males were reported in the U.S. (USFWS 1996); by 2005, the known U.S. population was 5,996 males (Wilkins et al 2006). Including the breeding range in Mexico, the current known population is at 6,269. Important points concerning population status are summarized below:

- From available survey data it is clear that the overall breeding population of black-capped vireos is substantially larger than was known at the time of listing. However, it is not clear how much of the difference can be attributed to increased survey effort. Because of unequal survey efforts across the

species' range, we cannot reliably estimate what proportion of the total breeding population is represented by the current known population.

- In many local cases, it could be that increased survey efforts alone have resulted in larger known populations of black-capped vireos. In other cases, however, it appears that breeding populations have likely increased since listing. For example, known breeding populations in three of the four areas with the most intensive survey efforts have increased almost 10-fold since surveys were reported in 1996 – these include Fort Hood Military Reservation (Texas), Wichita Mountains Wildlife Refuge (Oklahoma), and Fort Sill Military Reservation (Oklahoma).
- To date, about 75 percent of the known population in the breeding range is found on four well-surveyed areas– Fort Hood Military Reservation (Texas), Kerr Wildlife Management Area (Texas), Wichita Mountains Wildlife Refuge (Oklahoma), and Fort Sill Military Reservation (Oklahoma). Together, these facilities cover approximately 400,000 acres (161,877 ha) – an area representing only 1 percent of the total area of rangeland in the Texas/Oklahoma range of the species. The remaining 25 percent of the known population is the product of documented occurrences from at least 52 other properties, many of which are on private lands with only recent survey access.
- The current known breeding population in Mexico represents only 4 percent of the total known population. However, suitable breeding habitats in Mexico have been only sparsely surveyed, and most of the known breeding range has not been assessed for black-capped vireo occurrence. Where surveys have been conducted in Mexico, black-capped vireos are often found at densities higher than in the species' U.S. breeding range.

## **2. Threats**

The analysis of the magnitude and imminence of the current threats to the species is largely taken from the conclusions drawn from Wilkins et al. (2006) as they pertain to the five listing factors.

At the time of listing, the identified major threats to the black-capped vireo included habitat loss through land use conversion, grazing and browsing by domestic and wild herbivores, and brood parasitism by brown-headed cowbirds. The threat of vegetational succession, originally considered minor, appears to have been underestimated at the time of listing, although the extent of the effects on the black-capped vireo is not known. While the relative importance of individual threats appears to have changed since listing, these remain the primary threats to the species.

**a. Present or threatened destruction, modification or curtailment of its habitat or range:**

Habitat conversion and land use change

When proposed for listing, the largest known concentration of black-capped vireos was in the immediate vicinity of Austin, Texas and the population was under immediate threat from development and road construction. Much of the subsequent development in the Austin area was mitigated through habitat conservation plans and the subsequent set-aside of mitigation lands, including the Balcones Canyonlands National Wildlife Refuge. Habitat conversion and changes in land use continue to pose a threat throughout parts of the species' range. There are no data available for directly measuring trends in the amount of suitable habitat for the species, but some overall changes in land ownership and land use do suggest indirect trends that might be important for black-capped vireo conservation. However, these data were available only for the U.S. portion of the bird's breeding range.

- As of 2002, approximately 80 percent of the 68.8 million acres in the species' U.S. breeding range was classified as farm and rangeland. About 70 percent (33.9 million acres) of farm and rangeland in the area was classified as rangeland. This represents the land base on which suitable habitat for black-capped vireos might presently exist or be developed, either through management or natural processes.
- Recent trends in land use, land ownership and land fragmentation in the Texas part of the breeding range are quite different than those in Oklahoma:
  - Over the period 1992-2002, the total area classified as rangeland declined by 8.6 percent across the breeding range in Texas. This apparent change in land use was partly driven by an overall loss in farm and rangeland, but the reported loss of rangeland was 37 percent more than the overall loss in farm and rangeland. The figures collected for Oklahoma suggest a stable or slightly increasing inventory of rangeland. All else being equal, a net loss in rangeland area likely represents a loss of potential habitat for the species – but the magnitude of loss as well as compensating factors are unknown.
  - Over the period 1992-2002, about 2.8 million acres of large farms and ranches (more than 2,000 acres) were broken into smaller ownerships across the species' range in Texas. Oklahoma experienced a slight increase in large ownerships during the same period.

