Status and Management of the Least Bell's Vireo and Southwestern Willow Flycatcher in the Santa Ana River Watershed

2006

Prepared by
The Santa Ana Watershed Association

Prepared for
Orange County Water District
U.S. Fish and Wildlife Service

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March 2007

ABSTRACT

The 2006 monitoring effort for the Least Bell's Vireo, *Vireo belli pusillus*, documented late arrivals and decreased abundance but increased reproductive success as compared to the 2005 season. Three-hundred seventeen vireo territories, 208 pairs and 372 fledglings were documented throughout the watershed by SAWA and cooperating agencies, a decline of 19% in total vireo territories. Of that total, 256 territories, 187 pairs, and 352 fledglings were documented in the Santa Ana River watershed in SAWA's regularly monitored sites, also down 19 % from 2005. Delays in first arrival dates at four monitored sites ranged from 12-26 days as compared to 2005. Delays in the presence of 50% of the territories in these subpopulations ranged from 6-34 days. Delays in the presence of 50% of the pairs in these subpopulations ranged from 8-24 days. Nesting success was higher in 2006 at 62% as compared to 56% in 2005. The number of fledglings observed increased by 4%. The predation rate was 46% and was consist with past years. The parasitism rate was 19%, a decline from 23% in 2005. Twenty-four vireos fledged from 16 manipulated nests; the majority of these manipulations occurred in San Timoteo Canyon. Another 4 vireos fledged from 3 repaired nests. Sixty-six per cent of the nests were placed in willows, *Salix spp.*, and 11% were built in mulefat, *Baccharis salicifolia*. Brown-headed Cowbirds, *Molothrus ater*, were also managed throughout the watershed. Two thousand, eight-hundred and eight-one cowbirds were removed from 52 traps over 5,045 trap-days between 3/13/07 – 7/30/07. No breeding Southwestern Willow Flycatchers, *Epidonax trailli extimus*, or Yellow-billed Cuckoos, *Coccyzus americianus occidentalis*, were detected outside the Prado Basin in 2006. One breeding southwestern willow flycatcher and a second male were documented in the Prado Basin by Pike *et al.* (2006). Incidental sightings of other sensitive birds were made. Over 200 Yellow Warblers, *Dendroica petechia*, and 96 Yellow-breasted Chats, *Icteria virens*, were detected throughout the watershed. Continued degradation of riparian vegetation due to human intrusion occurred in 2006.

INTRODUCTION

The least Bell's vireo (*Vireo bellii pusillus*) is a small, insectivorous bird that occupies riparian habitat in central and southern California and northern Baja. It is listed as endangered by both the State of California and the Federal government due to the destruction of riparian habitat and brood parasitism by the brown-headed cowbird (*Molothrus ater*) (Pike *et al.*, 1999).

The southwestern willow flycatcher (*Empidonax traillii extimus*) occupies riparian habitat throughout the southwest. It too is listed as endangered by the Federal government due to habitat destruction and alteration and cowbird parasitism.

These two endangered species and several other sensitive species have been monitored and managed in the Prado Basin annually since 1986. From 19 pairs of vireo in 1986, the population has increased to 386 pairs and 600 territorial males in 2005 (Pike *et al.*, 2005). The work reported herein is an expansion upon the Prado Basin efforts into other portions of the watershed through the implementation of the Santa Ana River Watershed Program by the Santa Ana Watershed Association (SAWA) and the Orange County Water District (OCWD). The monitoring program was conducted during the breeding season to determine the number of least Bell's vireos and southwestern willow flycatchers present, their breeding status, and nesting outcomes; cowbird trapping in or near riparian habitat was conducted concurrently.

METHODS

Study locations were the Santa Ana River upstream of River Road to Fairmount Park (the river above Fairmount Park is surveyed by the County of San Bernardino), the Hidden Valley Wildlife Preserve, and downstream from Prado Dam to Weir Canyon (the Santa Ana Canyon), and the mouth of the Santa Ana River in Orange County at Talbert Park. The following tributaries to the Santa Ana River were also surveyed: San Timoteo Canyon, Sycamore Canyon, Mockingbird Canyon, Harrison Reservoir (McAllister Creek), Temescal Canyon and the San Jacinto watershed. Other sites in the watershed included the Chino Hills-Butterfield Ranch area and the March SKR Preserve.

Both the monitoring effort and data analysis followed Pike *et al.*, (1999). All potential habitat was carefully and slowly traversed along the edges and open trails. All vireos and other sensitive species encountered were noted as to location, behavior, reproductive status, etc. The primary purpose of this monitoring was to locate all vireos and flycatchers to determine their breeding status and enhance their breeding output through management. Surveys were conducted five days a week throughout the season from March into August. The surveys began in March and ended in August. See individual site reports for actual beginning and ending dates of surveys. Occasional visits to determine continued vireo presence occur through October. San Timoteo Canyon was surveyed by Melody Aimar, Allyson Beckman, and Linette Lina. The Santa Ana River between Fairmount Park and Van Buren Blvd. was surveyed by Talula Wiater; Hidden Valley was surveyed by Susan Hoffman; the Santa Ana River from River Road to Hidden Valley was surveyed by Jill Coumoutso; the Santa Ana Canyon below Prado Dam was surveyed by Terry Reeser and Susan Hoffman; Temescal Creek, Sycamore Canyon, and Harrison Reservoir were surveyed by Allyson Beckman and Jill Coumoutso; Mockingbird Canyon was surveyed by Melody Aimar; March SKR Reserve was surveyed by Samantha Dempster; Chino Hills was surveyed by Terry Reeser; San Jacinto was surveyed by Samantha

Dempster; and Talbert Park was surveyed by Jim Pike.

The field biologists worked under the direction of the Principal Field Investigators and all surveys and nest manipulations were performed under, and in compliance with, all terms and conditions of Federal Endangered Species Permit #TE-839480-3.

In addition to the above intensive monitoring, an assessment was made of all riparian habitat in the watershed. Biologists identified habitat not regularly monitored. Most of the 44 sites were surveyed three times during the season, during the weeks of 5/22, 6/26, 7/24 by SAWA. Other participating agencies such as the County of San Bernardino and California State Parks contributed data from their surveys. Assessment surveys were delayed three weeks in 2006 because of the late arrival of the vireo. Surveys were conducted by walking through habitat along trails. Surveys began about 7 a.m. and usually ended by 1 p.m. Territories were mapped and reproductive status was assessed if possible on the brief visits. A few sites were surveyed outside of the scheduled dates due to conflicting schedules. While three surveys were done for most sites, some sites received only one or two visits, e.g., Cottonwood Canyon, Alessandro Arroyo, and Cajalco Canyon (Table 7).

Although 2006 was a late season most likely due to the continual cold fronts that came into Southern California, surveys were done during periods of clement weather. Nest visitation and monitoring during conditions of very high winds, extreme cold, or other climatic factors that could influence survey results or cause disturbance to nesting birds were avoided.

Successful nesting is defined as fledging at least one bird. Pairs for whom nests were not located or who were never observed with fledglings were considered non-breeding. Two estimates of fledgling production are given: the number of fledglings observed, which is the minimum total number fledged, and the projected number of fledglings estimated by determining the average number of fledglings produced by closely-tracked pairs and ascribing that productivity to all pairs. The closely-tracked pairs were those visited frequently enough to document all breeding attempts during the season. This usually meant an effort of at least 5 visits per nesting attempt, several of which were needed to check for fledglings. Nests were visited once every 7 – 8 days to check for cowbird eggs. Cowbird eggs and nestlings were removed from nests.

No playbacks of taped vocalizations were used during any surveys for the least Bell's vireo. The search for willow flycatchers was done in conjunction with visual and auditory searches for vireos and other species. Additional surveys for the willow flycatcher involved visiting areas where the flycatcher had historically been detected and playing taped vocalizations.

Cowbird traps were located in, or near riparian habitat in each of the drainages. Fifty-two traps were deployed throughout the watershed. Trapped cowbirds were either euthanized at the site by asphyxiation or transferred to a licensed falconer. Native birds that were captured in the traps were released immediately on the day of their capture; traps were checked daily.

A minimum of 5,064 hours were spent in the field in 2006 for the vireo management program including 2,580 field hours on vireo monitoring; 328 field hours on the vireo assessment surveys; and 2,156 field hours on the cowbird trapping program.

Study Sites

Study sites contained typical Southern Californian riparian vegetation including tall canopies of cottonwood, *Populus fremontii*, and black willow, *Salix gooddingii*, and sub stories

of arroyo and red willows, *Salix lasiolepsis* and *Salix laevigata*, respectively, and mulefat, *Baccharis salicifolia*. Lush riparian habitat is abundant throughout the study sites, intermixed with invasive giant reed that is dominant in many locations. Non-native Pepperweed (*Lepidium latifolium*) is found at many sites mainly along paths and trails. Other than storm run-off, the river's water flow is from discharged treated water, urban runoff, very limited natural springs and upwelling in the Prado Basin, and releases from Seven Oak's Dam. The river is subjected to heavy human impacts for recreation such as swimming, fishing, paintball gaming, unauthorized trails, and off-road vehicle use. SAWA biologists surveyed approximately 15 mi (23 km) of the river from Fairmount Park to River Road. San Bernardino County biologists surveyed the river in San Bernardino County. For data from Prado Basin (from River Road downstream to the dam), see Pike *et al.*, 2006.

The Santa Ana Canyon was surveyed from Prado Dam to Weir Canyon Rd., a distance of approximately 9 miles (14 km). The width of the habitat is often less than 200 m. A private golf course covers approximately 2 miles (3.5 km) of the habitat and about 4.4 miles (7 km) is in the County of Orange's Featherly Regional Park. Parts of the habitat are subject to heavy human disturbance. A heavily used interstate highway, the 91 freeway, is built along the entire length of the canyon. Because of the differences in the habitat throughout the canyon, it was divided into three sites for purpose of analysis: the upper canyon from Prado Dam to the beginning of the Green River Golf Club, includes canopied habitat and open fields; the Green River Golf Club and Featherly Regional Park are characterized by narrow strips of riparian habitat.

The Hidden Valley Wildlife Preserve is located along the Santa Ana River in western Riverside County and supports 1300 acres (526 ha) of riparian habitat. In this report Hidden Valley refers to approximately 465 acres (188 ha) of riparian habitat on the south side of the river bounded roughly by Pedley St. on the east and Tyler Ave. to the west. Some of this habitat was inaccessible in 2006 due to the 2005 flooding of the Santa Ana River and subsequent breaks in the levee diverting water to the Hidden Valley pond system. Horse trails and service roads exist throughout the site. There is an education center that provides tours and education programs for school districts. The site contains a pond system of reclaimed sewage water. It is owned by the State of California and operated by the County of Riverside.

The riparian belt of cottonwoods along the San Jacinto River was surveyed from Sanderson Ave. to Bridge Rd. and above State St. The San Jacinto Wildlife Refuge was also surveyed.

Various public and private entities own the land along the river and in the four largest tributary study locations: San Timoteo Creek, Mockingbird Canyon, Temescal Canyon, and Santiago Creek.

San Timoteo Creek was intensively surveyed from the Norton Younglove Peserve to approximately 10 miles (16 km) downstream. A program initiated by SAWA to restore riparian habitat has removed *Arundo donax* along the entire creek watershed. The canyon's immediate uplands contain citrus groves and remnants of over grazed coastal sage scrub. A railroad and a two-lane road border the canyon. Development of portions of the uplands for homes is occurring.

Mockingbird Canyon was surveyed from Wood Rd. to the reservoir at Gage Canal. The canyon is characterized by willow species with an under story of mulefat, yerba mansa, *Anemopsis californica,* and watercress, *Rorippa nasturtium-aquaticum*. Residential development is occurring immediately adjacent to the creek on Riversidian alluvial sage scrub. Gage Canal basin is characterized by a large seasonally dry streambed leading to the reservoir

that contains native riparian vegetation, and exotics including giant reed, *Arundo donax,* and perennial pepperweed, which were removed in 2003 and are currently being monitored and re-treated as needed.

Habitat was surveyed along approximately 26 miles (42 km) of Temescal Canyon, from Railroad Canyon to approximately 2 miles upstream of the intersection of Magnolia Ave and Temescal Creek. Cottonwood Canyon and Horsethief Canyon were also surveyed. Temescal Canyon is characterized by patchy, dense riparian vegetation. Privately owned sand mines operate downstream in the northern section of the creek. There is recreational fishing in Lee Lake. A portion of the floodplain at Hwy 74 in Lake Elsinore is being restored by the U.S. Army Corps of Engineers. Residential development of the upland has occurred along portions of the creek.

Four fragments of riparian habitat were surveyed in Chino Hills: Butterfield Ranch Park; a ravine between Butterfield Ranch Rd. and Hwy 71 surrounded by pasture; a mitigation site at the base of Chino Hills State Park on Butterfield Ranch Rd.; and a mitigation site at Butterfield Ranch Rd. and Brookwood Ln.

Appendix A contains the UTM coordinates of the upstream and downstream boundaries of the drainages surveyed.

Sites surveyed for the three visit assessments are listed in Table 7. Patch sizes ranged from 2 miles stretches of ravines such as that off of Cajalco Rd. to small patches in urban parks as found in Norco and Chino Hills.

RESULTS

Results - Vireo Abundance

Three hundred seventeen territories and 208 pairs were detected in the Santa Ana watershed in 2006 (Table 1) . Two-hundred ninety-one territories, 197 pairs, and 363 fledglings were detected at sites monitored by SAWA biologists; two-hundred fifty-six territories, 187 pairs, and 352 fledglings were documented in regularly monitored areas and 35 teritories, 10 pairs and 11 fledglings were detected during the assessment surveys (Table 1 & 7). Other vireos reported in the watershed included 13 territories, 11 pairs and 9 fledglings in the Santa Ana River above Riverside Ave. to Waterman Ave. (T. Fay, pers. comm.) and 13 territories in Chino State Park (A. Ing, pers. comm.)

Vireo abundance in regularly-monitored sites decreased by 62 territories (n=256, 19%) in 2006 from the watershed's 2005 high count of 318. Pairs detected decreased from 224 in 2005 to 187 in 2006, down 17%. Observations of fledglings increased by 4% from 337 in 2005 to 352 in 2006 (Table 4). Numbers of territories detected during the 3-week surveys remained stable at 35 territories, however, the number of pairs detected decreased from 14 to 10. The number of fledglings detected during the briefer surveys also remained stable at 11 (Table 7).

San Timoteo held 32 territories including 29 pairs. Hidden Valley held 33 territories including 24 pairs. Sixteen territories including 13 pairs were found on Temescal Creek; Five territories additional territories were reported by J. Konecny (pers. comm..). The Santa Ana River (mainstem from River Road to Jurupa Park) held 151 territories and 99 pairs. The distribution along the river was: Fairmount Park to Van Buren Blvd area, 18 territories including 14 pairs; Norco - Goose Creek Golf Club to River Road, 32 territories including 26 pairs; the Santa Ana Canyon, 61 territories including 43 pairs; and Talbert Park and the oil fields at the

mouth of the Santa Ana River held 3 males, each paired. Sycamore Canyon held 4 territories and 2 pairs; March SKR Preserve held 9 territories 3 pairs; Mockingbird Canyon held 17 territories including 14 pairs; Harrison Reservoir held 2 territories including 2 pairs; Chino Hills held 7 territories including 6 pairs; Irvine Park held 5 territories including 3 pairs; San Jacinto held 9 territories and 5 pairs; and 2 territories were detected at the Alessandro Arroyo (surveyed as an assessment site).

Results - Vireo Distribution

Results – Distribution - San Jacinto

Nine vireos were found in San Jacinto in 2006, up from 6 in 2005. There was a cluster of 7 vireos on the San Jacinto River approximately 1.2 miles upstream of State St. off of Soboba Ave. There were 5 vireos at this site in 2005. Historically, there are reports of vireo on State-owned land at the San Jacinto River at State St. SAWA monitored this area in 2003 and again in 2006 but no vireos have been detected. For the second year in a row, no vireos were detected along the River near Bridge St. but this may have been due to a late monitoring effort

Two vireos were detected on the San Jacinto Wildlife Area. One new territority was located at Davis Rd. Another territory was detected in the northwest corner of the riparian area. This latter territory has been occupied for at least three years.

Results – Distribution - San Timoteo Canyon

Thirty-two vireo territories were detected in San Timoteo Canyon in 2006, down 26% from 43 vireos detected in 2005. The vireo population in San Timoteo Canyon increased dramatically between 2003 to 2004 from 14 territories to 29 territories. The majority of the land in the canyon lies in Riverside County. In 2006, 25 vireo territories were located in Riverside County while 7 were located in San Bernardino County.

Vireos were distributed throughout the canyon between the Army Corps of Engineers flood control project at the northwestern end and the Younglove Preserve at the southeastern end. Five vireos were located below Alessandro Rd.; only 2 were found at the edge of the habitat by the Army Corps of Engineers flood control project whereas 7 were detected in that area in 2005. Habitat at the southeastern portion of the canyon, by Hwy 60, was burned in 2005. As a result, in 2006, the birds at this extreme end of the canyon were found downstream of the burned habitat. Vireos were not detected east of the Younglove Preserve in 2006, because access was denied into habitat scheduled for development by Hwy 60.

Results – Distribution - Sycamore Canyon

Four vireo territories, including 2 pairs, were detected in Sycamore Canyon in 2006, down 3 territories from 2005 when 7 were detected. These birds are extremely secretive and this site was not intensively managed. It is possible that more birds were present but these numbers are comparable to historical data. Four vireo territories had been detected in 2003 and 6 in 2004. Nest monitoring was only done in 2004.

Results – Distribution - March SKR Preserve at March Air Reserve Base

Nine territories were again detected in riparian areas of the March SKR Preserve in 2006. Nine territories were detected at this site in 2005; seven territories were detected in 2004. Nests were not monitored due to the lack of parasitism detected during the 2004 nest monitoring effort. This site has been surveyed for three years. Monitoring is done in partnership with the Center for Natural Lands Management.

Results – Distribution - La Sierra

This ravine along La Sierra Ave. was not surveyed in 2006. It historically has held 1-2 vireos.

Results – Distribution - Alessandro Arroyo

Vireos were confirmed for the second year at the Alessandro Arroyo. As in 2005, 2 vireos were detected off of Old Bridge Rd. Two territories detected in a ravine off of John F. Kennedy Dr. in 2005 were not detected this year (Note: this latter site may be Prenda Arroyo).

Results – Distribution - Harrison Reservoir

Only 2 vireo territories were documented at Harrison Reservoir in 2006. Four territories were detected here in 2005. Monitoring was done with the cooperation of PCR Corp and Riverside County Flood Control. In 2004, 4 territories had been located and monitored for the first time. Three territories had been detected in September 2003 in this ravine, also known as McAllister Creek.

Results – Distribution - Mockingbird Canyon

This is one of the few sites that showed an increase in abundance in 2006. Seventeen vireos were documented in Mockingbird Canyon in 2006 whereas 15 had been detected in 2005. The largest increase in the number of vireo territories in Mockingbird came last year when the number of territories increased from 9 in 2003 and 2004, to 15 in 2005, a 66% increase. This area has been managed for 3 years with an emphasis on brown-headed cowbird management. The canyon needs to be managed for human intrusions such as paintball activity (see reproductive success).

