

# **Status and Management of the Least Bell's Vireo and Southwestern Willow Flycatcher in the Santa Ana River Watershed, 2015, and Summary Data by Site and Watershed-wide, 2000-2015**

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## Table of Contents

ABSTRACT.....	1
INTRODUCTION.....	2
METHODS.....	2
Study Location.....	2
Study Site Locations.....	3
Monitored Sites.....	3
Sampled Sites.....	4
Incidental Sites.....	5
Vireo Monitoring.....	5
Cowbird Trapping.....	7
RESULTS.....	9
Vireo Abundance.....	9
Chronology of Breeding Activity.....	9
Nesting Site Preferences.....	9
Reproductive Success.....	10
Predation Rates.....	10
Brown-headed Cowbird Parasitism.....	11
Repaired Vireo Nests.....	11
Results by Site.....	11
Monitored Sites.....	11
Sampled Sites.....	23
Incidental Sites.....	31
Southwestern Willow Flycatcher.....	31
Sightings of Interest – Incidental Species Observations.....	32
BROWN-HEADED COWBIRD TRAPPING RESULTS.....	32
Brown-headed Cowbird Trapping, March-July 2015.....	32
Non-Target Captures in Cowbird Traps, March-July 2015.....	33
Fall 2014 Brown-headed Cowbird Trapping and Non-Target Captures.....	34
DISCUSSION.....	34
MANAGEMENT RECOMMENDATIONS.....	36
FUNDING ACKNOWLEDGEMENTS.....	38

ACKNOWLEDGEMENTS.....	38
WORKS CITED.....	40
Figure 1: Map of the Santa Ana Watershed.....	41
Figure 2: Least Bell’s Vireo Survey Sites in the Santa Ana Watershed .....	42
Figure 3: Brown-headed Cowbird Trap Locations in the Santa Ana Watershed .....	43
Figure 4: Norco Bluffs Vireo Survey Area. Map adapted from USFWS/Corps draft <i>Scope of Work Least Bell’s Vireo surveys and Cowbird Trapping Santa Ana River Main Stem Project YF 2015 Figure 2</i> .....	44
Figure 5: Vireo Abundance in the Santa Watershed, Prado and Outside Prado, 2001-2015.....	45
Figure 6: Number of Cowbirds Removed from SAWA Monitoring Sites in the Santa Ana Watershed, 2000-2015 .....	46
Figure 7: Number of Least Bell’s Vireo Territories at Four Sites in the Santa Ana Watershed, 2004-2015.....	47
Figure 8: Least Bell’s Vireo Nesting Success, Depredation Rates, Parasitism Rates in the Santa Ana Watershed, 2003-2015 .....	48
Table 1: Least Bell’s Vireo Abundance and Distribution in the Santa Ana Watershed, 2015.....	49
Table 2: Least Bell’s Vireo, Survey Dates and Breeding Chronology, Monitored & Sampled Sites, 2015 .	50
Table 3: Survey Dates of Sites Listed as Incidental Sites.....	51
Table 4: Least Bell’s Vireo status and management data, at closely monitored and sampled sites in the Santa Ana River Watershed, California, 2015.....	52
Table 5: Least Bell’s Vireo nest placement preferences at monitored and sampled sites in the Santa Ana River Watershed, 2015 .....	53
Table 6: Least Bell’s Vireo reproductive success and breeding biology data, monitored and sampled sites in the Santa Ana River Watershed, 2015 .....	56
Table 7: List of all species observed by site .....	59
Table 8: 2015 Observations of Sensitive Species by Location .....	64
Table 9: Brown-headed Cowbird Trapping Results, March-July 2015 (grouped by funding source) .....	65
Table 10: Non-target Avian Captures in Brown-headed Cowbird Traps, March-July 2015.....	66
Table 11: Brown-headed Cowbird Trapping Results, Winter 2014-2015 .....	67
Table 12: Non-target Avian Captures in Brown-headed Cowbird Traps, Winter 2014-15 .....	68
APPENDIX A – SURVEY SITES, STARTING AND ENDING COORDINATES.....	69
Monitored and Sampled Locations.....	69
Incidental Sighting Locations .....	69
APPENDIX B: WATERSHED ANNUAL RESULTS 2010-2015 .....	72