- During this same period, the numbers of smaller farms and ranches increased by about 40 percent across the species' breeding range in both states.

### Grazing and browsing

At the time of listing, overbrowsing by domestic goats, sheep, white-tailed deer and exotic herbivores was given as a primary cause of habitat loss, particularly in the Edwards Plateau of Texas (Marshall et al. 1985). Since listing, the numbers and densities of domestic livestock have decreased throughout much of the species' U.S. breeding range, and the specific areas where livestock numbers are decreasing have generally coincided with areas where overbrowsing was most threatening to the species. However, white-tailed deer populations appear to have increased in many of the same areas (i.e., Edwards Plateau).

- Grazing *per se* is neither beneficial nor detrimental to black-capped vireo habitats. The use of grazing and browsing animals, under proper management, for enhancing rangeland habitats, is well supported in the scientific literature. However, high stocking rates combined with poor management can remove the low-growing, shrubby vegetation black-capped vireos require for breeding habitat.
- Evidence continues to suggest that extremely high stocking rates of herbivores—especially goats, white-tailed deer and exotic ungulates—can degrade black-capped vireo breeding habitat. When grazing pressure is reduced, the breeding habitat may recover under some conditions.
- Given the apparent relationship between cattle and brown-headed cowbirds, grazing by cattle may have an indirect impact on black-capped vireos by increasing the risk of brood parasitism. This relationship is highly variable and may be mitigated with livestock management and, possibly, cowbird removal.

### Trends in the numbers of grazing and browsing animals.

- Goat numbers have declined throughout a major portion of the black-capped vireo's range in Texas. For example, goat numbers declined by 22.6 percent during the period 1987-2002, including decreases of 58 percent in the Southwest and Trans-Pecos region and almost 35 percent in the Edwards Plateau.
- Since listing, cattle numbers have decreased by 9.6 percent within the Texas range of the species, while increasing by about 12.5 percent in

the Oklahoma portion of the range. In general, cattle densities decreased in the western portion of the species' range in Texas and increased in northeastern Texas and Oklahoma.

- Data for determining trends in grazing animals in the Mexico portion of the species' range were not available.
- Although white-tailed deer populations appear to have decreased throughout Texas since listing, deer population numbers in the Edwards Plateau appear to have increased. The resulting browsing pressure by white-tailed deer may be limiting the development of suitable habitat in many areas of that region.
- Data for estimating trends in the numbers of exotic herbivores are incomplete. However, the most recent estimates, from 1994, suggested that populations of the most numerous species (axis deer, blackbuck antelope, aoudad, fallow deer and sika deer) were increasing in the Edwards Plateau of Texas.
- The densities of domestic livestock, particularly goats, have decreased substantially in recovery regions 2 and 4 (the Edwards Plateau and Southwest and Trans-Pecos regions, respectively). However, across the Edwards Plateau, estimates of white-tailed deer densities now exceed the density estimates for all other classes of domestic livestock.

*Summary of threat factor a.:* The overall loss and potential fragmentation of native rangeland caused by land use conversion and ownership changes throughout major portions of the species' breeding range, especially in the Edwards Plateau and North-central Texas regions, has likely resulted in an overall decrease in the potential habitat available for the species.

The density and abundance of domestic livestock, particularly goats, have declined substantially in those regions where this threat was of greatest concern at the time of listing, primarily in the Edwards Plateau and Southwest and Trans-Pecos Regions. Therefore, the potential for livestock overbrowsing to destroy black-capped vireo habitat is probably not as widespread as it was before listing. At the local level, however, the effects of overbrowsing by domestic livestock can be quite variable and may put local breeding populations of black-capped vireos at risk.

The density and abundance of white-tailed deer and exotic herbivores may have increased in those regions of greatest concern at the time of listing. This is of primary concern in the Edwards Plateau of Texas. In some locations within that region, exotic ungulates may out-compete white-tailed deer.

The current overall magnitude of threat within factor *a* is considered reduced since the species was originally listed in 1987 for the following reasons: 1) the development threat to the Austin area population was partially mitigated, and currently the area supports a population higher than was known at the time of listing and 2) the abundance of domestic livestock within the Edwards Plateau region of specific concern has decreased since listing. While loss and fragmentation of native rangeland and an increase of exotic and wild herbivores in portions of the black-capped vireo's range is of concern, the extent this threat poses to the species is unknown.