Results – Distribution - Santa Ana River Between Fairmount Park and Van Buren Blvd.

Eighteen territories were detected on the Santa Ana River between Mission Blvd. and Van Buren Blvd., including the mitigation area at Van Buren Blvd. This is a decrease of 33% from 27 territories documented in 2005. Since SAWA has monitored this part of the river, the number of territories was lower only in 2003 when 16 territories were detected. The vireos remain clustered in habitat at the Van Buren Blvd. Bridge below the City of Riverside's sewage treatment facility. Fairmount Park itself was not surveyed this year.

Results – Distribution - Hidden Valley

The number of territories remained stable in 2006 at 33 territories. The population showed an increase of 17% from 29 in 2004 to 34 in 2005. When monitoring first began in 2000, 14 territories were detected. Vireos continue to inhabit the riparian corridor within Hidden Valley from the ponds on the east side (below Tyler St.) to the west as far as the nursery. In 2000 most vireos were found in habitat along the creek inside the Dept. of Fish and Game gates. By 2004, the vireos were distributed throughout the site.

During the assessment 3 vireos were detected on the north side of the river opposite Hidden Valley, whereas 5 vireos had been detected there in 2005. In 2006, the vireo west of the horse staging area at Riverview (first detected in 2005) was present. Only one of three vireos present in 2005 along Limonite Ave between the staging area and Bain St. was present in 2006. The third vireo was once again detected in dense habitat just below the trail along the cliff off of Archer and Kennedy Streets.

Results – Distribution - Santa Ana River Between River Rd. and Norco/Hidden Valley

The number of vireo territories detected on the Santa Ana River upstream of River Road to the Goose Creek Golf Club in Nocro decreased 24%, from 42 territories in 2005 to 32 territories in 2006. The previous year saw a dramatic increase of 50% from 28 territories in 2004 to 42 in 2005. This increase occurred after the floods of 2004-05 led to dramatic changes in the river floodplain. Habitat was scoured and the river changed course, leaving acres of sand bars. A portion of this section of the river (between Hammer Rd. and the Goose Creek Golf Course) includes 485 acres of the invasive *Arundo donax* under management by SAWA. This site was burned in 2002 and recolonization of native habitat was severely set back by the winter floods of the 2004-2005.

Results – Distribution - Temescal Canyon

In 2006, SAWA biologists detected sixteen vireo territories; another five vireo territories were detected on private property in Serrano Heights (J. Konecny, pers. comm.) for a total of 21 territories. The number of territories detected by SAWA biologists has remained fairly stable over the past three years. A new site for vireos was located in Temescal this year when five territories were detected in Olsen Canyon which is about 2 miles (1.2 km) upstream of Dawson Canyon. Unfortunately, this does not increase the total number of vireos detected in Temescal because no vireos were detected at the Army Corps of Engineers mitigation site at Hwy 74 in Lake Elsinore in 2006 whereas 5 territories had been documented for the last two years.

A mitigation site at the 3M plant has been surveyed since 2001 when one territory was documented. Two territories had been detected by 2004 and in 2005 and 2006, 4 territories were detected. Another 2 territories were found along the creek south of the mitigation site but north of Cajalco Rd. in 2006; 3 territories had been detected along this stretch of creek in 2005.

Three territories were detected in the Dos Lagos development, up from one territory in 2004. Dos Lagos was not surveyed intensively in 2005 due to construction but no vireos were detected during the assessment surveys that year.

For the third year in a row, Railroad Canyon, below Canyon Lake, held 2 vireos.

Past totals for Temescal were: in 2005, 15 territories, and in 2004, 10 territories. There is very good habitat under private ownership that has not been surveyed and numbers may very well be higher.

Results – Dsitribution - Santa Ana Canyon

Sixty-one territories were detected in the Santa Ana Canyon in 2006, a 25% decrease from the 81 territories detected in 2005. All three sections of the canyon saw equivalent declines in numbers of territories. The number of pairs decreased by 20% in 2006, from 54 pairs in 2005 to 43 pairs in 2006. The number of fledglings observed declined 12% in 2006, from 82 in 2005 to 72 in 2006, although an increase in the number of observed fledglings was documented for Featherly Park (see below).

The number of vireos in the upper section of the canyon, above the Green River Golf Club and within the environs of Prado Dam, declined by 26% in 2006. In 2006, 21 territories were detected, down from 28 in 2005 and 2004. There is still heavy construction around Prado Dam. Due to this construction, habitat was destroyed that comprised 10 territories in 2005. Some of the habitat that remains is deteriorating due to human interference. The habitat on the slopes along the old outflow channel has been trampled by fishermen. In 2005, there were three vireo territories in this habitat, in 2006, there was one. The number of pairs detected in 2006 declined by 24% and the number of fledglings observed declined by 50%. In 2006, 13 pairs were detected with 13 fledglings. In 2005, 17 pairs were observed with 26 fledglings. The birds here continue to nest in marginal habitat.

The vireo population at the Green River Golf Club also declined 25% in 2006, after increasing by 35% in 2005. Seventeen vireo territories were detected in 2006, down from a high of 23 territories in 2005. The number of pairs declined from 17 in 2005 to 12 in 2006. While the number of pairs declined by almost 30%, the number of fledglings declined by only 14%, from 28 in 2005 to 24 in 2006. Habitat at the golf club remains excellent and there is more room for the vireo population to expand. Management at Green River Golf Course has been very supportive of SAWA's efforts to manage the vireo and we hope to continue the same cooperative relationship with new management. However, the Army Corps of Engineers is planning a bank stabliziation effort around the Green River Homes which will take out mature riparian habitat currently occupied by 13 vireo territories. This project is scheduled to start in August 2007.

In 2006, numbers of territories decreased by 23% in Featherly Park. Twenty-three territories were detected in 2006, down from 30 in 2005. The vireo population in Featherly Park is a success story given that there were no vireos detected in 2001, the first year of monitoring. By 2002, 8 had been detected. Six were detected in 2003, and 24 detected in 2004. There was less of a decline in numbers of pairs detected in 2006, 18 compared to 20 in 2005, and the number of fledglings increased by 25% from 2005. The number of fledglings rose from 28 in 2005 to 35 in 2006.

Until this year, vireo numbers in the Santa Ana Canyon have tended to increase.

Results – Distribution - Chino Hills

In 2006, 7 territories were detected in the fragments of habitat in Chino Hills. This count represents a 42% decrease in the number of territories from 2005 when 12 territories had been documented. The clusters of birds in fragmented habitat in two drainages in Chino Hills have

been surveyed since 2003 and were showing incremental increases through 2005. Twelve vireo territories were located in four habitat patches in Chino Hills in 2005; 11 vireos were present here in 2004. Nine were present in 2003.

In 2006, just one vireo was detected at a mitigation site at the base of Chino Hills State Park on Butterfield Ranch Rd. whereas two had been documented in 2005. In 2006, only two pairs were detected in the ravines between Butterfield Ranch Rd. and Hwy 71 whereas three territories (including two pairs) were documented in 2005, 2004 and 2003.

Two pairs were detected within Butterfield Ranch Park in 2006 whereas 5 pairs had been detected for the previous two years. Two territories were detected within a mitigation site at Butterfield Ranch Rd. and Brookwood Ln. adjacent to Hwy.71 for both 2005 and 2006.

During the 2006 vireo assessment surveys only one territory out of the four found last year, was found. Five patches of habitat in Chino Hills are surveyed three times a season. The one vireo detected was found at a mitigation site on Eucalyptus near Del Monte where three were detected last year. The fourth vireo that was detected at Eucalyptus at Rancho Hills in 2005 was not detected in 2006. This site is being developed for a 98 unit gated community and grading was being done within 100 feet of the habitat.

Results – Distribution - Irvine Regional Park

Irvine Regional Park showed a drastic decrease in the number of territories in 2006. Only 5 vireo territories were detected in Irvine Park in 2006, down from 11 detected in 2005. This population had been gradually increasing. In 2003, 6 vireos were documented. In 2004, 9 vireos had been detected. All vireos were detected in the riparian area above Villa Park Dam. In past years most birds were detected in habitat off of the main trail that runs along the west side of the habitat patch. This year vireos were absent from that section and the birds were found along the eastern side of the patch. Biologists from the Multispecies Habitat Conservation Program (MSHCP) Lynn Miller, Chadette Pfaff, and Conan Guard, surveyed the park during the assessment surveys. Nest monitoring was not done.

Results – Distribution - Santiago Creek, Orange County

One vireo was located on Santiago Creek at Cambridge in Orange (see Results – LBVI Assessment Surveys). No vireos were found along Santiago Creek in 2006 between Silverado Canyon and the 241 toll road. This section of creek is surveyed three times a season during SAWA's general assessment surveys.

(A vireo was reported in 2006 by Phil Richards, Stokes and Jones, in mulefat on the east side of the creek at Chapman Ave., at Yorba Park. He reports that he detected the vireo on 6/16/06 and 6/21/06.)

In 2005, one male had been found in riparian vegetation north of Santiago Canyon Blvd. between the Irvine Park RV storage and Blue Diamond Rd. during the assessment surveys of the weeks of 6/6 and 7/11. This vireo was singing mere yards from a BHCO trap monitored by Brian Leatherman. In 2004 a vireo had been found in a small patch of mulefat south of Santiago Canyon Rd. approximately ¼ mi west of the 2005 vireo territory, while SAWA biologists were engaged in raptor field work.

Results - LBVI Assessment Surveys

Thirty-five LBVI were detected in 2006 in comparison to 36 in 2005. Six sites had an increase in the number of LBVI detected: Fresno Canyon (+2), Box Springs (+2), Poorman Reservior (+1), Kabian Park (+2), Wyle Labs at El Paso Dr. in Norco (+1), and Cannon Rd. at Katella Ave. in Orange (+1). Nine sites had decreases in vireo numbers: Carbon Canyon Regional Park and Carbon Canyon Rd. (-1), Starlight Dr. in Yorba Linda (-1), Castleview Park in Riverside (-1), the riparian habitat at a housing development site just south of Canyon Lake (-2), Van Buren Blvd. at Orange Pkwy to Lark St. (-1), the north side of the Santa Ana River off of Limonite between Ridgeview Ave. and Riverdale Pl. (-2), Norco Hills Park (-2), and Eucaluptus at Del Monte (-2) and Eucalyptus at Rancho Hills (-1), both in Chino Hills.

Of the 9 new sites surveyed in 2006, vireo were detected at only 2 sites. Two LBVI were detected in Mead Valley at Cajalco Rd. and the California aqueduct. These vireo were rumored to be present last year but not documented in SAWA's total number of birds. One vireo was detected at a small mitigation sites at Cambridge and Santiago Creek in Orange.

Because most of these sites held only a few birds in 2005, the 2006 decreases left some of these sites unoccupied. Starlight Dr. in Yorba Linda is a small ravine above Featherly Park that contained a singing male last year but not in 2006. Salt Creek before it enters Canyon Lake held 2 vireos last year but none were reported there this year after development (pers.comm. Mike Freeman, KB Homes). Norco Hills Park held 2 vireos in 2005 but none was detected in 2006. Eucalyptus and Rancho Hills had no vireo in 2006, whereas it had 1 vireo in 2005.

Breeding was detected at 6 assessment sites (8 territories) as compared to 8 sites (12 territories) in 2005.

Brown-headed cowbird parasitism was detected at one site. A vireo and a California Towhee, *Piplio crissalis*, were observed feeding the same juvenile cowbird at Kabian Park.

Again in 2006, SAWA surveyed sites where the number of birds were known through intensive monitoring. Biologists unfamiliar with the current status of the vireo at the sites walked transects in Featherly Park, Hidden Valley, and Mockingbird Canyon as if they were assessment sites. The lowest numbers of detections occurred at all transects in May. As in 2005, the percentage of birds detected in Featherly Park was low, only 25% to 50% of the birds were detected. The detection rates in Mockingbird Canyon and Hidden Valley were higher, from 64% to 100% of the birds were detected. For both of these latter sites, the detection rate was the highest in June, 100% and 85% respectively.

The following people participated in the surveys: Melody Aimar (MA), Peter Beck (PB), Allyson Beckman (AB), Jill Coumoutso (JC), Samantha Dempster (SD), Conan Guard (CG), Sue Hoffman (SH), James Law (JL), Lynn Miller (LM), Bonnie Nash (BN), Chadette Pfaff (CP), Terry Reeser (TRe), Tim Romo (TRo), Kerwin Russell (KR), Richard Zembal (RZ).

Efforts and results this year were comparable to 2005. In 2006, sixteen surveyors detected 35 territories over 328 hours. In 2005 eighteen surveyors detected 36 territories over 318 field hours.

Chronology of Breeding Activity

San Jacinto Chronology

Surveys began on 3/24 and ended on 9/13. The first vireos (n=2) were found on 4/14 on a stretch of the San Jacinto River approximately ½ mi. (.3 km) east of State St. off of Soboba Rd. Fifty per cent of the vireos were detected in San Jacinto by 5/19. Fifty per cent were paired by 5/16. Vireo presence was last detected on 8/31.

San Timoteo Canyon Chronology

The first vireos were detected on San Timoteo 12 days later in 2006 than in 2005. Fifty per cent of the vireos were in by 5/16, 35 days later than in 2005.

The first vireos were documented in San Timoteo on 4/17 (n=2) and 4/19 (n=2) one month after the surveys started on 3/17. The next vireos were detected on 5/3 (n=3) and 5/8 (n=2). Eight more vireos were detected by 5/17. Fifty per cent of the vireos had been detected by 5/16. In 2005, the first vireos were detected on the first day of surveying 4/5, 12 days earlier than in 2006. In 2005, 54% (n=19/35) of the vireo territories were established in the intensively monitored portion of the creek by 4/12, 35 days earlier than in 2006; By 4/22/05, 66% (23/35) were paired.

In 2006, the first nest was found on 5/5, 21 days later than in 2005 when the first nest was found on 4/15. The last nest was found on 7/12 in 2006 and on 7/1 in 2005. The last nests to hatch occurred in mid-July in both 2005 and 2006. In 2006, the last nests hatched the weeks ending 7/7 (n=2) and 7/14 (n=2); in 2005, the 3 last nests hatched on about 7/18.

Most vireos in San Timoteo made only 1 nesting attempt. Fourteen pairs nested only once and were successful. One pair successfully nested twice. Of the 8 pairs that were unsuccessful on their first attempts, 3 pairs were successful on their second attempts, 1 was successful on its third attempt and 4 pairs were unsuccessful in two attempts.

Five vireos remained on the last day of the surveys on 9/14.

Santa Ana River –from Fairmount Park to about Van Buren Blvd. Chronology

Surveys began on 3/18 and ended on 7/30. The first vireo was detected on 4/15, six days later than in 2005. By 4/22 50% of the vireos had been detected and 50% were paired by 4/29. In 2005, 50% of the territories were detected by 4/16, and 50% paired by 5/7. All pairs nested only once. The one pair with an unsuccessful breeding attempt lost its nest in the first part of May but did not attempt to renest. All nests fledged between 5/26 and 6/9. The first successful nest fledged on or about 6/7. The last nest fledged 6/9.

Mockingbird Canyon Chronology

Surveys began in Mockingbird Canyon on 3/30 and ended on 9/22. The first vireos were detected on 4/13 (n=2), 4/19 (n=2) and 4/26-27 (n=5). The last vireos to be detected were documented on 6/12 (n=2) and 6/19 (n=1). In 2005, the first vireo was detected on 3/21, 24 days earlier than in 2006. In 2006, 50% of the vireos were in by 4/24 and 50% were paired by 5/22.

In 2005, 50% of the vireo were in by 4/18, and 50% were paired by 5/2.

The first nest hatched by 5/2 and the last hatched by 7/14. Hatch dates for the remaining nests were: by 5/26 (n=2), by 6/2 (n=3), by 6/16 (n=2), by 7/7 (n=1). Neither of the two nests found in July were successful. One nest failed to hatch, the other failed to fledge. One of these nests contained only 2 undersized eggs and was abandoned by 8/1. These eggs were smaller than typical vireo eggs, a phenomenon that can be associated with a female's lack of resources.

Fledging occurred between approximately 5/28 (n=1) and 7/19 (n=1). Fledging occurred on or about 6/1 (n=2), 6/7 (n=1), 6/8 (n=1), 6/22 (n=2) and 6/24 (n=1).

Vireos were last detected on 9/6.

Harrison Reservoir Chronology

Surveys began on 4/26 and ended on 9/1. Only two territories were documented this year and they were both detected on 4/26. Only one pair was detected before nesting occurred on 5/8. The second vireo was observed with fledglings on 7/11. The vireo that was monitored fledged young on 6/6. Its second nest found with 3 nestlings aged about 4 days old was depredated by 7/18. One vireo was detected on the day of the last survey on 9/1.

Sycamore Canyon Chronology

Surveys began on 4/13 and ended on 9/13. The first two vireos were detected on 4/13, the third on 4/20 and the fourth on 5/1. The latter two birds were paired when detected. No nesting information is available for these birds. The last vireos were detected on 9/1 (n=3).

March SKR Preserve Chronology

Surveys began on 3/14 and ended on 9/12. The first vireo was detected on 4/18. Fifty percent of the 9 vireos detected were detected and paired by 4/26. In 2005, the first vireo was detected on 3/21 and 50% had been observed by 4/15.

Not all pairs may have been documented because of decreased management efforts at this site.

Hidden Valley Chronology

In 2006, surveys began on 3/14 and ended on 8/17. The first vireo was detected on 4/12, with 9 vireos documented by 4/14. This arrival date is 22 days later than in 2005 when the first vireos were documented on 3/21. In 2006, 50% of the vireos were documented by 4/25. In 2005, 50% were detected by 4/7. In 2006, two males were paired by 4/14 and 50% were paired by 5/31. In comparison, in 2005, 50% were paired by 5/2.

Nest management is not emphasized at Hidden Valley because of the lack of parasitism. The first nest was found on 5/8 and 4 eggs had been laid by 5/16. Fledglings were detected in 8 territories by 6/14. The last nest was found on 6/7 with 4 eggs and probably fledged about 6/22. Four vireos were detected on 8/17 during the last survey. No vireos were heard during surveys on 9/14 and 9/19. The last vireo was heard on 9/16 in 2005.

Santa Ana River Between River Rd and Norco Chronology

Surveys began on 3/14 and ended 9/19. The first vireo was detected 4/12 with 50% of the vireos detected by 5/1. Fifty per cent of the vireos were paired by 5/21. In 2005, the first vireo was found on the first day of survey on 4/20 and 50% of the vireos had been found by 4/25. Fifty per cent of the vireos were paired by 5/13 in 2005.

The first nests were found the week of 5/1 (n=4); the last was found on 7/21 with one, 9 day old, nestling that fledged about 7/23. Twenty nests were found in May (but only 5 successfully hatched, see Reproductive Success), 7 nests were found in June, and 3 nests were found in July. Seven nests fledged in June and 6 nests fledged in July.