Appendix B-1: Least Bell’s Vireo status and management and Brown-headed Cowbird management data at closely monitored sites in the Santa Ana River Watershed, California, 2000-2014, and at monitored and sampled sites in 2015. ....	73
Appendix B-2. Least Bell’s Vireo nest placement preferences at monitored sites in the Santa Ana River watershed, 2000-2014, and at monitored and sampled sites in 2015 .....	74
Appendix B-3. Least Bell’s Vireo reproductive success and breeding biology data at closely monitored sites in the Santa Ana River watershed, 2000- 2014, and at monitored and sampled sites in 2015 .....	79
APPENDIX C: SUMMARY TABLES BY MANAGED SITE, FROM 2000-2015 .....	81
Appendix C-1-A. Least Bell’s Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.....	82
Table C-2-A. Least Bell’s Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order. ....	98
Table C-3-A. Least Bell’s Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California.....	111
APPENDIX D: SUMMARY TABLES BY MANAGED SITE, FROM 2000-2009 .....	143
APPENDIX E: LEAST BELL’S VIREO ABUNDANCE AND DISTRIBUTION IN THE SANTA ANA WATERSHED, 2010-2014 .....	144

## ABSTRACT

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). Since 2000, monitoring has been conducted during the breeding season to determine the number of Least Bell's Vireos (*Vireo bellii pusillus*) and Southwestern Willow Flycatchers (*Empidonax traillii extimus*) present, their breeding status, and nesting outcomes. Cowbird trapping in or near riparian habitat is conducted concurrently. In 2015, nest monitoring was confined to four major sites: the Santa Ana Canyon, Prado Basin-Norco Bluffs, Norco Goose Creek, and San Timoteo Canyon. Abundance and distribution data (sampled) was also documented at the Santa Ana River, upstream of Norco Goose Creek to the Riverside/San Bernardino County line at Riverside Ave., Temescal Canyon, and Mockingbird Canyon. Incidental vireo occurrences were documented for many sites in the watershed that SAWA typically surveys more thoroughly.

SAWA biologists documented 962 Least Bell's Vireo (vireo) in the Santa Ana Watershed in 2015. Given funding limitations and timing, not all known occupied habitat was surveyed. Prado (Pike et al. 2015) reported 532 vireos in the Prado Basin, a number similar to that in 2014. Given these numbers and the lesser survey effort, the population in the watershed is probably well over 1,500. Four hundred twenty-nine pairs and 623 fledglings were observed. The Santa Ana Canyon and San Timoteo Canyon are the only sites that had the same nest monitoring effort as compared to prior years. Abundance in the Santa Ana Canyon increased by 8%, however nesting success was only 40% overall, a 10% decline from 2014 and 16% below the historical 56% nesting success for this site from 2001 to 2015. Abundance in San Timoteo increased by 17% and nesting success increased from 48% in 2014 to 58% in 2015, which is consistent with the historical nesting success of 57% for this site from 2001 to 2015.

In an effort to enhance vireo recovery, Brown-headed Cowbirds (*Molothrus ater*) were also managed at selected sites within the watershed. Over 1,200 cowbirds were removed from 36 traps over a period of more than 4,200 trap days between 3/18/15 and 7/31/15. Additionally more than 5,000 cowbirds were removed from the watershed during the winter of 2014-2015 over more than 900 trap days. Over 150,000 cowbirds have been removed from the Santa Ana Watershed since SAWA and OCWD began cowbird management.

No Southwestern Willow Flycatchers were detected in the Santa Ana Watershed, excluding Prado Basin, in 2015. All wildlife species detected (119 avian, 22 mammalian and 17 herpetofauna) are reported by site. Since the Santa Ana Watershed Program began vireo and

cowbird management, over 6,600 vireo fledglings have been produced. Presented here are summary totals and data by site for vireo detected in the watershed.

## INTRODUCTION

The Least Bell's Vireo 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 (cowbird) (Pike et al. 1999). From 19 pairs of vireo in 1986, the Prado population increased to a high of 386 pairs and 600 territorial males in 2005 (Pike et al. 2005). Since 2008, over 1,000 territorial males have been documented in the Santa Ana Watershed.

The Southwestern Willow Flycatcher (willow flycatcher) 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.