**b. Overutilization for commercial, recreational, scientific, or educational purposes:**

No new information is available regarding this threat factor. It was recognized in the original listing that excessive recreational activities (i.e., photography) can cause nest abandonment. Likewise, conducting presence/absence surveys for the black-capped vireo often involves recorded playback of the male's song or screech owl vocalizations, which may have induced territory abandonment. While it is impossible to quantify potential harassment from these sources, no substantial reports of adverse effects have ever been documented. Currently, there are more than 60 active permits issued for recovery purposes regarding the black-capped vireo. This threat is considered to be relatively low in magnitude.

**c. Disease or predation:**

The black-capped vireo does not appear to be significantly threatened by disease. No new information related to disease or ectoparasites has been identified since listing. Black-capped vireo nests are subject to predation from snakes, red imported fire ants, squirrels, foxes, and other birds. Eggs and young are most commonly depredated. The risk of predation from rat snakes and red imported fire ants may limit some populations, at least where parasitism is reduced through cowbird control programs. Because red imported fire ants have increased in distribution and abundance since the black-capped vireo was listed, they likely pose an increasing threat.

**d. Inadequacy of existing regulatory mechanisms:**

Prior to listing, the black-capped vireo was listed as a threatened species by the State of Texas. Following the Federal listing, the state uplisted the species to endangered to reflect the Federal status. A major concern prior to listing was the lack of habitat protection for the species. While there is still no mechanism of habitat protection (other than the Endangered Species Act protections), the importance of habitat management for the



species has been disseminated through various outreach and other programs (see Conservation Measures below).

**e. Other natural or manmade factors affecting its continued existence:**

Brood parasitism

At the time of listing, brood parasitism by brown-headed cowbirds was believed to be a primary factor in the low reproductive success of black-capped vireos (Marshall et al. 1985). At that time, it was thought that brown-headed cowbirds were becoming more abundant throughout the mid-continent of the U.S. and that cowbird removal was a necessary step towards black-capped vireo recovery. Important new information concerning brood parasitism and brown-headed cowbirds is summarized below.

Factors influencing abundance and parasitism rates.

- Brood parasitism rates on black-capped vireos appear to be correlated with the densities of other more conspicuous host species; this suggests that female brown-headed cowbirds may parasitize black-capped vireo nests more in areas where populations of more abundant species (e.g., northern cardinals) are denser.
- Brown-headed cowbirds often commute daily between separate feeding and breeding areas. Feeding areas are most often located with cattle; the proximity of feeding areas to breeding areas and the number of feeding sites within commuting distance are often correlated with cowbird abundance.
- At the local scale, the relationship between brown-headed cowbird abundance and rates of brood parasitism appears to be influenced by site factors such as host species assemblage, host abundance, and vegetative cover.
- At the regional scale, the threat of brood parasitism appears correlated with the regional abundance of brown-headed cowbirds.

Cowbird abundance trends.

- Throughout North America (excluding Mexico), the number of brown-headed cowbirds observed along Breeding Bird Survey (BBS) routes has declined by approximately 39 percent in the period 1966-2003.

- Since listing, the relative abundance of brown-headed cowbirds declined in the black-capped vireo's range in Texas, but remained stable in the species' range in Oklahoma. Over the last 10 years (1995-2004), observations of brown-headed cowbirds on BBS routes in the black-capped vireo's range in Texas have declined by 25 percent as compared to the 10-year period prior to listing (1976-1987). There was essentially no change in that comparison for Oklahoma.

#### Observed variability in parasitism rates.

- Observed brood parasitism rates on black-capped vireos vary across the range, with those in North-central Texas and Oklahoma being relatively higher than in other regions.
- As with other host species, the observed brood parasitism rates on black-capped vireos also can vary from year to year on any one site.

#### Effect of cowbird parasitism.

- The effect of cowbird parasitism on black-capped vireos is not a simple function of parasitism rates on individual nests. The effect at the population level is best measured as seasonal fecundity, which takes into account the desertion of parasitized nests, renesting attempts, remating efforts, and fledging rates. There is some evidence that high levels of brood parasitism can decrease seasonal fecundity of black-capped vireos.
- The threat posed by cowbird parasitism is proportionately greater when a species' population is declining because of other factors, such as habitat loss. In general, as a host population increases, the relative threat from brood parasitism declines.