The last vireos (n=2) were detected at this site on 9/15. None was detected on a 9/19 survey. During the week of 9/13 more than 6 vireos were still present in 2005.

Santa Ana Canyon Chronology

Throughout the canyon, 50% of the vireo territories were detected by 5/5, 23 days later than in 2005. Fifty per cent of the vireos were paired by 5/18, whereas 50% were paired by 5/10 in 2005.

Surveys began in the upper canyon on 3/24 (Prado Dam) and 4/12 (Green River Homes). The first vireo was heard at both sites on 4/12. Fifty per cent of the vireos were present by 5/12 and 50% were paired by 5/30. In contrast, 50% of the vireos were detected by 4/13 in 2005, while about 50% of the vireos were paired by 4/25. The first nest was found on 5/4 and hatched on 5/25. The last nest probably hatched around 6/17 and fledged on 6/28. In 2005, the first fledged nests occurred during the second week of May; the last fledging was detected on or about 7/18.

Surveys began at Green River Golf Club on 3/9 and continued weekly until the first vireos were detected on the 4/18 visit. In 2006, 50% of the territories were established by 5/9 and 50% of the vireos were paired by 5/15. In contrast, 50% of the territories had been detected in 2005 by 4/13 and 50% paired by 4/27. In 2006 the first hatching was detected the last week of May. In contrast, in 2005, the first fledgling was detected on or about 5/17.

Surveys began at Featherly Park on 3/6. The first vireo was detected on 4/13 with 50% being detected by 4/27. Fifty per cent were paired by 5/11. In 2005, the first vireo was detected on 3/25, with 50% being detected by 4/12, one day before the first vireo was detected in 2006. In contrast pairing dates are comparable between 2005 and 2006. In 2005, 50% of the vireos were paired by 5/12, effectively the same date as in 2006. The first nests (n=6) were found on 5/10-5/11 and three nests contained eggs. The first nest fledged on or about 6/7. The last nesting attempt was documented on or about 7/4. In 2005, the first nesting attempt found on 4/5 was predated by 4/19. The first fledgling in 2005 took place on 5/17 and the last successful nest fledged on 7/22.

Vireos were last heard in the upper canyon on 9/7 (n=1) and on 8/28 (n=1) on the Green River Golf Club. These sightings are consistent with last detection dates in 2005. The last vireos were heard on 8/31 (n=8) in Featherly Park. No vireos were detected on a short visit to 4 territories on 9/19. In 2005, the last vireos (n=2) were detected on 9/6. No vireos were detected on surveys at the golf club or Featherly Park in the first week of October.

Temescal Canyon Chronology

The first survey was done on 3/13 and the first vireo was detected 4/17. Fifty per cent of the vireo were detected by 5/16 and 50% were paired by 6/8. In 2005, the first vireo was detected on 4/6 and already was tending a 4-egg nest. In 2005, all vireo were found and 50% were paired within the first week of surveying. In 2006, the first nests were found on 5/3 (n=1), 5/4 (n=1), and 5/5 (n=2). Hatching was documented by: 5/19 (n=1), 5/26 (n=2), 6/16 (n=2), 6/23 (n=2), and 6/30 (n=1). The last two active nests that fledged vireos were found on 6/13 and fledged on or about 7/4. The last nest found on 6/14 fledged a cowbird. One pair located in the creek at the 3M plant built five nests between 5/16 and 7/7 in unsuccessful attempts to breed; the latter three nests were incomplete.

Chino Hills Chronology

Surveys began on 3/14 and ended 10/3. The first vireo was detected 4/18. By 5/12, 50% of the 7 vireos had been detected. By 5/22, 50% of the pairs had been detected, only one day earlier than last year.

Nesting was not detected until June. The first 2 nests were found on 6/9, 1 successfully fledged on 6/22 but ants depredated the other. Nest construction by the pair whose first nest was depredated was documented on 6/23 but that nest was found depredated and abandoned by 7/7. A fourth nest found 6/22 with 3 nestlings fledged between 6/29 and 7/1. Two more successful breeding attempts in other territories were documented in June and August when fledglings older than 2 weeks were observed. Vireos were last heard in the Chino Hills sites on 9/13.

Results - Nesting Site Preferences

Nesting site preferences followed parameters previously documented by other observers (Pike et al 1999). Nests were found mostly in riparian vegetation, near water, along dirt trails or roads, and on edges of rows of willows and other riparian vegetation.

The three most heavily used plant species for nesting were the same as in 2004 and 2005, but the frequencies changed. Of 145 nests for which vegetation data were gathered, only 11% (n=16) were built in mulefat, *Baccharis salicifolia*, whereas 31% (n=45) were built in arroyo willow, *Salix lasiolepis*, and 23% (n=34) were built in black willow, *Salix gooddingii*. This distribution varies somewhat from previous years. In 2004, based on 184 nests, 33% were built in mulefat, 23% were built in black willow, and 20% were built in arroyo willow. In 2005, based on 174 nests, the results were similar to that of 2004, in that 27% were built in mulefat, 18% were built in black willow, and 16% were built in arroyo willow.

Overall, 66% of the nests were built in *Salix spp.* (including black, arroyo, red, *Salix laevigata*, narrow-leafed, *Salix exigua*, and shinning, *Salix lucida spp. lasiandra*) (Table 3) whereas, only 49% and 45% of all nests were built in willow species in 2004 and 2005, respectively.

Other nest-host species included: elderberry, *Sambucus mexicana,* mugwort, *Artemsia douglasiana,* Fremont cottonwood, *Populus fremonti,* wild grape, *Vitis girdiana*, laurel sumac, *Malosma laurina*, toyon, *Heteromeles arbutifolia*, scrub oak, *Quercus spp.*, poison hemlock, *Conium maculatum*, Peruvian pepper, *Schinus molle*, black walnut, *Juglans californica*, black

mustard, *Brassica nigra*, arrow weed, *Pluchea sp.*, and Arundo, *Arundo donax*. Expected vireo shrub favorites such as wild rose, *Rosa californica*, and poison oak, *Toxicodendron diversilobatum*, were not used in 2006.

This year was SAWA's first documented case of a vireo nesting in *Arundo*. The pair was found building a nest on a dead stalk within a tangled *Arundo* clump at the Green River Golf Club. The next week the nest with one egg was found to be precariously dangling from the stalk. Although the nest was repaired by the biologist, it was ultimately unsuccessful. The first documentation of vireos nesting in black walnut in the watershed occurred in 2003 in Featherly Park. This same territory held a nest in black walnut again in 2005 and 2006.

Results - Reproductive Success

Despite the shortened season, reproductive success increased from 2005 levels in terms of nesting success and the number of observed fledglings. In 2006, nesting success was 62% (78/125) while the 2005 nesting success rate was 56%. The 2006 rate represents about a 10% increase over the nesting success rates that have been fairly stable over the previous three years. Nesting success rates in 2004 and 2003 were 54% (77/143) and 57% (54/95), respectively. A low nesting success rate was documented in 2002, when the rate was 42% (31/74).

In 2006, 352 fledglings were observed in regularly monitored areas while in 2005, 337 fledglings were observed, which represents a 4% increase.

The predation rate was 46% which is similar to that of 47% in 2005. Predation rates in 2004 and 2003 were 52% and 53% respectively.

The parasitism rate was 19%, down from 23% in 2005. Parasitism rates in 2004 and 2003 were 23% and 21% respectively.

Again this year, predation was the major cause of loss. Of all failed nests (n=47), 72% (n=34) failed due to predation, 17% (n=8) failed due to parasitism, and 11% (n=5) failed due to reproductive failure (abandonment, lost nest).

Nesting success rates varied among individual sites. The Santa Ana River from Fairmount Park to Van Buren/Hidden Valley, Hidden Valley, and Green River Golf Club had success rates equal to or over 80%. Mockingbird Canyon had a good success rate with 75% of the nests fledging young. The low success rate on the Santa Ana River between River Road and Norco, 41%, was disappointing.

San Timoteo and Featherly Park had increased nesting success from the 2005 levels which were in the 40% range. San Timoteo had a 64% rate and Featherly Park had a 50% success rate.

Overall productivity in 2006 is estimated at 486 fledglings (2.6 x 187 pairs) while 352 fledglings were observed (Table 4). In 2006, the productivity rate was 2.6 while in 2005, the projected productivity rate was 2.4.

Results – Reproductive Success - San Jacinto

Four of the 7 vireos found in the San Jacinto River upstream of State St. were paired. Nests were found for 3 of the pairs; only two nests contained eggs and they were both successful. One of the 3 nests was parasitized but the cowbird egg was removed and at least 3 vireos fledged from the nest. A cowbird egg was also found on the ground beneath the second nest after it had

fledged at least one vireo. No nests were found at the San Jacinto Wildlife area although 2 fledglings were detected 6/15.

Results - Reproductive Success - San Timoteo Canyon

The shortened nesting season did not appear to have an adverse impact on productivity. Nesting success increased from 44% in 2005 to 64% in 2006. Both the predation and parasitism rates decreased in 2006. The predation rate in 2006 was 33%, down from 62% in 2005. The parasitism rate was 43% in 2006, down from 53% in 2005. The comparison of these statistics between years is based on a similar number of well-tracked nests. In 2006, 33 nests were well-monitored, in 2005, 34 nests were well-monitored. However, in 2005, 49 nests were found as opposed to 36 in 2006. Once again, the first nests found were not successful. In 2006 the first outcomes were depredations (n=3) by 5/19; in 2005, the first nests (n=3) found on 4/15 were not successful.

Productivity per pair was 2.6 (based on well-monitored pairs), an increase from 1.9 in 2005. The number of fledglings observed doubled in 2006. Sixty-six fledglings were observed in 2006, whereas only 36 had been documented for 2005.

Up to 75.4 fledglings may have been produced in San Timoteo in 2006. The number of observed fledglings in 2006 (n=66) is equivalent to the projected number calculated for San Timoteo in 2005 (66.5 fledglings).

Most vireos in San Timoteo made only one nesting attempt in 2006. Fourteen pairs nested only once and were successful. One pair successfully nested twice. Of the 8 pairs that were unsuccessful on their first attempts, 3 pairs were successful on their second attempts, 1 was successful on its third attempt and 4 pairs were unsuccessful in two attempts.

In 2005, 11 of 27 pairs (41%) were documented to have made 1 nesting attempt, 8 pairs made 2 attempts, and 8 pairs made 3 attempts. Of the 8 pairs making 3 attempts, 4 were successful at least at their last attempt. A fifth pair may have been successful. Three pairs are known to have successfully fledged young from 2 nests.

Nesting success has varied over the years in San Timoteo. Nesting success was 44% in 2005 which is an increase from 2004 when only 29% of the nests were successful. In 2003 and 2002, nesting success was 48% and 35% respectively. This year's 66% nesting success rate is a dramatic improvement and hopefully signifies an upturn in reproductive success at San Timoteo.

The productivity rate also increased in 2006 to 2.6 from 1.9 (13 pairs) in 2005 and 0.8 (22 pairs) in 2004. The productivity rate in 2003 was 2.8.

The depredation rate in 2005 was 62% (21/34) which is a decrease from the 77% (24/31) in 2004 and 76% rate in 2003. The parasitism rate also declined from 2004 levels when 74% (23/31) of the nests were parasitized. In 2005, 53% (18/34) of the nests were parasitized. In 2003, the parasitism rate was only 24%.

Snakes and Western Scrub-jays, *Aphelocoma californica*, were present throughout the canyon this year and are known predators elsewhere.

Results – Reproductive Success - March SKR Preserve

Nest management was not done at March SKR in 2006. Three pairs were detected and two pairs were observed with 2 fledglings each, late in the season.

In 2005, nesting success was 33% for 6 well-tracked nests. Three nests had been monitored in 2004 for a successful nesting rate of 67%. Most losses occurred during the nestling stage. In 2004 productivity was high, 5.5, based on only two pairs. In 2005, productivity was 2.0 based on 3 pairs. Nine fledglings were observed which correlates well with the projected productivity of 10 youngsters. The future of high value habitat is in doubt with the cessation of management at the Stephens' Kangaroo Rat Preserve. It is not clear if the riparian areas are to be preserved and managed once the land, which was originally supposed to be set aside in perpetuity with a management endowment, is developed.

Results – Reproductive Success - Sycamore Canyon

Sycamore Canyon was not managed in 2006 except to document the number of territories and pairs. No breeding data were gathered. In 2005 only one fledgling was observed but this low number is likely due to the lack of effort. Nest searching at Sycamore is very time-consuming and the parasitism rate has been low so SAWA put its efforts into the watershed population assessment. However, in 2004, 3 nests of 2 breeding pairs were monitored. In 2004, these pairs produced 2.0 fledglings/pair. Nine fledglings were observed for all 5 pairs detected in 2004; As many as 10 fledglings may have been produced. Two of the 3 nests were successful; The unsuccessful nest was lost due to depredation; Of the 3 well- tracked nests, two were depredated and one was parasitized.

Results – Reproductive Success - Mockingbird Canyon

Mockingbird Canyon had a 75% nesting success rate in 2006 up from 50% in 2005. Productivity in 2006 was 3.1 fledglings per pair (n=8 pairs), a decrease from 3.8 in 2005 (n=6 pairs). The 2006 productivity rate is comparable to the 2004 rate of 3.0. While 36 fledglings were observed in Mockingbird in 2006, up to 43 may have been produced. Of 8 well-tracked pairs, only 3 made second nesting attempts. One successfully nested twice, 1 was unsuccessful in the second attempt and 1failed in both nesting attempts.

Increased BHCO trapping efforts since 2003 have been concurrent and probably responsible for the greatly increased productivity. In 2003, when monitoring began, the parasitism rate was 62% and 8 pairs produced only 4 young; The rate of nest failure due to parasitism was 36% (4/11 failed nests). That year, SAWA conducted a community awareness effort, and in response to education brochures, many property owners allowed SAWA to put cowbird traps on their property. In 2004 and 2006, the parasitism rate was 0%. In 2005, only one of 15 nests was parasitized. Since 2003, 88 young have fledged from Mockingbird Canyon.

Depredation rates dropped from 50% in 2005 to 25% in 2006. Depredation by Argentine ants was not detected this year in Mockingbird Canyon although a large presence of ants still exists. In 2005, ants caused the loss of at least one nest.

Housing development has begun in an area that had been highly disturbed by paintball and off-road activities at Mariposa and Mockingbird Canyon Rd. SAWA has been contracted to manage the vireos in the riparian corridors within the development and is hopeful that disturbance levels will decrease greatly however paintball activity is now occurring in the basin of Gage Canal, impacting the quality of the riparian habitat.

Results – Reproductive Success - Harrison Reservoir and La Sierra

Two pairs of vireos were documented in Harrison Reservoir in 2006. One pair was well-monitored. It nested twice and fledged 4 young from its first nest on 6/6. Its second nest was lost in mid-July. Two fledglings were observed with the second pair in mid-July for a total of six fledglings for the site.

Brown-headed cowbird parasitism was problematic the first year SAWA began to monitor in 2004. In 2004, parasitism occurred in two of two well-tracked nests and only one youngster was produced. In 2005, the one well-tracked nest was parasitized twice but it produced three fledglings due to nest manipulation (removal of the cowbird eggs). In 2006, no parasitism was detected in the two nests followed.

Harrison Reservoir is destined to become an isolated patch of riparian habitat surrounded by a housing development. The low numbers of vireo found in this ravine must be due partially to low recruitment. In the first year of surveying, in 2004, five territories were detected, now in subsequent years, only one or two are found. Continued cowbird trapping is essential to help reproductive success if vireos are to build a sustainable subpopulation in this ravine.

The ravine along La Sierra Ave. was not surveyed in 2006. In 2005, only one vireo pair with 2 fledglings was detected at this site during two visits.

Results – Reproductive Success - Santa Ana River from Fairmount Park to Hidden Valley

Nesting success was 89% (8/9). One nest was lost due to depredation. This high rate was observed in 2004, when nesting success was 80%. Nesting success was only 63% in 2005.

The depredation rate in 2006 was 33%, down from 47% in 2005, and 40% in 2004.

No parasitism was detected on this section of the Santa Ana River in 2006. In 2005, the parasitism rate was 16% and 20% in 2004.

Nine of 14 pairs of vireos were well-monitored and produced 23 young for a productivity rate of 2.6. Thirty-six fledglings were observed for all pairs. Based on the productivity rate for the well-monitored birds, 36 fledglings is the estimated maximum number of offspring expected. Productivity rates for the last two years are: 2005, 2.3 and 2004, 3.3. Last year up to 44 youngsters may have been produced by 19 pairs. In 2004, up to 69 offspring may have been produced by 21 pairs.

Results – Reproductive Success - Hidden Valley

In 2006, 5 of 9 nests were well-monitored and nesting success was 80% (4/5). The one failed nest was abandoned with 4 eggs. No parasitism was observed. The projected productivity rate for 2006 is 2.8 fledglings per pair (n=5 pairs). While only 36 fledglings were detected, up to 67 fledglings may have been produced (2.8 fledglings x 24 pairs).

In 2005, 7 of 8 nests found were well-monitored and nesting success was 57%; two of the 7 nests found were depredated resulting in nest failure. One nest was parasitized and was abandoned by the vireos. The parasitized nest in 2005 was found west of the flooded agricultural fields and the nest shrub, which was arroyo willow, was located on the edge of a patch of burned *Arundo donax*.

In 2004, 9 well-tracked pairs produced 21 young for a productivity rate of 2.3. Fifty-one fledglings were detected but up to 61 may have been produced. Sixty per cent (9/15) of the well-

tracked nests were successful. All 6 unsuccessful nests failed due to predation. Sixty-seven per cent of the nests were depredated.

Results – Reproductive Success - Santa Ana Canyon

Despite lower vireo numbers, the productivity rate of 2.8 for the Santa Ana Canyon was the same in 2006 as in 2005. In 2006, 14 well-monitored pairs produced 39 young. While 72 fledglings were observed, up to 120 youngsters may have fledged if a productivity of 2.8 is ascribed to all pairs (n=43). This rate is up from 2.4 in 2004 (n=13 pairs).

Since SAWA began monitoring in the Santa Ana Canyon, 404 fledglings have been documented.

Nesting success in 2006 was 63% (12/19), up from 56% (14/25) in 2005. Nesting success was much higher in 2004 and 2003 when rates were 73% (11/15) and 71% respectively. All but two nest failures in 2006 were due to depredation. Reproductive failure caused the loss of the two remaining nests. In 2005, 8 of the 11 (73%) failed nests failed due to depredation.

The depredation rate in 2006 was 42% which is comparable to the 40% rate documented for 2005. In 2004, the depredation rate was only about 20%. No parasitism has been detected in the canyon for two years. The last parasitism occurred in Featherly Park in 2004 when 2 of 7 nests were parasitized.

Results – Reproductive Success - Temescal

Nesting success was 67% (8/12 nests) in 2006 and comparable to rates in 2004 when the nesting success rate was 58% (7/12) and 2003 when the rate was 55% (6/11). All failed nests but one failed in 2006 due to predation. In 2005 and 2004, all failed nests failed due to predation.