#### Vegetation change

Habitat changes resulting from the encroachment of woody shrubs and small trees (vegetational succession) were identified as a threat to the species at listing. In reviewing the relevant scientific literature, much of the current threat can largely be attributed to the invasion and growth of juniper species. Confounding this threat is the requirement of Ashe juniper for another sympatric endangered species, the golden-cheeked warbler. The golden-cheeked warbler breeds exclusively in Texas and requires mature oak-juniper woodlands for nesting.

- The invasion and growth of native juniper species appears to be one of the most prevalent problems in maintaining existing suitable habitat throughout a major portion of the species' range in Texas and

Oklahoma. Juniper invasion has contributed to an overall afforestation of rangeland habitats throughout much of the species' breeding range in both states.

- Since listing, both Ashe juniper and redberry juniper have increased in dominance throughout the Texas range of the species; in Oklahoma, eastern red cedar has increased substantially.
- Juniper invasion into suitable habitats appears to be a function of the combined influence of fire suppression and overgrazing, and it may be further influenced by drought. At least in the eastern portion of the species' U.S. breeding range, fire appears to exert an overriding influence on the development and maintenance of breeding habitat for the species by controlling invasive juniper.
- Since listing, the increased abundance of five species of woodland birds throughout the U.S. breeding range of the black-capped vireo suggests that woody shrubs and tree cover are increasing, which would have a negative impact on black-capped vireo conservation.

*Summary of threat factor e.:* The threat posed by brood parasitism throughout major portions of the species' range in Texas has likely lessened since the species was listed due to a combination of an apparent decrease in cowbird abundance, an apparent increase in black-capped vireo populations, and circumstantial evidence of a reduction in parasitism rates at some locations due to cowbird removal. This same threat essentially remains unchanged since the time of listing throughout the species' range in Oklahoma. This conclusion is largely based on the fact that the relative abundance of brown-headed cowbirds in Oklahoma appears to be unchanged.

The widespread shift toward juniper-dominated woodlands is an issue of increasing concern for the black-capped vireo. Afforestation affects the species throughout its U.S. breeding range in all but the more western sections of the Edwards Plateau and Southwest and Trans-Pecos Regions. The threat of vegetational succession, particularly by Ashe juniper, is complicated by the requirement of mature oak-juniper woodlands by the endangered golden-cheeked warbler. The concern of vireo habitat loss due to invasive Ashe juniper is equaled by the concern of unchecked juniper removal in suitable habitats of the golden-cheeked warbler.

The overall magnitude of threat originally attributed to threat factor *e* is considered reduced. This is largely due to the data suggesting a decrease in abundance of the brown-headed cowbird over a large portion of the vireo's range and current cowbird control programs (see Conservation Measures) that manage the parasitism threat. It is acknowledged that the

threat of vegetational succession has likely increased since listing, however, there are no available data that allow a quantitative analysis of the level of threat that vegetational succession poses to the vireo.

### **3. Conservation measures**

Since the listing of the black-capped vireo, several conservation actions have been implemented that have reduced the magnitude of the primary threats. These measures are summarized below.

#### Cowbird removal programs

Cowbird control programs across the black-capped vireo's range resulted in the removal of more than 235,000 cowbirds (mostly female) from 2000 through 2004. To date, most cowbird removal efforts in the range of the black-capped vireo are in those areas where there are relatively large black-capped vireo populations – Fort Hood Military Reservation (Texas), Kerr Wildlife Management Area (Texas), Wichita Mountains Wildlife Refuge (Oklahoma), and Fort Sill Military Reservation (Oklahoma). Cowbird removal can decrease local parasitism rates on black-capped vireo nests resulting in an increase in individual nest success. However, most cowbird control efforts for the black-capped vireo are combined with habitat management and restoration efforts (e.g., coordinated brush control, controlled burning, and grazing management), which confounds most attempts to determine the overall population-level benefit of cowbird removal.