Productivity was 2.4 based on 10 well-monitored pairs in 2006. The productivity rates based on well-tracked pairs in 2004, 2003, 2002 were 2.4 (n=8 pairs), 2.3 (n=9 pairs), and 2.1 (n=7) respectively.

The number of fledglings observed decreased 31% from 42 in 2005 (9 pairs) to 29 in 2006 (13 pairs).

The nesting success and productivity rates were notably high in 2005. In 2005, while only one pair was well-tracked and produced 5 fledglings, all pairs were intensively monitored, not by nest checks (see Methods), but by observations at the nest. In 2005, intensive observation at nest sites revealed that all 9 pairs had multiple nesting attempts. Seven of 9 pairs had 2 attempts. Three of these pairs successfully nested twice for an observed number of fledglings of 16. Three pairs had a successful nest after a failed first attempt for an observed number of fledglings of 9. The results of the first nesting attempt of the seventh pair was inconclusive, although it successfully nested the second time producing 3 offspring. Two pairs nested three times. One pair had successful first and third nests producing 7 offspring. One pair had an unsuccessful first nest but successful second and third nests and produced 7 offspring. Based on observed numbers of pairs and fledglings the productivity rate was 4.7 (42/9).

In 2006, eight pairs nested once with 6 attempts being successful. The 2 unsuccessful pairs did not attempt to renest. Two pairs nested twice, one with a successful first nest and unsuccessful second nest, the second with a failed first nest but successful second nest. One pair was unsuccessful with 5 nesting attempts.

The contrast in statistics between this year and last year continues for predation rates. In 2006, the depredation rate was 50% (6/12). In 2005 the depredation rate was just 20% (2/10). In 2004 the depredation rate was 42% (5/12) and in 2003 it was 45% (5/11).

The parasitism rate has stayed fairly constant. In 2006 the parasitism rate was 25% (3/12) compared to 30% (n=3/10) in 2005 and no parasitism was detected in 2004. However, in 2003 and 2002 the rates were 27% (3/11) and 24% (1/4) respectively.

One cowbird fledgling was observed leaving a vireo nest in the new development of Dos Lagos. Due to construction, a cowbird trap had not been deployed at that site. In 2004, SAWA had deployed one at the location of the only vireo on the development that year. SAWA is currently arranging to have two traps on the creek in Dos Lagos in 2007.

Results – Reproductive Success - Santa Ana River Between River Rd. and Norco

This site was intensively managed in 2006. Most nests were located and tracked. Seventy-five percent of all nests (n=20) were lost due to predation in the first month of monitoring.

The productivity rate was 2.3 based on 12 well-tracked pairs. Because most nests at the site were found and outcomes known, it is unlikely that many more than the observed 46 fledglings were produced by the 24 pairs detected. Ascribing a 2.3 productivity rate to all 24 pairs would indicate that up to 55 fledglings may have been produced. In 2004, the productivity rate was 2.7 (n=21 well-tracked pairs). The potential number of young equaled that observed, 62 fledglings. The 2004 productivity rate was down slightly from 2003 when 6 well-tracked pairs produced 18 fledglings for a productivity rate of 3.0.

Nesting success was 41% based on 27 well-tracked nests. Forty per cent of well-tracked nests failed due to predation and 15% failed due to parasitism. Seventy-eight per cent of nests were depredated. Twenty-two per cent of nests were parasitized. Nesting success was 65% in 2004 and estimated to be approximately 55% in 2005.

Results – Reproductive Success - Chino Hills

Despite the 42% decrease in the number of territories the number of fledglings decreased by only a few. In 2006, 11 fledglings were observed as opposed to the 14 fledglings observed in 2005. In 2004, 7 fledglings had been observed and in 2003, 11 had been seen.

In 2006, three well-monitored pairs had 7 young for a productivity rate of 2.3. Given this rate, up to 13.8 youngsters may have fledged which is close to the actual number observed. Nesting success based on three well-tracked nests was 50%. The predation rate was also 50%. No parasitism was detected.

In 2005, 2 of the 3 nests found were successful. The one unsuccessful nest failed due to predation. In 2004, only 1 of 7 nests was successful for a 14% success rate. Most of those nests (71%) failed due to predation. One nest failed due to parasitism. The 2004 parasitism rate was 43% (3/7).

Results – Reproductive Success - Irvine Park

Nest management was not done in Irvine Park in 2006 or 2005. In 2006, fledglings were observed in 3 of 5 territories and a total of 3 fledglings observed. In 2005, successful breeding was documented in 6 of the 11 territories (55%).

In 2004, six breeding attempts were detected in Irvine Park. Six territories were in habitat affected by the fire that took place around Memorial Day, 2004. Five of the 6 vireos affected directly by the fire were paired, and of those five, four are known to have successfully fledged young. One of the pairs was detected only after the fire, in mid-June, with a clumsy new fledgling in habitat on the periphery of the fire-damaged habitat.

Results - Predation Rates

The predation rate was 46% in 2006. The predation rate has remained fairly stable over the past 4 years at 47% in 2005, 52% in 2004, 53% in 2003 and 49% in 2002.

The heaviest predation occurred along the Santa Ana River just upstream of Hwy 15 in the Norco Burn area. Norco Burn had a 78% predation rate. Most nests found in the first month of surveying were lost to predation. The river above Norco Burn at Van Buren had only a 33% predation rate. The Santa Ana Canyon had an overall predation rate of 42%. The Green River Golf Club, in the Santa Ana Canyon, had only a 17% predation rate. Unfortunately, habitat for about 19 territories is scheduled for removal for a flood control project.

Last year San Timoteo had a high predation rate of 62%. In 2006, San Timoteo had only a 33% predation rate.

The most likely avian predators are the western scrub –jay, the greater roadrunner, *Geococcyx californianus*, and the California thrasher, *Toxostoma redivivum*. In 2006, a pair of California Gnatcatchers, *Polioptila californica*, was observed chasing a scrub-jay in Mockingbird Canyon. In 2002, in the Santa Ana Canyon, there were several sightings during a single day of scrub jays carrying eggs in their bills. On Temescal, a yellow-breasted chat, *Icteria virens*, was observed chasing a scrub jay with an egg in its bill. In Mockingbird Canyon, late in the 2003 season, a scolding vireo attracted a scrub-jay into the area; the scrub-jay looked around and left after the scolding stopped. In 2005, a greater roadrunner was observed near nests and a vireo was observed scolding a California thrasher in marginal habitat at the Prado dam.

Snakes are also suspected given that many eggs disappear with nests left intact. In 2006, in the Santa Ana Canyon, a vireo pair and a house wren were scolding a gopher snake, *Pituophis melanoleucus,* in a tree near a vireo nest. The gopher snake was relocated from the tree by the biologist. In 2004, in Mockingbird Canyon a vireo with offspring out of the nest was observed scolding a garter snake, *Thamnophis sp.* Other possible predators observed in 2005 were roadrunners, gopher snakes, coachwhips, *Masticophis flagellum*, and raccoons, *Procyon lotor*. Feral hogs, *Sus scrofa*, are present along the river and their foraging in the under story may disturb nesting vireos. During the winter storms of 2004-2005, the berm causing the diversion of water to the Hidden Valley ponds was lost. As a result, while the season started with water in the creek and ponds, during the season, most of the ponds dried up. Some persistent water remained in portions of the creek. The feral hogs were observed much more often in the dry fresh water reed ponds and in the willow riparian habitat because of the dry conditions and many acres of vegetation was trampled and rutted. However, there was no evidence that this activity

led to the loss of a vireo nest. The ponds at Hidden Valley remained empty in 2006 until early June when repair work was done.

Argentine ants caused a nest failure in Chino Hills in 2006. Nest failure due to ants was documented in Mockingbird Canyon in 2005. This year while no nests were lost due to ants in Mockingbird Canyon, one ravine was so thick with ants it could not be easily walked.

Results - Brown-headed Cowbird Parasitism

The parasitism rate throughout the watershed was 19%. This is a decline from previous years' rates of 23% in 2005, 23% in 2004, 21% in 2003, 28% in 2002 and 25% in 2001.

In 2006, parasitism was detected at 4 sites: San Timoteo, the Santa Ana River between River Rd. and Norco, Temescal and San Jacinto. No parastitism was detected this year in Mockingbird Canyon, Hidden Valley, on the Santa Ana River between Fairmount Park and Hidden Valley, or the Santa Ana Canyon.

San Timoteo has had a declining parasitism rate over the last three years. It had a 43% parasitism rate in 2006, down from 53% in 2005 and 74% in 2004. In 2006, San Timoteo accounted for 58% (14/24) of all parasitized nests detected.

Most of the nests tracked along the Santa Ana River between River Rd. and Norco were located upstream of Hwy 15 in Norco. In 2006, 6 of 27 nests were parasitized (22%). In 2005, this site had a 25% parasitism rate based on 4 well-tracked nests. In 2004, no parasitism had been detected based on 34 well-tracked nests. No parasitism was detected this year on another stretch of the Santa Ana River, from Fairmount Park to Van Buren/Hidden Valley: in 2005, 16% (3/19) of the nests were parasitized. In 2002, this Santa Ana River site at Van Buren Blvd. was heavily parasitized (67%) with 63% of the nest losses due to parasitism. In 2003, with initiation of cowbird trapping at the beginning of the season, 1of 5 nests (20%) was parasitized. In 2004, 2 of 10 nests (20%) were parasitized.

The parasitism rates at Temescal for 3 of the past 4 years range between 25-30% based on the 10-15 nests found. In 2006, 2 parasitized nests were found in the Dos Logos development and 2 were found on the 3M property. (Only 3 of these nests were well-tracked and so included in statistics.) In 2005 the rate was 30% (3/10 nests). In 2004, no parasitism was detected but in 2003 there was a 27% (3/11 nests) parasitism rate.

After detecting parasitism in a newly-found cluster of vireos on the San Jacinto River in 2005, SAWA deployed a cowbird trap on the levee near by within the fenced enclosure of the Eastern Municipal Water District. In 2006, 1 of 2 nests followed at San Jacinto River was parasitized.

Parasitism seems to be under control in Mockingbird Canyon, with the initiation of cowbird trapping in 2003. No parasitism was detected in 2006 or 2004. Only one nest was parasitized in 2005; that nest successfully fledged two young after the removal of the cowbird egg. Trapping was initiated after a parasitism rate of 62% was found during the first year of vireo monitoring. Private property owners were contacted with informational flyers and many responded favorably. Because properties back up to the riparian vegetation, traps can be placed in secure private yards directly adjacent to the habitat.

For the second consecutive year, no parasitism was detected in the Santa Ana Canyon in 2006. Parasitism pressure has varied in the Santa Ana Canyon since monitoring began in 2001. Whereas in 2001 the upper canyon and Green River Golf Club experienced 10% and 44% parasitism rates, respectively, in 2002 no parasitism was detected at those sites. With the

relatively recent appearance of vireos in Featherly Park in 2002, parasitism occurred in 2 of the 3 nests monitored and caused the failure of 1 of the nests. In 2003, there was no parasitism at the golf club or Featherly Park. However, in the upper canyon, 3 of 5 nests were parasitized, of which 2 failed due to parasitism. In 2004, Featherly Park again had parasitism (29%).

The trap at Harrison Reservoir was deployed at the beginning of the season in 2006 and as a result, was much more successful than in 2005 when the trap was deployed at the end of June. In 2006, the trap caught 28 cowbirds as opposed to 2 cowbirds in 2005. The two nests followed at Harrison were not parasitized in 2006. In 2005, the one nest found at Harrison Reservoir was parasitized twice but successfully fledged young most likely because it was manipulated.

In 2006, only one occurrence of parasitism was detected during SAWA's assessment surveys. At Kabian Park, a vireo and a California Towhee, *Piplio crissalis*, were observed feeding a juvenile cowbird.

Parasitism caused failure of 17% of the 47 failed nests in 2006. This rate has been variable over the last five years. In 2005, parasitism caused failure in 13% (7/56) of failed nests. Parasitism accounted for only 2% of the nesting failures in 2004 down from 17% (7/41) in 2003 and 26% (11/43) in 2002. The criteria for judging nest failure being due to parasitism is abandonment of vireo eggs in the presence of a cowbird egg.

Sixteen nests were manipulated with a 69% success rate. Twenty-four vireos fledged from manipulated nests, which accounts for 7 % of all observed fledglings. The number of vireos that were successfully fledged from manipulated nests is as follows: San Timoteo, 16, the Santa Ana River at Norco, 4, Temescal, 1, and San Jacinto, 3.

In 2005, manipulated nests also contributed 7% of all observed fledglings. In 2005, 26 nests were manipulated with a 54% success rate and produced 25 young. In 2004, 40% of the manipulated nests successfully fledged 18 young.

Results - Repaired Vireo Nests

Three nests were repaired during the 2006 season with a 67% success rate and fledging 4 young. One nest was repaired in Mockingbird Canyon and fledged 1 young. Two nests were repaired in the Santa Ana Canyon at the Green River Golf Club; one nest was successful and fledged 3 young.

The two nests at the Green River Golf Club were repaired by securing the side of the nest to the branch with white zip ties. The nest in Arundo was eventually depredated. The second nest, in willow, was dangling from the branch with the 3 nestlings on the verge of tumbling out. The parents were very actively feeding the nestlings. A second repair was also made on the second nest. After both repairs, the parents returned to the nest and seemed oblivious to the new material. At Mockingbird, the nest was braced with a branch to keep it upright.

Five nests were repaired during the 2005 season. Four nests were repaired in the Santa Ana Canyon and one in San Jacinto. The nests needing support were built in hemlock, cocklebur, narrow-leaf willow, black willow, and mulefat. The nest in narrow-leaf willow successfully fledged 4 vireos. The nest in hemlock lost its 3 eggs to either depredation or to the branch failing. The nest in cocklebur was depredated with the loss of 4 eggs. The nest in black willow was secured to its branches with thread (see exhibit 1, sent as separate file in electronic copy). It successfully fledged its 3 nestlings. The fifth nest, in mulefat, was located in the San

Jacinto River. It was repaired with mulefat stems, wire, and duct tape. It fledged 2 young. Overall, the success rate was 60% and 9 young fledged.

Tolerance of vireos to the repair work varied. Some birds scolded then left. Others continued to scold while the work was being done. One bird perched quietly nearby and then returned to the nest after the nest had been secured.

Results - Southwestern Willow Flycatcher

In 2006, one pair of southwestern willow flycatchers successfully bred in Prado; another single male was also present (Pike *et al.* 2006).

No breeding southwestern willow flycatchers were detected in the watershed by SAWA biologists in 2006. Eleven sightings of probable migratory willow flycatchers were made. Six of these sightings were in late May. All detections listed were by vocalization unless otherwise noted. All UTMs are UGS 84. During the assessment surveys three willow flycatchers were sighted. Two were observed on 5/22 (UTM 0464712, 3751489) in the riparian patch at Woodcrest Dam. One was observed at Box Springs (0472391, 3757077) on 5/23. Two willow flycatchers were detected on 5/22 (with a second sighting of one on 5/30 not vocalizing at the same site) in Mockingbird Canyon. A willow flycatcher was detected on the Santa Ana River in Norco, upstream of Hwy 15, on 5/30. Two willow flycatchers were observed dueling at Hidden Valley on 5/31 (0452641, 3758263). Three willow flycatchers were observed by L. Hays at Shipley Nature Center the week of 9/26. One was singing (pers. comm.)

In 2005, SAWA biologists detected one pair of southwestern willow flycatchers and 4 single willow flycatchers in the watershed. The pair was observed on 5/31/05 at the Harrison Reservoir in willows upstream of the dam where a ravine comes in from the west. Although one member of the pair appeared to be pulling bark from a tree, the birds were not seen again on subsequent visits. Nine migratory flycatchers were detected on a single survey at Harrison by Jason Berkely (pers. comm.). A willow flycatcher was observed at Perris Lake (11S0485670, 3746377) on 5/11/05. Two singing males were observed at March SKR Preserve on 5/25/05. One willow flycatcher was detected on the Santa Ana River between Waterman Ave. and California St. on 5/20/05 (0479017, 3772057).

In 2004, in San Timoteo, three flycatchers were detected visually and by vocalization at one site approximately 0.5 miles upstream of Eastside Ranch (33.98338546°, 117.1274108°) by several SAWA biologists. One of the historical sites of flycatcher sightings approximately 1.2 km upstream of the San Timoteo Canyon Rd. crossing in Redlands was destroyed in December of 2003 by the flood control project at the lower end of San Timoteo Canyon. The flycatcher was last detected at this site on 5/29/03 and 6/4/03.

No willow flycatchers were detected at Hidden Valley in 2005 whereas two were observed in 2004. In 2004, at Hidden Valley, two flycatchers were observed on 5/27/04 within the gated Dept. of Fish and Game portion of the preserve (UTM 11 S 0454343 /3757847). Their identities were confirmed by vocalizations. At least one flycatcher remained at the site 0.5 hours later. On 6/9/04 a flycatcher was observed approximately 50 m away perched on nettle growing on the berm of a pond. It flew into willow and disappeared. No vocalization was given. While the first sightings on 5/27/04 may have been migrating birds, the second observation increases the possibility that nesting was occurring. These flycatchers were in habitat that contained 7

vireo pairs within 200 m. and was under intensive monitoring but no breeding activity was detected.

In 2004, one flycatcher was detected (by vocalization) by SAWA biologists in the Mockingbird basin near the reservoir but it was not re-sighted on subsequent visits. A flycatcher was detected (by sight only) in 2003 in the same area.

Sightings of Interest

Incidental sightings were made throughout the watershed during vireo monitoring. Emphasis was placed on sensitive species and potential predators.

Over 200 Yellow Warblers, *Dendroica petechia*, were detected throughout the watershed. Sites with the highest numbers included: Hidden Valley (n=60), the Santa Ana Canyon (n=44), San Timoteo (n= 18), the Santa Ana River, from River Road to Norco (n=11), the Santa Ana River between Riverview Ave. and Kennedy and Archer Sts. (n=13), Mockingbird Canyon, (n=11), and Santiago Creek at Cannon (n=9). Yellow warblers were found in small, fragmented, habitats as well, such as Yorba Linda at Starlight Dr., a residential track with a small patch of riparian habitat in a ravine;Van Buren Blvd. at Plummer in the City of Riverside; and Eucalyptus at Rancho Hills in the City of Chino Hills to name only a few. In 2005, at least 40 were present in the Santa Ana Canyon and a minimum of 25 were observed in Hidden Valley. The ponds behind the large pond on the west side of Hidden Valley were inaccessible for the second year. Many Yellow Warblers are usually counted along the berms of those ponds. Also in 2005, 5 Yellow Warblers were observed in the basin of Mockingbird Canyon, 1 was seen in Kabian Park, 10 were observed in Peter's Canyon, and 1 was documented in Perris Lake.

A minimum of 96 Yellow breasted Chats, *Icteria virens*, were detected throughout the watershed in 2006. Twenty-nine chats were detected in Hidden Valley, 23 in the Santa Ana Canyon, 8 in Norco Burn, and 6 in both Temescal and San Timoteo, 7 in Santiago Creek at Cannon, 3 at the Santa Ana River at about Bain and Limonite, 2 at Starlight Dr. in Yorba Linda, and 2 in Mockingbird Canyon. Allessandro Arroyo, Santiago Creek at Blue Diamond Rd., Harrison Reservoir, and Sycamore Canyon each held one chat. None was detected in Peter's Canyon in 2006. Their presence was noted at Irvine Park, Poorman's Reservoir, and Eucalyptus at Del Monte in Chino Hills. In 2005, 35 were documented in Hidden Valley, 2 were detected in the basin of Mockingbird Canyon and 1 was detected in Peter's Canyon. At least 16 were present in the Santa Ana Canyon in 2005.

In 2006, California Gnatcatchers, *Polioptila californica*, were detected for the third consecutive year at Harrison Reservoir below Lake Matthews and in Mockingbird Canyon. In 2005, a nesting pair of California Gnatcatchers was documented in the Santa Ana Canyon for the fourth consecutive year; in 2004 a pair was seen with a juvenile. In 2003, two pairs of gnatcatchers were seen at Harrison Reservoir and one pair was observed with at least two fledglings. In 2005, gnatcatchers were also observed in Peter's Canyon.

Five pairs and 20 individual Downy Woodpeckers, *Picoides pubescens*, were detected in 2006. One pair was detected at the outflow of Santiago Creek at Cannon St.; one pair was detected west of the staging area on the Santa Ana River at Riverview Ave. in Mira Loma (the north side of Hidden Valley), 2 pairs and 6 individuals were detected in Temescal, and 1 woodpecker was observed feeding nestlings in Mockingbird Canyon. Additionally, 1 individual was observed in Gavilan Hills, 3 were observed in Mockingbird Canyon, 2 in San Timoteo, 7 in

Hidden Valley, and 1 in the Santa Ana Canyon. Their presence was also noted in Irvine Park, the City of Riverside at Van Buren Blvd. at Bountiful St., Cottonwood Canyon in Lake Elsinore, and on the Santa Ana River at Hwy 15 in Norco.

Several sightings of Loggerhead Shrikes, *Lanius ludovicianus*, were made throughout the watershed in 2006. Shrikes were detected at Kabian Park (n=1), San Timoteo (minimum of 2), and an immature was seen at Hidden Valley. There were 8 occurrences of shrikes in cowbird traps at the San Jacinto Wildlife Area and all were released. In 2005, shrikes were detected in San Jacinto and at Newport Slough, a marsh at the mouth of the Santa Ana River. In 2004, one was observed in the basin at Mockingbird Canyon. In 2004 a shrike was observed defending its territory against a Greater Roadrunner, *Geococcyx californianus,* at the base of Prado Dam in the upper Santa Ana Canyon. The shrike's apparent territory overlapped with a vireo territory. In previous years they have been detected on the Santa Ana River at Riverside Ave. and in the Prado Basin.

Tri-colored Blackbirds, *Aegelaius tricolor*, are present in San Jacinto. During the season, they were caught in the traps (91 occurrences) and released.

Roufus-crowned Sparrows, *Aimophila ruficeps*, were detected in San Timoteo and at the 3M plant in Temescal in 2006. In 2005, two Rufuos-crowned Sparrows were detected at Sycamore Canyon.

A Cactus Wren, *Campylorrhynchus brunneicapillus*, was detected on the hillside above Santiago Canyon Rd, east of the 261 tollway in 2006. A Catcus Wren was detected at Perris Lake during the vireo surveys in 2005. Catcus Wrens were also detected at El Toro marine base in 2005.

Burrrowing Owls, *Athene cunicularia*, were seen in 2006 in several locations. A minimum of 17 individual including 7 pairs were documented in Mead Valley, near the aqueduct off of Cajalco Rd. A pair was detected within a fenced culvert at Limonite and Bain Streets along the Santa Ana River. The site in Mockingbird Canyon at Wood St., where Burrowing Owls were detected in 2005, has been developed. Several have been documented in the open fields and dairies at Prado Basin (B. Nash, OCWD) over several years. In 2005, a pair with a fledgling were observed at Mockingbird Canyon and a pair was observed at Perris Lake.

In 2004, Greater Roadrunners were observed at the Green River Golf Club and in Mockingbird Canyon, both in the basin and in the canyon, trying to enter cowbird traps. The traps were in upland habitat above the reservoir and in habitat greatly disturbed by off-road vehicles in the canyon. Fortunately, the roadrunners were unsuccessful in entering the traps. Roadrunners are potential nest predators.

Warbling Vireos, *Vireo gilvus*, were detected as late as the end of May, at the end of their migration. Warbling Vireos are now considered migrants but they used to nest along coastal southern California and their decline is thought to be due to cowbird parasitism (Garrett and Dunn 1981).

Blue Grosbeaks, *Guiraca caerulea*, were detected in Hidden Valley (n=6), Santa Ana Canyon (n=3), Cottonwood Canyon, San Timoteo and Chino Hills in 2006.

Ash-throated Flycatchers were observed in the small patch of riparian habitat at Starlight Dr. in Yorba Linda, in Peter's Canyon, March SKR Preserve, Mockingbird Canyon, and San Timoeto and Cottonwood Canyon in Lake Elsinore. In Chino Hills they were documented at Eucalyptus and Del Monte and south of Rancho Hills and at the Carbon Canyon entrance to Western Hills Golf Course. Two Ash-throated Flycatchers were observed in Hidden Valley, and

3 in Featherly Park. This species was also present in the City of Riverside at Huan Rd. and Santa Rosa Mine Rd.

Eight Black-headed Grosbeaks, *Pheucticus melanocephalus*, were documented in Featherly Park below Gypsum Canyon Rd. in 2006. Their presence was also detected in Mockingbird Canyon and in San Timoteo. A Black-headed Grosbeak nest in hemlock, eventually abandoned, was detected just downstream from Prado Dam. A Black and White warbler, *Mniotilta varia*, and 9 Black-headed Grosbeak territories were detected in Featherly Park below Gypsum Canyon Rd. in 2005.

Although 2 Vermillon Flycatchers, *Pyrocephalus rubinus*, were documented in the Santa Ana Canyon in 2005, none was documented in 2006.

Wood Ducks, *Aix sponsa*, were observed along the river in Featherly Park and in Hidden Valley in 2005 and 2006. In 2004 a pair was observed in the reservoir at Mockingbird Canyon.

Sixteen active Red-tail Hawk, *Buteo jamecensis*, nests were detected throughout the watershed in 2006. Nestlings or fledglings were observed at Hidden Valley (1 nest) and Featherly Park (1 nest). Three nests were detected in San Timoteo, 4 in Temescal, 2 at Harrison Reservoir, 1 at Sycamore Canyon, 1 in San Jacinto off of Soboba Rd., 1 in Mockingbird Canyon, 1 along the Santa Ana River at Norco, and 1 at Huan Rd. in the City of Riverside.

More detections of the San Diego Horned Lizard, *Phrynosoma coronatum blainvillii*, occurred in 2006 in the Santa Ana Canyon and along the Santa Ana River. Numerous sightings have been made along the Santa Ana River off of Limonite Ave. over the past three years. In 2006, 8 sightings were made, in 2005, 3 were seen, and in 2004, 10 were detected. The horned lizard continues to be seen along the State Park Road in Chino Hills downstream of Prado Dam. First observed by SAWA biologists in 2003 and 2004 near a cowbird trap, one small and 3 baby lizards were observed in 2006. This species is getting special attention from State Parks and the Army Corps of Engineers due to the need to cross its habitat in order to access construction projects in the river. Again, in 2006, Horned Lizards were observed in San Timoteo at Younglove Preserve. In 2003, a Horned Lizard was also seen in the riverbed of the Santa Ana River above Tippecanoe Ave.

In 2006, Orange-throated Whiptails, *Aspidoscelis hyperythra beldingi*, were observed in San Timoteo, Mockingbird Canyon, Temescal, Sycamore Canyon and along the Santa Ana River in Norco. In 2005 Orange-throated Whiptails were documented in Mockingbird Canyon (adults and juveniles), San Timoteo, Sycamore Canyon, Cottonwood Canyon (an adult on 6/10). In 2004, sightings of Orange-throated Whiptails, occurred in both Mockingbird Canyon basin and canyon, at Harrison Reservoir, and in Sycamore Canyon. In 2003, juvenile Orange-throated Whiptails were detected in two locations at Mockingbird Canyon; adults with young were detected at a third location.

In 2005, Western Spadefoot Toads, *Spea hammondii*, were detected at Sycamore Canyon breeding in pools of water in tire track ruts during the vireo season. The toads were also found at the lands set aside for El Toro wildlife refuge. During the winter of 2004-2005, breeding was documented in two transient ponds in the San Jacinto River off Soboba Rd. In 2003-2004, Spadefoot Toads were observed in the uplands above a riparian ravine in Dos Logos, Temescal. This ravine has been filled in to make a golf course.

Crotalus ruber, the Red Diamond-back Rattlesnake, was detected in San Timoteo in 2006 and 2005. Previously, it has been sighted in 2005 and 2004 in Sycamore Canyon and in 2005 at Perris Lake. In 2006, sightings of Western Pacific Rattlesnakes, *Crotalus viridis*, were made at Santiago Creek at Cannon Rd., Eucalyptus at Del Monte in Chino Hills, San Timoteo Canyon,

and the Santa Ana Canyon. In the Santa Ana Canyon, alert postures by a California Ground Squirrel and California Thrasher, *Toxostoma redivivum,* alerted a SAWA biologist to a rattlesnake in the brush. A Pacific Rattlesnake was observed eating a California Ground Squirrel.

In 2005 a Ring-neck Snake, *Diadophis punctatus modestus*, was captured in pit-fall traps at the El Toro refuge; one had been observed in a creek at San Timoteo in 2003. Two-striped Garter Snakes, *Thamnophis hammondii*, were observed in Mockingbird Canyon in 2003 and at Irvine Park in 2004. The snake in Irvine Park was found dead along a trail in the riparian habitat, the probable victim of a mountain biker.

Long-tailed Weasels, *Mustela frenata*, were observed in San Timoteo Canyon and at March SKR Preserve in 2005.

At March SKR Preserve in 2005, incidental sightings included a pair of White-tailed Kites, *Elanus leucurus*, and a Long-tailed Weasel. In 2004, a Cooper's Hawk, *Accitpiter cooperii*, perched on a cowbird trap, was observed taking an endangered Stephens' Kangaroo Rat, *Dipodomys stephensii*. Miscellaneous observations of species in riparian habitat at March SKR Reserve in 2004 included a pair of Loggerhead Shrikes, nesting Great Horned Owls, *Bubo virginianus*, with 3 fledglings, 1 Yellow warbler and 1 Yellow-breasted Chat; a Western Whiptail *Aspidoscelis tigris,* was detected in the upland..

The Santa Ana Woolly-star, *Eriastrum densifolium, sp sanctorum*, was documented at two sites. Plants were detected in their known site upstream of the confluence of Cajon and Lytle Creek and the one plant (which is most-likely *spp. santorum*) in the Norco Burn area along the Santa Ana River was detected again in 2006 for the second consecutive year.

Results - Cowbird Trapping, March – July 2006

Fifty-two traps were deployed during the vireo season in 2006 and 2,881 cowbirds were removed from all sites over 5,045 trap days (Table 5). The sex and ages of the cowbirds removed in 2006 were 1,737 males, 659 females, and 485 juveniles. Over 2,500 hours were spent on the BHCO program. SAWA biologists and field assistants spent approximately 2,150 field hours servicing traps. An additional 382 hours were spent for administrative functions.

The areas trapped and the number of traps in each area are as follows: San Jacinto, 11; San Timoteo, 9; Mockingbird Canyon, 7; Hidden Valley, 5; Temescal Canyon, 5; Santa Ana Canyon, 5; March Air Reserve Base, 2; Sycamore Canyon, 1; Santa Ana River, from Jurupa Park to River Road, 7. The majority of the traps were opened in late March and April and closed July 30. A few traps were left open into August and two sites will remain open through the winter (Green River and San Jacinto dairies). Trapping results in this report end with July 31 data. Trapping results after July 2006 will be reported in winter trapping results in 2007.

Since 2000, 10,372 cowbirds have been removed from the habitat during the vireo breeding season over 25,229 trap days (Figure 1).

SAWA deployed 52 traps in 2006, an increase over the 45 traps in 2005, but a decrease from 2004 and 2003 when 65 and 58 were deployed respectively.

In 2006, 0.57 cowbirds per day were taken from the habitat as compared with 0.43 cowbirds/trap-day in 2005. The daily removal rates for 2004, 2003, 2002, and 2001 were 0.46 cowbirds/trap-day, 0.34 cowbirds/trap-day, 0.22 cowbirds/trap-day, and 0.27 cowbirds/trap-day, respectively. Traps were managed closely and usually moved to a new location if they did not catch cowbirds.

The increase in the number of cowbirds trapped in 2006 was probably due to increased trap-days. Additional traps were deployed and traps were deployed at an earlier date. The cowbird assistants started earlier this season which meant that SAWA was able to keep traps open over the weekend.

Again this year, the San Jacinto dairy traps captured the largest proportion of birds. Traps in San Jacinto in 2006 trapped 1.54 cowbirds/trap-day as compared to the overall average of 0.57 cowbirds/trap-day. San Jacinto dairy traps accounted for 62% (1782/2881) of the cowbirds removed over 15% (776/5045) of the trap-days. In 2005, the San Jacinto dairy traps accounted for 58% (912/1,569) of the cowbirds removed over 16% (570/3662) of the trap-days. The dairy traps alone in San Jacinto trapped 2.3 cowbirds/trap-day (1782/776). In 2005, flooding prevented deployment of traps at the San Jacinto Wildlife Area and the only traps deployed were at dairies. In 2006, an additional 5 traps were deployed. Three traps were deployed at the Wildlife Area and an additional 2 traps were deployed along the San Jacinto River. The Eastern Municipal Water District authorized placement of a trap on the levee by the Allessandro Ponds. SAWA removed 72 cowbirds from this trap. Riverside County Parks and Open Space District authorized a trap on land at State St. and the river. These latter five traps accounted for 121 cowbirds removed.

Cowbird management in San Timoteo Canyon has been problematic but is showing signs of improvement. The number of cowbirds removed increased in 2006 to 223 over 931 trap-days 0.24 birds/trap-day), as compared to the removal of 116 cowbirds over 540 trap-days (0.21 birds/trap-day) in 2005. The increased trapping effort may have been one factor leading to a lower parasitism rate in San Timoteo. Other possible factor includes a shorter nesting season due to the late arrival of the vireos. In 2005, over 50% of the nests found were parasitized, for 2006 parasitized nests were reduced to 44%. Next year's management plans will continue to include contacting local landowners for permission to put traps on their properties in order to adjust trap placement to maximize cowbird removal.

In 2006, SAWA biologist Melody Aimar tried a new management strategy in San Timoteo which may have increased trapping results. Research is showing that cowbirds sing with distinctive dialects (Duffy and McChrystal 1992 and O'Loghlen 1995) so it may be that the San Jacinto birds (that we use for bait birds at the beginning of the season) do not attract the San Timoteo birds. SAWA changed out the original bait birds, which came from San Jacinto, with those caught locally at San Timoteo during the season. It is unknown if these two locations hold birds from different wintering areas during the vireo season.

Temescal Canyon showed a tremendous increase in cowbirds removed in 2006 with 222 removed from 5 traps, compared to 27 removed from 7 traps in 2005. This year we eliminated 2 trap locations that were unproductive and deployed traps earlier for an increase of 166 trap-days.

Continued closely-managed cowbird trapping in Mockingbird Canyon resulted in the removal of 171 cowbirds for 6 traps over 629 trap-days in 2006. These results are less than 2005 when 200 cowbirds were removed from 7 traps over 742 trap-days. The decrease in the number of cowbirds removed can probably be related to the one trap that wasn't deployed due to security concerns. The good news is that there was no nest parasitism in Mockingbird Canyon for 2006. In 2005 the parasitism rate was 17%.

Cowbird trapping in Mockingbird is dependent upon the goodwill of its residents. All 6 traps in the canyon are on private property. The seventh trap usually deployed in the basin at Van Buren Blvd. and Firethorn could not be placed this year due to a newly-established paintball

park set up in the habitat. The trap at this site was vandalized last year after the paintball park was initiated.

Vandalism occurred at a few sites this year. The one trap in Temescal Canyon at 3M was damaged twice and taken out of service. The one trap at Sycamore Canyon was vandalized once but did stay in service. Along the Santa Ana River a trap at Jurupa Park was vandalized twice, it was relocated and remained in service for the season.

Modified crow traps measuring 6'x6'x8' were used as well as a smaller, more maneuverable version measuring 6'x6'x4'. The smaller traps are easier to transport, install, and move around when searching for a productive trapping site. We are continuing to analyze the utility of the smaller trap.

Results - Non-Target Avian Species Caught in Cowbird Traps

Twenty-seven non-target species, consisting of 3,968 individual trapping occurrences, were trapped in 52 cowbird traps (Table 6). The most common species were European Starling, *Sturnus vulgaris,* House Sparrow, *Passer domesticus,* California Towhee, *Pipilo crissalis,* House Finch, *Carpodacus mexicanus,* and Red-winged Blackbird, *Agelaius phoeniceus.*

While the number of non-targets caught during the season was similar to that for 2005 (n=3,232), a far greater percentage of these birds were native birds in 2006. Seventy-nine per cent of the non-targets caught in 2006 were native. In 2005, only 24% of the non-targets captured were natives. The overall trap rate for non-targets was 0.79/trap day. The exotic non-target species trap rate was 0.17/trap day (n=850 birds trapped); the native non-target trap rate was 0.62/trap day (n=3,118 birds trapped). Overall, the 2006 non-target mortality rate was 0.83%. The 2006 native species mortality rate was 0.67% and the non-native species mortality rate was 1.41%.

The increase in native non-target captures is a concern. There was an eight-fold increase in non-target captures in San Timoteo in 2006 with 1058 non-targets trapped versus 125 captures in 2005. Although, mortality was very low at 0.09% (1/1058), more management will be needed to try to decrease the numbers of non-targets caught in the San Timoteo area. A larger number of Red-winged Blackbirds are always caught in San Jacinto and San Timoteo due to trap placement by fresh water reeds; and the mortality rate is always low. In 2006 the mortality rate for Red-winged Blackbirds was 0.2%. However, the large number of California Towhees caught in San Timoteo, Mockingbird Canyon, Temescal Canyon, and the Santa Ana Canyon is unprecedented. In general, the increases may be due to the greater number of traps open this year (an increase of 7), and the higher number of trap days than in 2005 (an increase of 1,383). However, many traps that caught increased native non-targets this year were deployed in the same locations as in previous years. It may be that food availability was limited given the late season rains and cold temperatures. Care was taken to place traps away from vegetation when possible in an attempt to lower the total number of non-targets caught and we closed traps when repeated captures of non-targets took place. Mortalities were reviewed on a daily basis. In 2007, management of SAWA's cowbird traps will concentrate on ways of reducing the numbers of non-targets caught, not only to minimize the risk of mortality but to lessen the impact of trapping on their daily lives.