#### Balcones Canyonlands National Wildlife Refuge

In 1992, Balcones Canyonlands National Wildlife Refuge was established in Burnet, Travis and Williamson Counties, Texas, to protect and manage habitat for the black-capped vireo and golden-cheeked warbler. Within a larger acquisition area of 80,000 acres, the refuge hopes to obtain at least 46,000 acres of habitat for these priority species and other species and habitats of concern. Currently, the refuge consists of about 60 tracts totaling approximately 21,436 acres including lands held in fee simple and conservation easements. Draft habitat management maps currently under development indicate about 360 acres of occupied vireo habitat and at least 1,125 acres of future vireo habitat management on the current tracts. As of 2005, the black-capped vireo population within the refuge boundary was estimated to be 80 to 100 pairs.

#### Safe Harbor Agreements

Environmental Defense, Inc. is a national non-profit conservation organization that implements diverse programs and activities for the conservation of wildlife. It works with private landowners to promote voluntary, incentive-based conservation efforts for endangered species throughout the country. A Safe Harbor Agreement and associated permit for the black-capped vireo and

endangered golden-cheeked warbler was issued to Environmental Defense in December 2000. The Safe Harbor Agreement originally covered 25 counties in Texas, but was amended in 2005 to include an additional 12 counties in Texas. To date, seven landowners in six counties have enrolled over 6,200 acres for black-capped vireo management. The permit for the Agreement expires in 2030.

#### Private Lands Incentives

The 2002 Farm Bill, administered by the Natural Resources Conservation Service (NRCS), authorized and funded conservation programs to address natural resource concerns related to soil, air, water, plant, and animals, including wildlife. Conservation practices conducted under Farm Bill programs include brush management, for which Ashe juniper is a target brush species. As of October 1, 2003, approximately 997,256 acres have been treated under brush management in Texas. In April 2004, the NRCS entered into consultation with the Service on the 2002 Farm Bill and potential impacts to the black-capped vireo, as well as other listed species. One outcome of the non-jeopardy biological opinion resulting from the consultation was the establishment of conservation guidelines to allow Farm Bill programs to reduce juniper encroachment in black-capped vireo habitat and reduce potential impacts to the species. Although the biological opinion authorizes incidental take of the black-capped vireo, brush management activities funded through Farm Bill conservation programs are anticipated to have an overall benefit on the black-capped vireo by reducing the threat of vegetational succession primarily resulting from invasive Ashe juniper. The Farm Bill expires in 2007, however, reauthorization is expected.

Initiated in Texas in 1990, the Service's Partners for Fish and Wildlife (PFW) program restores and enhances fish and wildlife habitat on private lands. The PFW program originally targeted wetland habitat for restoration and enhancement work, but has expanded to benefit habitats for all federal trust resources, including waterfowl, other migratory birds, and candidate, threatened, and endangered species. Through 2005, the FWS has entered into 1,194 voluntary partnerships with private landowners, covering approximately 290,000 acres in Texas. Approximately 42,000 acres of habitat for endangered or candidate species have been restored and/or enhanced by the PFW program in Texas. In 2003, the PFW program in Region 2 assumed the administrative responsibility for the Private Stewardship Grants Program, which requires all projects to have a direct benefit to a federally listed or candidate species. To date, approximately 30 private landowners, involving at least 5,000 acres across the range of the species in Texas, have signed Private Lands, Cooperative, or Grant Agreements whereby they agree to work with the Service and our conservation partners to improve the value of the habitat on their property for the black-capped vireo. Habitat improvement practices involve brush management (most often the mechanical control of juniper with skid-steer equipped with tree sheers), prescribed burning, and fencing to control livestock. In the last 3 years approximately \$350,000 has been obligated toward projects intended to specifically benefit black-capped

vireos. In Oklahoma, the PFW has included over 400 acres of black-capped vireo restoration in two counties since 1993.

In 1997, the Texas Parks and Wildlife Department (TPWD) initiated their Landowner Incentive Program (LIP) as a pilot project using funds under section 6 of the Endangered Species Act. In subsequent years, this program was supplemented with money appropriated by the Texas legislature. The Texas LIP was developed to encourage private landowners to improve habitat on their property for rare species (including federally listed, candidate, and State listed species) by providing financial incentives. In 2002, the Service initiated the Federal version of LIP as a competitive grant program for States, territories, and Tribes to develop and implement a qualifying program to provide financial and technical assistance to private landowners for projects that would protect and manage habitat for species-at-risk. Since 1998, TPWD has enrolled landowners in eight counties in Texas for restoration or enhancement of over 7,400 acres of black-capped vireo habitat.