Results - Winter 2005-2006 BHCO Trapping

Cowbird trapping took place at San Jacinto, the Santa Ana Canyon at Hwy 91 and Green River Road, at a stable in Norco, and in Mockingbird Canyon during the winter of 2005-2006.

Ten traps were open in San Jacinto for a total of 1,319 trap days between 8/01/05 and 3/14/06. Seven traps were located at dairies and three in the San Jacinto Wildlife Refuge. Three thousand eight hundred and forty-six cowbirds were removed (1,493 males, 1,748 females, and 605 juveniles). A total of 2,503 non-target birds were trapped and released: 4 Cooper's Hawks, *Accipiter cooperii,* 18 Brewer's Blackbirds, *Euphagus cyanocephalus,* 1,854 European Starlings, (5 mortalities), 274 House Sparrows, (1 mortality), 259 Red-winged Blackbird (1 mortality), 63 Tricolored Blackbirds, 3 California Towhees, 14 Lark Sparrows, *Chondestes grammacus,* 3 Loggerhead Shrikes, 1 Song Sparrow, *Melospiza melodia,* (1 mortality), 1 Spotted Towhee, *Pipilo maculatus,* 12 Brown-headed Cowbirds (great basin race), and 9 Yellow-headed Blackbirds, *Xanthocephalus xanthocephalus.*

The two horse stable traps at Green River Road were open for 210 trap-days from 8/1/05 to 11/23/05 and one trap at the maintenance yard at the Green River Golf Club was open for 39 days from 8/1/05 to 9/14/05. At the horse stable traps, 477 cowbirds were removed (147 males, 179 females, and 151 juveniles). Non-targets released were: 4 California Towhees and 11 Brown-headed Cowbirds (great basin race). At the Green River Golf Club, 19 cowbirds were removed (3 males, 5 females, and 11 juveniles). The Norco Stable trap was open for 57 days from 8/1/05 to 9/28/05. A total of 61 cowbirds were removed (8 males, 8 females, and 45 juveniles). Non-targets released were: 1 European Starling and 1 Brown-headed Cowbird (great basin race), and 11 House Finch (2 mortalities). In Mockingbird Canyon 6 traps were open for 174 trap-days from 8/1/05 to 8/29/05. A total of 28 cowbirds were removed (3 males, 5 females, and 20 juveniles). Non-targets released were: 15 California Towhees, 2 Brown-headed Cowbird (great basin race), 9 House Finch, 5 Hooded Oriole, *Icterus cucullatus*, and 5 House Sparrows.

Discussion

This report documents a 19% decline in the vireo population in the Santa Ana Watershed after several years of steady increases. The late arrival of the vireos portended an unusual season. At 4 major population sites in the watershed (San Timoteo, Mockingbird Canyon, Hidden Valley, and the Santa Ana Canyon) which contained 54% (n=173/318) of territories in 2005, the first arrival dates were delayed 12-26 days. Delays in the presence of 50% of the subpopulations ranged from 6 to 34 days. Detection of 50% of the pairs at the same sites occurred from 8 to 24 days later in 2006 than in 2005. The reasons for the late arrivals could be numerous. The cold fronts of the weekly late spring rains probably delayed migration. Events on the wintering grounds are unknown.

However late the arrivals, the breeding season was not extended. Nor did the shortened season negatively impact breeding success overall as compared to 2005. Nesting success in 2006 was 62% as compared to 56% in 2005. Nesting success improved in San Timoteo from 44% to 64%. Nesting success at Hidden Valley increased from 57% to 80%. Nesting success at Mockingbird Canyon and the Santa Ana Canyon increased from 50% to 75% and 56% to 63%, respectively. An extreme decrease in nesting success occurred in Temescal where rates declined from 80% to 67%.

The number of fledglings produced remained stable. While most sites showed declines in the number of fledglings, the large increase in fledglings produced in San Timoteo (an 83% increase from 36 to 66 fledglings) allowed for a slight increase in the overall numbers of fledglings produced. In 2006, 15 more fledglings were observed than in 2005 at monitored sites; in 2006, 352 fledglings were detected while in 2005, 337 were detected. The downward trend at some sites may be due to less intense monitoring.

The decrease in numbers at monitored sites was not duplicated in results from the 3 visit assessment surveys done in peripheral patches of riparian habitat throughout the watershed. Numbers of vireos detected remained constant although some sites occupied in 2005 were unoccupied in 2006. In 2006, 35 vireos were detected whereas 36 were detected in 2005.

Nesting success appears to be fairly stable in the watershed although this year's rate, 62%, is the highest so far in the 2000s. In 2005, nesting success was 56% as compared to 54% in 2004, 57% in 2003 and 42% in 2002.

The predation rate is stable at 46%. The predation rate in 2005 was 47%. The rates were 52%, 53%, 47% in 2004, 2003, and 2002, respectively. Predation accounted for the loss of 75% of the unsuccessful nests in 2005. In 2004 and 2003, predation accounted for 86% and 78% of the unsuccessful nests.

The parasitism rate of 19% shows a decline from 2005. In 2005 the parasitism rate was 23%, identical to that of 2004 and similar to those of 2003, 2002, and 2001 with rates of 21%, 28%, and 25% respectively.

Figure 3 compares nesting success, predation, and parasitism rate from 2001-2006.

Nest loss due to reproductive failure (abandonment of nests with eggs for unknown reasons) was 4% in 2006. The reproductive failure rate was 5% in 2005 as compared with 6% in 2004, 5% in 2003 and 2% in 2002.

The lack of nesting southwestern willow flycatchers in the watershed is not surprising given the continuing low number in the Prado Basin (Pike *et al* 2005). The mountain canyons have held flycatcher territories in the past and should be under management and monitoring by now but the resources to accomplish the additional work have not been forthcoming.

Management Recommendations

SAWA continues development of its vireo population assessment program that will provide accurate annual data on status and distribution of the vireo in the watershed. Intensive monitoring will be balanced with assessment sampling to free additional field time for sensitive species investigations during the breeding season. A sampling program for monitoring nesting success, predation and parasitism rates is being developed. SAWA will continue to coordinate with other agencies for a watershed-wide assessment of all potential vireo habitat. SAWA will continue to identify more locations to survey. Riparian areas will be surveyed over 7-14 day periods three times during the season to assess abundance and pairing. More intensive monitoring will be continued on selected populations to assess reproductive success and parasitism rates.

Restoration of riparian habitat through the removal of non-native invasives such as *Arundo donax*, tamarisk, and pepperweed continues to be important to the continued recovery of the vireo. The development of notification procedures to make natural resource agency managers aware of local infestations of exotics at an early stage may help to prevent future

massive infestations. SAWA biologists and SAWA's habitat assessment coordinator notify SAWA project managers when infestations are detected.

At specific locations, it may be worthwhile to consider predator control although more data must be collected first to determine target species and examine preventative methods. We deployed cameras in San Timoteo in 2006 but no useful data was obtained. We will deploy cameras again in 2007.

Along with restoration and procurement of new land there needs to be increased protection of those lands for wildlife values. Specifically, there continues to be a need to enforce current laws, and perhaps promulgate new laws, to restrict the use of off-road vehicles in sensitive riparian areas. Local landscapes are scarred with OHV tracks and the damage is removing habitat, willows and cottonwoods, in areas such as Mockingbird Canyon, San Timoteo Canyon, the San Jacinto River, and the Santa Ana River. The effect of rampant off-road vehicle use is the destruction of significant riparian resources. The lands with these high wildlife values are very limited in extent and cannot be meaningfully protected or restored in consort with OHV activity. SAWA is attempting to initiate a program of law enforcement in San Timoteo in conjunction with State Parks and the Department of Fish and Game.

Laws meant to prevent other human disturbances such as laws against streambed alteration must be enforced. There are too many examples of the devastating effects of the lack of enforcement. Riparian areas are under assault from adults and children playing war with paintballs. Websites are advertising locations of paintball 'parks,' to the extent of even labeling them as "illegal." On San Timoteo Creek in 2002, for example, five vireo nests were located in habitat that was illegally altered for a paintball park during the breeding season. Large limbs (>12") of black willows were cut and stands of mulefat were destroyed on about 5 acres just downstream from Live Oak Canyon Road. The habitat alteration was reported to the appropriate authorities when first discovered but nothing was done and the abuse ended only when the canyon was scoured by winter storms. In 2003, biologists witnessed a woman driving a car full of young boys carrying paintball guns on to the service road on Live Oak Canyon Rd. at San Timoteo Creek. Nesting vireos were present in the area. Obviously, education of both parents and children is an important component in any strategy to protect these resources. The habitat destruction associated with paintball games is probably finished at this location in San Timoteo because it was recently fenced to accommodate the habitat destruction associated with cattle grazing. In 2004, we asked the question "Where will the ousted paintballers destroy habitat next?" In 2005, the answer is, they just moved further upstream. Paintball enthusiasts also are now using Railroad Canyon in Lake Elsinore and since they have lost a site now being developed for housing in Mockingbird Canyon, they have moved to the Mockingbird Canyon basin below Gage Canal. The basin is the site of one of SAWA's habitat restoration projects. This situation exempiflies a major problem in wildlife management today. Setting aside and enhancing habitat does little good when that land is transformed for other uses by trepassers.

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ACKNOWLEDGEMENTS

Many people helped in our efforts over the past season. Special thanks to those who help with vireo monitoring: Peter Beck, Teresa Fay, Conan Guard, Alissa Ing, Lynn Miller, James Pike, Dharm Pelligrini, Chadette Pfaff, Linette Lina, and Talula Wiater.

We especially thank Loren Hays who retired from the U.S. Fish & Wildlife Service this year for all of his years of dedication to the endangered wildlife in the watershed. His support of SAWA and its efforts on the river have been responsible, in large measure, for what successes we show in this report and, hopefully, in future years.

We want to remember Dharm Pelligrini who passed away this season for his absolute dedication to the vireo cause for many years. We will miss him greatly.

We also remember David Hansberger for his role in the success of the vireo program. David's leadership as chair of the Inland Empire Resource Conservation District is gratefully acknowledged.

We heartily thank our field and cowbird assistants: Nicole Peltier, Tim Romo, Tyler Baldwin, Adam Loukeh, Erin Hailstones, Paul Henry, Mary Shogren and Brett Mills. We also wish to give special thanks to Jennifer Ares, Ron Baxter and John Vint, Karen Cleary-Rose, Jim Gilmore, David Hansberger, Rob Johnson, Renee Latu, Hayley Lovan, Yvonne Moore, and Kerwin Russell.

We would also like to thank the following individuals for their continued assistance: Russ Adams, Alger Dairy, Bill Bradberry, Jeff Brandt, CBJ Dairy, Rod Cruze, Jim Earsum, Eastern Municipal Water District, Dan Ebert, Elsinore Valley Municipal Water District, Carmen Fleming, Johnny Garcia, Slim Hart, Dennis Hayes, Don Houlihan, Ken Kietzer, Gage Canal, KB Homes, James Law, Ed Lotz, Michael McBride, Jim Middleton, Ron Nadeau, Sue Nash, Norco River Trails Stable, Tom Paulek, Judy Saguchi and Phil Clone and the staff of the Green River Golf Club, the staff of the Canyon RV Park, the staff at Fisherman's Retreat, Roberta Reed, R & J Dairy, Scott Brothers Dairy, Zully Smith, Ranger Randy Solis, Lynn Staford, Edward Stanton, Barry Wells, Martie Wells, Western Municipal Water District, and Northwestern Vector Control.

Special thanks go out to the following residents of Mockingbird Canyon and San Timoteo Canyon for their assistance in cowbird trap placement: Mr. and Mrs. Dak, Jill Dale, Norm and Audrey Flickinger, the Mendoza Family at Eastside Ranch, Bill Tobin and Chris Ungerer.

Appendix A

Monitored Locations
(All coordinates – WGS84 except where noted otherwise (Zone 11S))

Survey Site	Starting Coordinates	Ending Coordinates
San Jacinto	3739692, 506426	3749761, 490640
San Timoteo – Riverside County	3762464, 484860	3753159, 501099
San Timoteo – San Bernardino County	3764699, 481911	3762464, 484860
March SKR Preserve	3752740, 471879	3749595, 474210
Mockingbird Canyon	3750319, 461212	3746409, 469427
Sycamore Canyon	3756422, 470287	3753591, 473519
Harrison Reservoir (McAllister Creek)	3748576, 460376	3746911. 462484
Santa Ana River- Fairmount Park to Hidden Valley	3762311, 464841	3757886, 455523
Santa Ana River – River Rd to Hidden Valley (Norco Bluffs)	3756090, 448474	3754049, 444626
Temescal Canyon	3730855, 473469	3746371, 451657
Hidden Valley	3757886, 455523	3757486, 451924
Santa Ana River – Santa Ana Canyon		
- Upper Canyon	3749724, 440677	3749743, 438736
- Green River Golf C.	3749743, 438736	3748403, 436675
- Featherly Park	3748409, 436613	3748343, 430885
Chino Hills	3754612, 438975	3755632, 436980
Santiago-Irvine Park	3740099, 425911	3740590, 429411
Santa Ana River – Orange County – Talbert Park	3722775, 411796	3723877, 412029

Assessment Locations

Survey Site	Starting Coordinates	Ending Coordinates
Alessandro Arroyo	3750512, 0471087	3754499, 0465058*
Box Springs	3757056, 0472535	3757448, 0471832
Cajalco Creek	3744446, 0457239	3742822, 0453829*
Cajon Wash	3795099, 0457890	3791800, 0457587
Canyon Crest	3757034, 0468569	3757034, 0468569
Carbon Canyon	3743810, 0425024	3753203, 0422494
Carbon Canyon at Western Hills Golf Club	3798336, 0429512	3758497, 0429755
Castleview Park	3756312, 0467676	3745974, 0466171

Appendix A (cont.)

Corona St. at Gilmore	3750572, 0448093	3750398, 0448406
Cottonwood Hills	3725806, 0475023	3720734, 0479891*
Chino Hills (Eucalyptus/Del Monte)	3759940, 0430248	3760083, 0430302
Chino Hills (Eucalyptus/Rancho Hills)	3759497, 0429003	3759441, 0429076
Fresno Canyon	3749297, 0440778	3749136, 0439724
Gavilon Hills	3740298, 0466927	3743559, 0467044*
Goldenstar	3750579, 0465791	3751301, 0465388
Hart Memorial Park	3737936, 0421594	3737868, 0421792
Kabian Park	3734644, 0479291	3731160, 0475999
Mead Valley (Cajalco/aqueduct)	3744786, 0471867	3743056, 0467048
Menifee-Paloma H. S.	3725307, 0482515	3724847, 0481557
Menifee-Haun Rd	3725045, 0483716	3724364, 0483706
Norco Hills Park	3751342, 0449609	3751342, 0449609
Oak Glen Preserve	3799958, 0505308	3766213, 0505300
Old Haul Road	3734046, 0439213	3736675, 0432263*
Perris Dam (below)	3746610, 0481752	3756882, 0477136
Perris Lake	3758660, 0476394	3745359, 0484919
Peters Canyon	3738523, 0429409	3735650, 0428555
Poorman Reservoir	3758660, 0476394	3757134, 0477059
Porter Rd. (end)	3749713, 0466905	3750117, 0466409
Promenade	3749951, 0451326	3749566, 0451362
Quail Run	3757533, 0471025	3757478, 0470129
Santa Rosa Mine Rd.	3737819, 0471840	3738146, 0471012
Santiago Canyon Rd	3736418, 0433004	3736418, 0433004
Santiago Creek/Cannon Rd.	3742002, 0426421	3742770, 0428079
Santiago Oaks Regional Park	3742695, 0428072	3742151, 0429119
SAR (north-across from Hidden Valley)	3758638, 0451722	3758583, 0456251
Silverado Canyon	3733996, 0439172	3734044, 0438671*
Starlight Dr.	3750075, 0431072	3750075, 0431072
Steele Valley	3735608, 0481266	3735535, 0470985
Sun Canyon Park	3749160, 0454803	3749244, 0454608
Tequesquite	3756548, 0467751	3756548, 0467751
Van Buren Blvd./Plummer Rd. (So)	3749731, 0472163	3749571, 0472539
Van Buren Blvd. at Bountiful	3749823, 0469521	3749846, 0469378
Wardlow Wash	3747392, 0443309	3749271, 0441834
Woodcrest	3751424, 0464754	3751475, 0464607
Wyle Labs	3751831, 0450125	3751809, 0450051

* Coordinates measured on Topographic maps using NAD 27.

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Table 1. Least Bell's Vireo status and distribution, Santa Ana Watershed, 2000-2006.

SUBPOPULATION	2000	2001	2002	2003	2004	2005	2006
San Jacinto	-	-	-	0/0/0+	3/2/0	6/5/2	9/5/6
San Timoteo Canyon	5/2/2 [a]	5/4/11	15/13/15	14/13/28	29/28/18	43/35/36	32/29/66
Sycamore Canyon	- [b]	-	-	4/-/- + [c]	6/5/9	7/7/1+	4/2/0+
March SKR Reserve (March ARB)	-	-	-	-	7/7/20	9/5/9	9/3/4
Allesandro Arroyo	-	-	-	-	0/0/0 [+]	4/1/1+	2/0/0+
Mockingbird Canyon	-	-	-	9/8/4 [c]	9/8/19	15/13/29	17/14/36
Harrison Resevoir	-	-	-	-	4/3/1	4/1/3	2/2/6
La Sierra	-	-	-	-	2/1/2	1/1/2+	-
Santa Ana River - -- from Van Buren to Hidden Valley	--	--	18/12/4	n/a	n/a	n/a	n/a
-- from Fairmount Park to Hidden Valley				16/13/13	24/21/30	27/19/35	18/14/36
Hidden Valley	14/11/23	18/13/32	28/21/47	26/18/37	29/27/51	34/27/49	33/24/37
Santa Ana River (South side between River Rd. and Hidden Valley)	--	8/4/9+	6/4/4	12/8/23	(included in numbers below)	n/a	n/a
Santa Ana River - River Rd. to Hidden Valley/Norco	-	-	-	-	28/23/62	42/26/24	32/26/46
Temescal Canyon (from Railroad Canyon to approx. Cajalco Rd.)	--	7/1/6+	14/6/6	13/10/21	10/8/19	15/9/42	16/13/29 (plus 5/0/0*)
Chino Hills (Butterfield Ranch)	-	-	-	9/6/11 +	11/8/7	12/9/14	7/6/11

Table 1. Least Bell's Vireo status and distribution, Santa Ana Watershed, 2000-2006 (cont.)

Subpopulation	2000	2001	2002	2003	2004	2005	2006
Santa Ana Canyon Upper Canyon (River below Prado Dam to Green River Golf Course)	--	13/12/30	20/18/39	22/18/51	28/20/22	28/17/26	21/13/13
Santa Ana Canyon Green River Golf Club	--	10/10/20	8/8/17	9/6/22	17/12/17	23/17/28	17/12/24
Santa Ana Canyon Featherly Reg. Prk	--	0/0/0	8/3/0	6/4/9	24/18/23	30/20/28	23/18/35
Santiago – Irvine Park Santiago Canyon Rd.	--	--	--	6/4/10	9/8/8 1/0/0 +	11/6/6+ 1/0/0 +	5/3/3 + 0/0/0 +
Santa Ana River mouth, Talbert Park	-	-	-	4/3/6 [c]	5/3/1 +	6/6/2	3/3/0 +
Misc. Sightings Shipley Nature Ctr., Huntington Beach	-	-	-	-	-	-	1/0/0/+
Santa Ana River at Woolly-star Preserve	--	--	--	--	1/1/1+]	--	--
# LBV from SAWA Sites	**19/13/25**	**61/44/108**	**117/85/132**	**150/111/235**	**247/203/310**	**318/224/337**	**256/187/352**
# BVI from Assessment Sites						**36/14/9**	**35/10/11**
Total # LBV for all SAWA sites						**354/238/346**	**291/197/363**
# LBV San Bernardino County						**15/12/21**	**13/11/9**
# LBV Chino Hills State Park						**22/--/--**	**13/--/--**
Grand Total for Santa Ana Watershed (excluding Prado Basin						**391/250/367**	**317/208/372**

[a] Entries correspond to numbers of territorial males/pairs/'known fledged young' for designated time and locale.
[b] The "--" symbol indicates that no data were available.
[c] The "+" symbol indicates that actual count may have been somewhat higher; field census efforts were started late or were otherwise deemed to be incomplete

(1) Reported by John Konecny
(2) Reported by biologists, San Bernardino County
(3) Reported by biologists, California State Parks and Recreation
(4) Reported by Loren Hays, J. Pike

Table 2. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at closely monitored sites in the Santa Ana River Watershed, California, 2006. As of 2006, page 1 of this table lists only those sites closely monitored; see Table 1 for complete listing.

	Parameter	San Jacinto	San Timoteo	March ARB	Sycamore Canyon	Allesandro Arroyo	Mockingbird Canyon	Harrison Resevoir	Santa Ana River (Fair-mount Park to Hidden Valley)	Hidden Valley	Santa Ana River (River Rd to Goose Creek G.C./ Norco)	Temescal Canyon	Santa Ana Canyon			Chino Hills	Irvine Park	Santiago Creek - Santiago Canyon Rd.	Santa Ana River at the mouth, Orange County-Talbert Park		Total
													Upper Canyon	Green River Golf Club	Featherly Reg. Park						
A.	Number of terrritorial males	9	32				17	2	18	33	32	16	21	17	23	7					227
B.	Number of pairs (breeding and non-breeding)	5	29				14	2	14	24	26	13	13	12	18	6					176
C.	Number of fledged young observed	6	66				36	6	36	37	46	29	13	24	35	11					345
D.	Projected total recruitment of vireo young (a)	10	75.4				43.4	8.0	36.4	67.2	59.8	31.2	32.5	43.2	41.4	13.8					462.3
E.	Average number of fledglings per pair (C/B)	1.2	2.3				2.6	3.0	2.6	1.5	1.8	2.2	1.0	2.0	1.9	1.8					2.0
F.	Projected number of fledglings per pair (D/B)	2.0	2.6				3.1	4.0	2.6	2.8	2.3	2.4	2.5	3.6	2.3	2.3					2.6
G.	Rate of nest depredation (includes all well-tracked nests)	See Table 4																			
H.	Rate of cowbird nest parasitism	See Table 4																			

Table 2. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at closely monitored sites in the Santa Ana River Watershed, California, 2006.

	Parameter	San Jacinto	San Timoteo	March ARB	Sycamore Canyon	Allesandro Arroyo	Mockingbird Canyon	Harrison Resevoir	La Sierra Ave.	Santa Ana River (Fair-mount Park to Hidden Valley)	Hidden Valley	Santa Ana River (River Rd to Goose Creek Golf Course/ Norco)	Temescal Canyon**	Santa Ana Canyon			Chino Hills	Irvine Park	Santiago Creek - Santiago Canyon Rd.	Santa Ana River at the mouth, Orange County-Talbert Park		Total
														Upper Canyon	Green River Golf Club *	Featherly Reg. Park						
I.	Numbers of cowbirds removed from study area	1,903	223	28	12	n/a	183	28	n/a	56	117	40	194	50	40	7	n/a	n/a	n/a	n/a		2881
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	1,235	931	179	97	n/a	769	93	n/a	384	428	104	393	192	151	89	n/a	n/a	n/a	n/a		5045
L.	Average number of cowbirds trapped per trap day (J/K)	1.54	0.24	0.16	0.12	n/a	0.24	0.30	n/a	0.15	0.27	0.38	0.49	0.26	0.26	0.08	n/a	n/a	n/a	n/a		0.57
M.	Number of field hours –LBV (+)	118	372	42	39	8	166	31	n/a	157	196	500	294	477			68	23	18	10		2519
N.	Number of field hours – BHCO (+)	411	418	74	45	n/a	177	72	n/a	156	155	16	284	276			n/a	n/a	n/a	n/a		2084

* Includes horse stable traps at Green River Rd. and Interstate Hwy 91.

(+)See text for total field hours for the vireo management program

** Harrison BHCO trap broken out from Temescal for purposes of this table.

(a) Survival rate of fledglings in well-tracked nests was applied to nests not visited as frequently by the function (average # fledglings produced by well-tracked pair x total number of pairs)

Table 3. Least Bell's Vireo nest placement preferences, monitored sites in the Santa Ana River watershed 2006.

Host Plant Species	San Jacinto	San Timoteo	Mocking-bird Canyon	Harrison Resevoir	Santa Ana River (Fairmont to Hidden Valley)	Hidden Valley	Santa Ana River (River Rd to Hidden Valley)	Temescal Canyon	Chino Hills	Santa Ana Canyon			Total
										Upper Canyon	Green River Golf Course	Featherly Regional Park	
Black Willow *(Salix gooddingi)*		8	5	2		2	7	6	1	1	2		34
Arroyo Willow *(Salix lasiolepis)*		11			5	5	16	8					45
Red Willow *(Salix laevigata)*		7	2										9
Narrow-leafed Willow *(Salix exigua)*	1	2									1		4
Shining Willow *(Salix lucida spp lasiandra)*		2											2
Willow species *(Salix spp.)*										1			1
Fremont Cottonwood *(Populus fremontii)*							2					1	3
Mulefat (Baccharis salicifolia)	1	2	1		3	1	3	2		1		2	16
Elderberry *(Sambucus mexicana)*		1	3							1		4	9
Black Walnut *(Juglans californica)*												2	2
Wild Grape *(Vitis girdiana)*		3	1			1	3						8
Black Willow *(Salix gooddingi)* and Poison Hemlock *(Conium maculatum)*							1						1

Tale 3 (cont.) Least Bell's Vireo nest placement preferences, monitored sites in the Santa Ana River watershed, 2006.

Host Plant Species	San Jacinto	San Timoteo	Mocking-bird Canyon	Harrison Resevoir	Santa Ana River (Fairmont to Hidden Valley)	Hidden Valley	Santa Ana River (River Rd to Hidden Valley)	Temescal Canyon	Chino Hills	Santa Ana Canyon			Total
										Upper Canyon	Green River Golf Course	Featherly Regional Park	
Mugwort *(Artemsia douglasiana)*									3				3
Toyon *(Heteromeles arbutifolia)*											1	1	2
Poison Hemlock *(Conium maculatum)*													0
Poison Oak *(Toxicodendron diversilobum)*													0
Wild Rose *(Rosa californica)*													0
Pepperweed (Lepidium latifolium)													0
Pepperweed (Lepidium latifolium) and Black Willow (*Salix gooddingii*)													0
Scrub Oak (*Quercus sp.*)					1								1
Laurel Sumac *(Malosma laurina)*												1	1
Castor Bean *(Ricinus communis)*													0
Peruvian Pepper Tree *(Schinus molle)*											1		1
Black Mustard (*Brassica nigra*)	1												1
Arundo (*Arundo donax*)											1		1
Arroweed (*Pluchea spp.*)								1					1
Total	3	36	12	2	9	9	32	17	4	4	6	11	145

Table 4. Least Bell's Vireo reproductive success and breeding biology data, monitored sites in the Santa Ana River watershed, 2006.

		San Jacinto	San Timoteo	March ARB	Sycamore	Allesandro	Mockingbird Canyon	Harrison Resevoir	La Sierra	Santa Ana River (River Rd to Norco)	Santa Ana River (Fair-mount Park to Hidden Valley)	Santa Ana River at the mouth (O.C)	Hidden Valley	Temeescal	Santa Ana Canyon			Chino Hills	Irvine Park		Total
															Upper Canyon	Green River Golf Club	Featherly Reg. Park				
A.	Number of pairs	5	29	3	2	0	14	2	n/d	26	14	3	24	13	13	12	18	6	3		187
B.	Number of breeding (nesting) pairs	4	28	2	n/d	n/d	13	2	n/d	25	14	n/d	21	13	10	9	17	5	3		166
C.	Number of breeding pairs that were well-monitored throughout the breeding season	2	23	0	n/d	n/d	8	1	n/d	12	9	n/d	5	10	2	5	7	3	0		87
D.	Number of 'known fledged young' (a) OBSERVED	6	66	4	n/d	n/d	36	6	n/d	46	36	n/d	37	29	13	24	35	11	3		352
E.	Number of 'known fled ged young' produced by pairs monitored throughout the breeding season	4	59	n/d	n/d	n/d	25	4	n/d	27	23	n/d	14	24	5	18	16	7	n/d		226
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.5	2.4	2.0	n/d	n/d	2.8	3.0	n/d	1.8	2.6	n/d	1.7	2.2	1.3	2.7	2.1	2.2	n/d		2.1
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.0	2.6	n/d	n/d	n/d	3.1	4.0	n/d	2.3	2.6	n/d	2.8	2.4	2.5	3.6	2.3	2.3	n/		2.6

Table 4 (cont.). Least Bell's Vireo reproductive success and breeding biology data, monitored sites in the Santa Ana River watershed, 2006.

		San Jacinto	San Timoteo	March ARB	Sycamore	Allesandro	Mockingbird Canyon	Harrison Resevoir	La Sierra	Santa Ana River (River Rd to Norco)	Santa Ana River (Fair-mount Park to Hidden Valley)	Santa Ana River at the mouth (O.C)	Hidden Valley	Temescal	Santa Ana Canyon			Chino Hills	Irvine Park		Total
															Upper Canyon	Green River Golf Club	Featherly Reg. Park				
H.	Number of nests that were discovered	3	36	n/d	0	n/d	12	2	n/d	32	9	n/d	9	17	4	6	11	4	n/d		145
I.	Number of nests that were regularly monitored or 'tracked'	2	33	n/d	n/d	n/d	12	2	n/d	27	9	n/d	5	12	3	6	10	4	n/d		125
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	(2/2) 100%	(21/33) 64%	n/d	n/d	n/d	(9/12) 75%	(1/2) 50%	n/d	11	(8/9) 89%	n/d	4/5 80%	(8/12) 67%	(2/3) 67%	(5/6) 83%	(5/10) 50%	(2/4) 50%	n/d		(78/125) 62.4%
K.	Number of 'tracked' nests that were depredated (%=K/I x100) (b)	(2/2) 100%	(11/33) 33%	n/d	n/d	n/d	(3/12) 25%	(1/2) 50%	n/d	(21/27) 78%	(3/9) 33%	n/d	0%	(6/12) 50%	(2/3) 67%	(1/6) 17%	(5/10) 50%	(2/4) 50%	n/d		(57/125) 45.6%
L.	Number of 'tracked' nests that were parasitized by cowbirds (%=L/I x 100)	(1/2) 50%	(14/33) 43%	n/d	n/d	n/d	0%	0%	n/d	(6/27) 22%	0%	n/d	0%	(3/12) 25%	0	0	0	0	n/d		(24/125) 19.2%
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	0%	0%	n/d	n/d	n/d	(1/12) 8%	0%	n/d	(1/16) 6%	0%	n/d	1/5 20%	(1/12) 8%	0	0	(1/10) 10%	0	n/d		(5/125) 4%
	B. Number of 'tracked" nests that failed as a result of parasitism	0	(4/33) 12%	n/d	n/d	n/d	0	0	n/d	(4/16) 25%	0%	n/d	0%	0	0	0	0	0	n/d		(8/125) 6.4%
	C. Number of 'tracked' nests that failed as a result of predation	0	(8/33) 24%	n/d	n/d	n/d	(2/12) 16%	(1/1) 100%	n/d	(11/16) 69%	(1/9) 11%	n/d	0%	(3/12) 25%	(1/3) 33%	(1/6) 17%	(4/10) 40%	(2/4) 50%	n/d		(34/125) 27.2%

Table 4. (cont.) Least Bell's Vireo reproductive success and breeding biology data, monitored sites in the Santa Ana River watershed, 2006.

		San Jacinto	San Timoteo	March ARB	Sycamore	Allesandro	Mocking bird Canyon	Harrison Resevoir	La Sierra	Santa Ana River (River Rd to Norco)	Santa Ana River (Fair-mount Park to Hidden Valley)	Santa Ana River at the mouth (O.C)	Hidden Valley	Temescal	Santa Ana Canyon			Chino Hills	Santiago-Irvine Park		Total
															Upper Canyon	Green River Golf Club	Featherly Reg. Park				
N.	Average clutch size	3.0	3.4	n/d	n/d	n/d	3.2	3.5	n/d	3.7	3.4	n/d	4.0	3.8	4.0	4.0	3.6	3.5	n/d		3.6
O.	Number of cowbird eggs found in or near vireo nests	2	14	n/d	n/d	n/d	0	0	n/d	7	0	n/d	0	3	0	0	0	0	n/d		26
P.	Number of cowbird nestlings removed from 'tracked' nests	0	0	n/d	n/d	n/d	0	0	n/d	1	0	n/d	0	0	0	0	0	0	n/d		1
Q.	Number of cowbird young fledged by vireos	0	0	n/d	n/d	n/d	0	0	n/d	0	0	n/d	0	1	0	0	0	0	n/d		1
R.	Number of 'manipulated' parasitized nests	1	9	n/d	n/d	n/d	0	0	n/d	3	0	n/d	0	3	0	0	0	0	n/d		16
S.	Number of 'successful, manipulated' nests (%=S/R x100)	(1/1) 100%	(6/9) 67%	n/d	n/d	n/d	n/a	n/a	n/d	(3/3) 100%	0%	n/d	n/a	(1/3) 33%	n/a	n/a	n/a	n/a	n/d		(11/16) 68.8%
T.	Number of vireos fledged from "manipulated' parasitized nests	3	16	n/d	n/d	n/d	n/a	n/a	n/d	4	0	n/d	n/a	1	0	0	0	0	n/d		24
U.	Number of repaired nests	0	0	n/d	n/d	n/d	1	0	n/d	0	0	n/d	0	0	0	2	0	0	n/d		3
V.	% successful repaired nests	n/a	n/a	n/d	n/d	n/d	100%	n/a	n/d	n/a	n/a	n/d	n/a	n/a	n/a	(1/2) 50%	n/a	n/a	n/d		(2/3) 67%
W.	Number of vireos fledged from repaired nests	n/a	n/a	n/d	n/d	n/d	1	n/a	n/d	n/a	n/a	n/d	n/a	n/a	n/a	3	n/a	n/a	n/d		4

a) Survival rate of fledglings in well-tracked nests was applied to nests not visited as frequently by the function (ave. # fledglings produced by well-tracked pair x total number of pairs. These data represent minimum recruitment as defined by the Least Bell's Working Group "known fledged young." (b) includes successful and unsuccessful nests

Table 5. Brown-headed cowbird trapping summary, monitored sites in the Santa Ana Watershed, 2006

Monitored Site	Trap/Location	Dates of Operation	Number of Trap Days	Cowbirds Removed				Daily Removed Averages	
				Total	Male	Female	Juveniles	Adults	All
San Jacinto									
	Scott	3/13-7/30	128	639	478	98	63	4.50	4.99
	R&J-Tuls 1	3/13-7/30	129	216	109	81	26	1.47	1.67
	R&J- Tuls 2	3/13-7/30	127	131	62	55	14	0.92	1.03
	CB#1	3/13-7/30	131	186	71	69	46	1.07	1.42
	CB#2	3/13-7/30	135	266	214	9	43	1.65	1.97
	CB#3	3/13-7/30	126	344	253	32	59	2.26	2.73
	Old Park	4/11-7/30	97	-3	0	-3	0	-0.03	-0.03
	Alessandro Ponds	4/11-7/30	100	72	26	6	40	0.32	0.72
	SJWR 1	4/18-7/30	88	28	12	11	5	0.26	0.32
	SJWR 2	4/26-7/30	83	1	0	1	0	0.01	0.01
	SJWR 3	4/20-7/30	91	23	10	4	9	0.15	0.25
Subtotal			1235	1903	1235	363	305	1.29	1.54
San Timoteo									
	FISH	3/27-7/30	126	79	49	15	15	0.51	0.63
	LOC	3/27-7/30	126	17	6	5	6	0.09	0.13
	Alessandro	3/27-7/30	121	-1	4	-6	1	-0.02	-0.01
	ESR	3/27-7/30	126	16	6	8	2	0.11	0.13
	St Park	6/7-7/30	54	4	0	3	1	0.06	0.07
	Kalmia	3/27-7/30	126	37	18	13	6	0.25	0.29
	Younglove #1	4/17-6/7	51	-1	0	-1	0	-0.02	-0.02
	Younglove #2	4/19-7/30	100	45	23	14	8	0.37	0.45
	Younglove #3	4/19-7/30	101	27	4	9	14	0.13	0.27
Subtotal			931	223	110	60	53	0.18	0.24
Mockingbird									
Canyon	Reservoir	4/6-7/30	108	45	22	19	4	0.38	0.42
	Tobin	4/6-7/30	108	30	13	15	2	0.26	0.28
	Dale	4/6-7/30	108	35	11	11	13	0.20	0.32
	Ungerer	4/6-7/21	101	12	5	7	0	0.12	0.12
	Dak	4/6-7/21	101	14	8	6	0	1.14	0.14
	Markham	4/11-7/30	103	35	8	9	18	0.17	0.34
Subtotal			629	171	67	67	37	0.21	0.27
	Samantha	3/13-7/30	140	12	8	1	3	0.06	0.09
Subtotal			140	12	8	1	3		
MB Cyn. Subtotal			**769**	**183**	**75**	**68**	**40**	0.19	0.24
Hidden Valley	East End	5/12-7/18	67	0	1	-3	2	-0.03	0.00
	Gate 3	4/24-7/18	85	24	14	9	1	0.27	0.28
	Horse Trail Full	5/26-7/28	63	23	7	1	15	0.13	0.37
	Horse Trail 1/2	4/12-7/27	106	7	4	3	0	0.07	0.07
	West Trailhead	4/12-7/28	107	63	23	24	16	0.44	0.59
Subtotal			428	117	49	34	34	0.19	0.27

Table 5 (cont.) . Brown-headed cowbird trapping summary, monitored sites in the Santa Ana Watershed, 2006