#### Public Outreach

In 1995, the TPWD published the book “Endangered and Threatened Animals of Texas – Their Life History and Management” funded in part by section 6 of the Endangered Species Act. This book provides important information on the listed animals of Texas, including habitat needs, life history, and threats. The information included for the black-capped vireo also provides guidance on avoiding habitat impacts from normal land management activities and techniques for habitat creation and management. These guidelines have been widely distributed and utilized in land management programs as a condition of Federal funding.

#### **D. Synthesis**

The black-capped vireo was originally listed in 1987 throughout its entire range in the U.S. and Mexico, largely due to loss of habitat and the effects of brood parasitism by the brown-headed cowbird. The Recovery Plan for the vireo was finalized in 1991, but is in need of revision and not considered the best available information for the purpose of a 5-year review. A complete population assessment is not currently possible due to the lack of available information from Mexico, which may contain a significant population, and the lack of access to private property in Texas, which is approximately 97% privately owned or otherwise controlled. Some threat factors are difficult to quantify for the same reasons. In the future, technology may enhance such analyses through the use of remote sensing, but for the current review equal emphasis is placed on the known population and magnitude of threats.

The known population of the black-capped vireo is currently much larger than at the time of listing, which may be attributed to an increase in the overall population and/or increased survey efforts having identified populations at new locations, including private

lands. Information on private lands in Oklahoma is lacking, but new information indicates the black-capped vireo occurs in portions of Mexico not thought to be part of its range when listed. When the black-capped vireo was listed, the *known* population was 191 pairs and the estimated population was 256 to 525 pairs, occurring in four counties in Oklahoma, 21 counties in Texas, and one Mexican state. An accounting of the *known* population since 2000 shows over 6,200 vireos inhabiting three counties in Oklahoma, 38 counties in Texas, and three states in Mexico.

The black-capped vireo was listed due to major threats identified as habitat loss through land use conversion, grazing and browsing by domestic and wild herbivores, and brood parasitism by brown-headed cowbirds. Other threats include predation and vegetational succession. No new threats to the black-capped vireo have been identified since listing. Based on this review, it appears the original threats to the species still exist, but the magnitude of the threats has changed, resulting in an overall decrease in threat level. A discussion on the magnitude of threats is given in the “conclusion” section below.

Conservation programs and measures implemented to reduce the threats to the species include a 37-county Safe Harbor Agreement, private lands incentives, cowbird removal programs, and public outreach. Most of these measures have occurred within the species’ range in Texas and target the major threats to the species – loss of habitat and brood parasitism. Those conservation programs that include on-the-ground actions are coordinated through Service sponsored programs with annual reporting requirements that, at a minimum, include reporting of area and/or habitat enhanced or treated. Such data do not usually provide information useful for detecting trends in vireo populations, distribution and/or overall status, however, some measurable performance can be reported concerning the reduction of threats. For example, a program reporting the number of acres treated for juniper encroachment for black-capped vireo habitat restoration has reduced the threat attributed to vegetational succession in the area(s) treated. It would not be practical nor cost-effective to design detailed monitoring plans for each program, when the purpose of such programs is to utilize measures known to be beneficial to the species. The Service believes the proper implementation of these conservation measures effectively reduce the primary threats to some degree.

### Conclusion

Based on the information in this review, the current overall threat level to the black-capped vireo is less in magnitude than it was at the time the species was listed. This is based on some threats decreasing in magnitude, the reconsideration of magnitude to certain threats, and the effects of conservation measures on the major threats to the species.

When the threat of habitat destruction by domestic livestock through overbrowsing was identified during the original listing, no quantitative data were made available, and therefore, the magnitude attributed to the threat was based on anecdotal evidence. The current review shows quantitative data for domestic livestock from 1987 to 2002. The data show this threat has decreased, based upon the decrease in density and abundance of

livestock in those regions of particular concern during the original listing. However, it appears the density of white-tailed deer and exotic ungulates may have increased in the same regions, which may be a concern for habitat availability. This may be the only threat that is not countered by conservation measures, with the possible exception of game management programs.