Monitored Site	Trap/Location	Dates of Operation	Number of Trap Days	Cowbirds Removed				Daily Removed Averages	
				Total	Male	Female	Juveniles	Adults	All
Temescal									
	Railroad Cyn. WM facility	3/27-7/23	119	44	28	13	3	0.34	0.37
	Baker St.	3/27-7/25	121	100	54	41	5	0.79	0.83
	New Sump	4/3-7/25	114	42	23	8	11	0.27	0.37
	3M	3/27-5/5	39	8	5	3	0	0.21	0.21
	Harrison	4/21-7/22	93	28	24	0	4	0.26	0.30
Subtotal			486	222	134	65	23	0.41	0.46
Santa Ana Canyon									
Upper Canyon									
Horse Stables at	Horse Stables Full	4/10-7/30	96	24	19	5	0	0.25	0.25
Green River	Horse Stables 1/2	4/10-7/30	96	26	16	10	0	0.27	0.27
Subtotal			192	50	35	15	0	0.26	0.26
Green River Golf Club	G. C. Maintenance	4/4-7/21	97	40	26	14	0	0.41	0.41
	GC Path	5/9-7/21	54	0	0	0	0	0	0
Subtotal			151	40	26	14	0	0.27	0.27
Featherly Park	Featherly Park RV#1	4/12-7/21	89	7	3	3	1	0.07	0.08
Subtotal			89	7	3	3	1	0.07	0.08
Santa Ana Canyon									
Subtotal			432	97	64	32	1	0.22	0.23
March Air Reserve	March SKR 1	4/18-7/21	90	20	9	10	1	0.21	0.22
Base	March SKR 2	4/18-7/20	89	8	4	4	0	0.09	0.09
Subtotal			179	28	13	14	1	0.15	0.16
Sycamore Canyon	Sycamore 1	4/18-7/28	97	12	6	2	4	0.08	0.12
Subtotal			97	12	6	2	4	0.08	0.12

Table 5. (Cont.) Brown-headed cowbird trapping summary, monitored sites in the Santa Ana Watershed, 2006

	Trap/Location	Dates of Operation	Number of Trap Days	Cowbirds Removed				Daily Removed Averages	
				Total	Male	Female	Juveniles	Adults	All
Santa Ana River--	Rancho 2	4/3-4/21	19	0	0	0	0	0.0	0.0
Fairmount Park to	Rancho 1	6/14-7/27	43	11	3	0	8	0.05	0.18
Hidden Valley	Acorn 1	4/3-7/19	107	24	9	6	9	0.14	0.22
	Acorn 2	4/3-7/19	107	3	1	2	0	0.03	0.03
	Van Buren (Riverside Dept of Transp.)	4/3-7/20	108	18	7	10	1	0.16	0.17
Subtotal			384	56	20	18	18	0.10	0.15
Santa Ana River –									
River Road to Hidden Valley	Norco Horse Stables	4/17-7/30	89	37	31	3	3	0.38	0.42
	Norco burn Dairy	7/10-7/28	15	3	0	0	3	0	0.20
Subtotal			104	40	31	3	6	0.33	0.39
GRAND TOTALS			**5045**	**2881**	**1737**	**659**	**485**	**0.47**	**0.57**

Table 6. Number of times non-target bird species trapped in 52 brown-headed cowbird traps in the Santa Ana River watershed, 2006
* (Mortalities are in parentheses and are included in the number stated, e.g., in Hidden Valley 22 SOSP were caught, 1 of those died.)

Species	San Jacinto	San Timoteo	March ARB	Syca-more	Mocking-bird Canyon	Santa Ana River-Norco	Santa Ana River-Fairmount to Hidden Valley	Hidden Valley	Temescal	Santa Ana Canyon				Total
											Horse Stables	Green River Golf Club	Featherly Park	
AMKE							1							1
ANHU									1					1
CALT		499	4		221 (2)	4	1	6	167 (3)		19(4)	108(1)		1029(10)
SOSP		1			1	2		22 (1)	2 (1)		3	15		46(2)
BEWR												1		1
HOFI	12	63	2	18	46 (2)	2	2	13	4				2	164(2)
RWBL	616 (3)	423 (1)	77		17			3	474			1		1611(4)
HOOR		1	1		1 (1)							9(1)		12(2)
EUST	278 (11)	7			15						2	6		308(11)
HOWR						1						1		2
BRBL	60	1												61
TRBL	91													91
HOSP	267	39	1		209 (1)	5	12	2				1		536(1)
WSJA					2									2
SPTO								1						1
LOSH	8													8
LASP					6									6
YHBL	19	17					1				1			38
COYE												1(1)		1(1)
BUOR	1	1			1									3
BHCO (Great Basin)	4													4
NOMO	2				2						1			5
BHGR	1	6			1				1		1			10
WCSP					1				2		15			18
WETA						1								1
WIWA												1		1
ZEFI									6					6
Un-identified								1						1
TOTALS	1359(14)	1058(1)	85	18	523 (6)	15	17	48(1)	657(4)		42(4)	144(3)	2	3968(33)
#/trap day	1.10	1.14	0.47	0.19	0.68	0.14	0.04	0.11	1.35		0.22	0.95	0.02	0 79
# BHCO removed/ trap day	1.54	0.24	0.16	0.12	0.24	0.39	0.15	0.27	0.46		0.26	0.27	0.08	0.57

*Abbreviations used in Table 6.

AMKE: American Kestrel; ANHU: Ann's Hummingbird; BHCO (GB): Brown-Headed Cowbird, Great Basin race; BUOR: Bullock's Oriole; CALT: California Towhee (formerly CATO in SAWA reports); SOSP: Song Sparrow; EUST: European starling; BEWR: Bewick's Wren; HOWR: House Wren; SPTO: Spotted Towhee; HOFI: House Finch; BRBL: Brewer's Blackbird; HOOR: Hooded Oriole; WSJA: Western Scrub Jay; RWBL: Red-wing Blackbird; TRBL: Tri-colored Blackbird; YHBL: Yellow-headed Blackbird; HOSP: House Sparrow; ZEFI: Zebra Finch; LASP: Lark Sparrow; COYE: Common Yellowthroat; BHGR: Black-headed Grosbeak; LOSH: Loggerhead Shrike; NOMO: Northern Mockingbird; WCSP: White-Crowned Sparrow; WETA: Western Tanager; WIWA: Wilson's Warbler.

Table 7. Results of LBVI Assessment Surveys in the Santa Ana Watershed, 2006.

Santa Ana Watershed LBVI Assessment Results, 2006

Site #	Site	Surveyor	# of LBVI Detected in 2005	# of LBVI Detected				Breeding Documen-tation	# Hours
				Week of May 22	Week of June 26	Week of July 24	Total # Detected		
1-BN	Peter's Canyon	SH	4	2	4	1	4		11.5
2-BN	Carbon Canyon Reg. Park and CC Rd.	JC, JL	6	3	5	5	5	1 F, 1 F	9
3-BN	Starlight Dr. & Hidden Hills Rd., Yorba Linda	SH	1	0	0	0 (8/2/06)	0		3.5
1-MA	Cajalco Canyon	KR	1	1	1	nc	1	1F	8
2-MA	Wardlow Wash	AB	0	0	0	0	0		7.5
5-MA	Sun Canyon PK	AB	0	0	0	0	0		3
6-MA	Fresno Canyon	AB	2	4	2	2	4	1 pr- 4E nest & 1F. 1 pr-4E & 2E nests.	11
7-MA	Alessandro Arroyo	RZ	see Table 1						
8-MA	Castleview	SD	1	0	0	0	0		3
8-MA	Box Springs	AB,TR o	0	1	0	2	2	2F, 3F	7.5
9-MA	Quail Run/Scy (Behind UCR	AB,TR o	0	0	0	0	0		5
10-MA	Poorman Reservoir	LM,CP,CG	0	0	1	1	1		20.5
11-MA	San Jacinto River below Perris Dam = Lake Perris	LM,CG	1	1	0	0	1		26
13-MA	Oak Glen Preserve	MA, BN	n/a	0	0	0	0		5
14-MA	Cajon Wash	AB, JC	n/a	0	0	0	0		19.5
15-MA	Goldenstar	SD, SH	n/a	0	0	0	0		3.5
16-MA	Woodcrest	SD, SH	n/a	0	0	0	0		4
17-MA	Canyon Crest	JC	n/a	0	0	0	0		4
18-MA	Tequesquite Arroyo	JC	n/a	0	0	0	0		2.5

Table 7. Results of LBVI Assessment Surveys in the Santa Ana Watershed, 2006 (cont.).

Site #	Site	Surveyor	# of LBVI Detected in 2005	# of LBVI Detected				Breeding Documen-tation	# Hours
				Week of May 22	Week of June 26	Week of July 24	Total # Detected		
1-SD	East of Canyon Lake	Not surveyed	2						
2-SD	Cottonwood Hills	PB	0	0	n/a	0 (75/06)	0		3
3-SD	Santa Rosa Mine Rd.	SD	0	0	0	0	0		1.5
4-SD	Steele Valley	SD	0	0	0	0	0		2
6-SD	Paloma Valley High School + Huan Rd.	SD	0	0	0	0	0		2.5
7-SD	Van Buren Blvd. at Bountiful & Starbucks	SD	0	0	0	0	0		
7-SD	End of Porter	TR	0	0	0	0	0		3.5
7-SD	Van Buren Blvd. at Orange Pkwy to Lark St. (Plummer)	TR	3	1	1	0	2		4
9-SD	Kabian Park	LM,	2	4	3	2	4	1 F, LBV + CALT feeding BHCO juv	15
10-SD	Gavilon Hills	LM, CP,CG	0	0	0	0	0		12
	Cajalco at Aqueduct	MA	n/a	not surveyed	2	2	2		6
2-TR	North SAR (across from Hidden Valley)	SH,. TR	5	1	2	1	3	1F	34
3-TR	Corona St. at Gilmore	SH	0	0	0	0	0		1.5
4-TR	Norco Hills Park - mitigation area	SH	2	0	0	0	0		3.5
5-TR	Wyle Labs	SH	0	0	1	0	1		2
20-MA	Promenade	SH	n/a	0	0	0	0		2
6-TR	Carbon Canyon at Chino Hills Parkway	TR	0	0	0	0	0		5.5
7-TR	Carbon Canyon at entrance to Western Hills Golf Club	TR	0	0	0	0	0		2.5

Table 7. Results of LBVI Assessment Surveys in the Santa Ana Watershed, 2006 (cont.).

Site #	Site	Surveyor	# of LBVI Detected in 2005	# of LBVI Detected				Breeding Documen-tation	# Hours
				Week of May 22	Week of June 26	Week of July 24	Total # Detected		
8-TR	Eucalyptus at Del Monte	TR	3	1	1	1	1		3
9-TR	Eucalyptus at Rancho Hills	TR	1	0	0	0	0		2
10-TR	End of Eucalyptus s/o Rancho Hills	TR	0	0	0	0	0		2.5
	Irvine Regional Park	LM,CP,CG	See Table 1						
4-BN	Santiago Oaks Regional Park	JC	0	0	0	0	0		6
5-BN & 6 BN	Santiago – Irvine Park Santiago Cyn Rd.	SH	See Table 1						
7-BN	Cannon Rd at Katella Ave., Orange	SH	2	2	1	3	3		7.5
1-SH	Santiago Creek at Cambridge, Orange	SH	n/a	1	0	0	1		2
8-BN	OCWD Resevoirs	Not surveyed	0						
	TOTAL NUMBER OF LBVI DETECTED		**36**	**21**	**23**	**19**	**35**		**279**
	Transects of Known Numbers of Birds								
	Featherly Park from Gypsum to car wash	JC		2/8	4/8	4/8			9
	Mockingbird Canyon section	AB, CP,CG		4/5	7/7	6/7			19
	Hidden Valley section	Tr e, LM		7/11	12/14	9/14			21
								Total Hours	**328**

Figure 1. Santa Ana Watershed Association Number of Cowbirds Removed from SAWA Monitoring Sites in the Santa Ana Watershed 2000-2006

(n=# of traps)

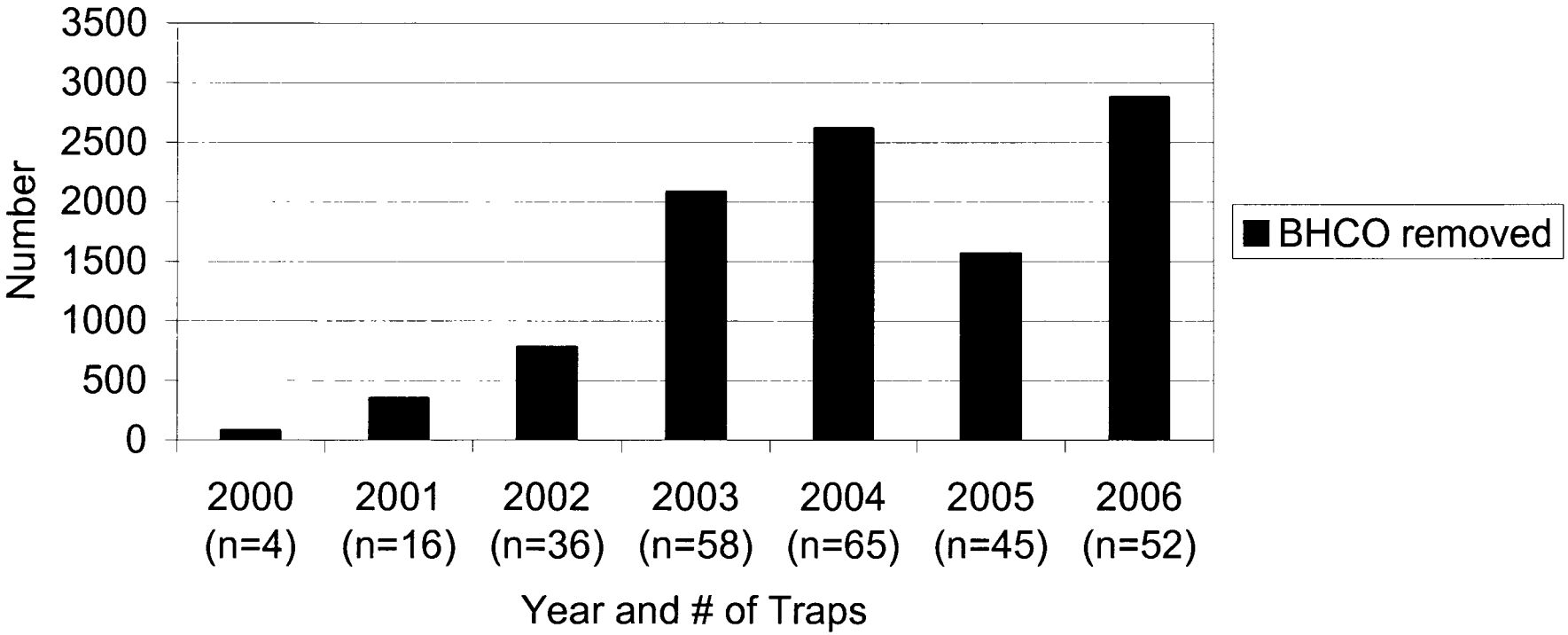

Figure 2. Santa Ana Watershed Association Number of LBVI Territories at Four Sites 2000-2006

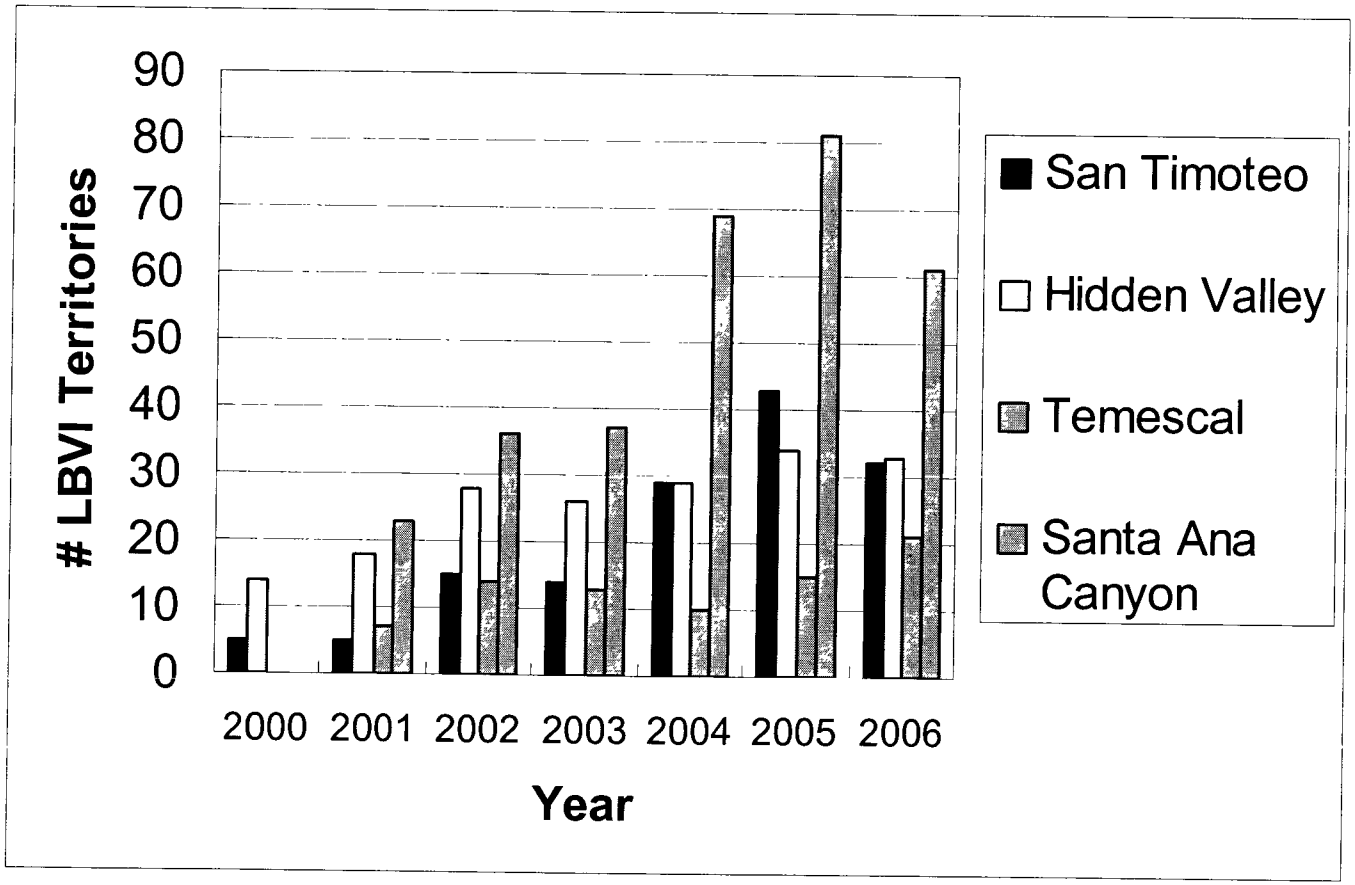

Figure 3. Santa Ana Watershed Association. LVBI Nesting Success, Predation and Parasitism Rates In the Santa Ana River Watershed 2001-2006