The threat of brood parasitism by brown-headed cowbirds remains a major, albeit partially managed, threat to the species. At the time of listing, it was believed that the brown-headed cowbird was increasing in abundance; current information suggests that the species may be decreasing in abundance where its range overlaps the black-capped vireo, at least in Texas. Additionally, in the vireo's U.S. range, brood parasitism is effectively managed at the major black-capped vireo populations occurring on public land, and supplemented by cowbird control programs on private lands.

Habitat loss through vegetational succession was considered a minor threat to the species at the time of listing. As revealed in this review, this threat has increased or perhaps was underestimated in the 1987 listing due to a lack of information. While juniper encroachment in black-capped vireo habitat continues to be a concern, the conservation measures outlined in this review reduce the magnitude of the threat.

In the original listing 5-factor analysis, habitat destruction resulting from development activities was considered a major threat to the species. This was based on the existing development threat to 88 percent of the "largest known concentration of black-capped vireos," which consisted of an estimated 33 pairs in the Austin area. While the immediacy of this threat was correctly assigned, the predicted demise of the Austin area black-capped vireo population, as well as the importance placed upon this population to the vireo's overall status, was overvalued in terms of magnitude. That is, the effects of the development in the Austin area have extirpated some populations of black-capped vireo, yet the currently known population is higher now than at the time of listing. This is due in part to effective mitigation and conservation efforts, such as the Balcones Canyonlands National Wildlife Refuge, which currently supports an estimated 80-100 pairs of vireos. Currently, the largest known concentration of black-capped vireos is likely to be the population at Fort Hood, Texas, which is estimated to be more than 13,000 birds. Clearly, the effects of the development threat to the Austin area population of black-capped vireos were substantially less in magnitude than originally anticipated in 1987.

Additionally, more information is known about the distribution of the species, including the discovery of new breeding populations in Texas and Mexico. However, known populations may continue to be extirpated within the species' range. This is the nature of the species' habitat, which is often ephemeral especially in the eastern portion of its range, giving its distribution a patchy appearance across the landscape. The absence of vireo populations in apparently suitable habitat was heavily weighted in the original listing threat analysis, especially in the assignment of the magnitude of identified threats to the species. As such, it was predicted that the occurrence of black-capped vireos on private land would be relatively low, thus making the species in danger of extinction over



the next several decades. This has not been the case, as the discovery of new vireo populations on private lands over the last few years have been a substantial addition to the status of the species. It is expected that such discoveries are likely to continue due to the increase in conservation and other programs that produce survey information. The continued reporting of new populations is not indicative of a species in danger of extinction within all or a significant portion of its range. Nor does the magnitude of threats discussed above indicate the black-capped vireo is endangered. However, the threats to the species still exist and its recovery currently depends largely on management actions to reduce these threats. Therefore, it is recommended that the species be reclassified from endangered to threatened status.

### III. RESULTS:

#### A. Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist**
- No change is needed**

#### B. New Recovery Priority Number   8

The black-capped vireo recovery priority is recommended to be changed from 2C to 8. As detailed in this review, the magnitude of threats has decreased since listing, however, the major threats are still imminent.

#### C. If applicable, indicate the Listing and Reclassification Priority Number (FWS only):

**Reclassification (from Endangered to Threatened) Priority Number:   6**

The black-capped vireo requires management actions that are unlikely to change if downlisted. A reclassification of the species is not the result of a petition.

### IV. RECOMMENDATIONS FOR FUTURE ACTIONS

Many information gaps in the biology and threats to the black-capped vireo should be addressed before the next 5-year review. Of particular importance, information regarding the magnitude and trends of brood parasitism by the brown-headed cowbird, as well as differences in parasitism rates across the breeding range is essential to formulating measurable recovery criteria. Additionally, information on the status, threats and distribution of the species across its breeding and wintering range in Mexico is lacking. Surveys and research in Mexico to fill these gaps is a high priority. This additional information should provide a basis for analysis of black-capped vireo populations with

regard to possible reclassification under DPS or significant portion of the range. The Recovery Plan should be revised to reflect the most current information available, including a thorough threats analysis, and development of objective and measurable delisting criteria.

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**U.S. FISH AND WILDLIFE SERVICE  
5-YEAR REVIEW of the black-capped vireo**

Current Classification: Endangered

Recommendation resulting from the 5-Year Review

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable 6

Review Conducted By: Arlington, Texas Ecological Services Field Office

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Lead Assistant Regional Director for Ecological Services, Fish and Wildlife Service, Region 2

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