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 and the Orange County Water District. Since 2000, a monitoring program has been conducted during the breeding season to determine the number of vireos and willow flycatchers present, their breeding status, and nesting outcomes. Cowbird trapping in or near riparian habitat is conducted concurrently. Past efforts have included nest monitoring in the major riparian corridors of the watershed. In 2015, nest monitoring was confined to four major sites: the Santa Ana Canyon below Prado Dam (SAC), Prado Basin-Norco Bluffs, Norco Goose Creek, and San Timoteo Canyon. Abundance and distribution data was documented at the Santa Ana River (SAR) above Norco to the Riverside County line at Riverside Ave., Temescal Canyon, and Mockingbird Canyon.

## METHODS

### Study Location

The Santa Ana Watershed is located in Southern California, and includes parts of San Bernardino, Riverside, Orange, and Los Angeles Counties (Figure 1). Nearly 3,000 square miles are covered by the watershed, and includes habitats in the mountains, foothills, valleys, and the

coast. The main river is the Santa Ana River, with more than 50 tributaries. Areas surveyed include portions of the SAR mainstem from the City of Riverside to the City of Yorba Linda, excluding Prado Basin, and tributaries including San Timoteo Canyon, Temescal and Mockingbird Canyon (Figure 2).

Study sites contained typical Southern Californian riparian vegetation including tall canopies of Fremont cottonwood (*Populus fremontii*) and black willow (*Salix gooddingii*), sub stories of arroyo and red willows (*Salix lasiolepis* and *Salix laevigata*, respectively), and mulefat (*Baccharis salicifolia*). Many lush riparian habitats are abundant throughout the study sites, but intermixed with invasive giant reed (*Arundo donax*), which is currently dominant in many locations only in the middle watershed. Other non-native plants found in many sites include perennial pepperweed (*Lepidium latifolium*), castor bean (*Ricinus communis*), poison hemlock (*Conium maculatum*), and tamarisk (*Tamarix ramosissima*). Other than natural storm flow, the river's water comes from discharged treated water, urban runoff, very limited natural springs, upwelling in the Prado Basin, and releases from Seven Oak's and Prado Dam. The river is subjected to heavy human impacts for recreation such as swimming, fishing, paintball gaming, horseback riding, unauthorized trails, homeless encampments, off-road vehicle use and a variety of other illegal activities.

## Study Site Locations

### Monitored Sites

Those sites where territories were well tracked (> 8 visits) and regular nest monitoring occurred are considered "monitored" for the purposes of this study. These sites included San Timoteo Canyon, SAR Goose Creek in Norco, Norco Bluffs in the Prado Basin, Chino Hills, and the Santa Ana Canyon (Upper Canyon, Green River Golf Course, and Featherly Park).

#### Norco Bluffs

This site is along the Santa Ana River between the I-15 and River Rd. The Corps considers it part of the Prado Basin. SAWA biologists surveyed a patch work of habitat from the I-15 to River Rd. which was not under contract to other firms (Figure 4).

### ***Santa Ana Canyon***

The Santa Ana Canyon (SAC) is located downstream of the Prado Dam to Weir Canyon Road, a distance of approximately nine miles (14 km). Due to the differences in the habitat throughout the canyon, it was divided into three sites: the Upper Canyon from Prado Dam to the beginning of the Green River Golf Club. The Green River Golf Course covers approximately two miles (3.5 km) of the habitat, and about 4.4 miles (7 km) is in the County of Orange's Featherly Regional Park.

### ***San Timoteo Canyon***

San Timoteo Canyon is located near Redlands within the counties of San Bernardino and Riverside. San Timoteo Creek, a tributary to SAR, was surveyed from Cooper's Creek to approximately 15 miles (24 km) downstream.

### ***SAR Norco (Goose Creek Golf Course to I-15)***

Both sides of the Santa Ana River were surveyed from the Goose Creek Golf Club to the I-15. Previously this site extended to River Road, but has been adjusted this year to end at the I-15. This site includes a mitigation area managed by the Inland Empire Resource Conservation District (IERCD).

### ***Chino Hills***

Nine fragments of riparian habitat were monitored in the city of Chino Hills including fragments at Butterfield Ranch which includes two drainages on both sides of Butterfield Ranch Road, a small ravine off Butterfield Ranch Road, Slaughter Canyon Creek at Butterfield Park, a flood basin at Brookwood Lane and a patch of habitat at Slate Dr. Habitat at Soquel Canyon, the Community Park at English Channel, Rancho Hills, and Del Monte were also surveyed.

### **Sampled Sites**

Those sites where territories were tracked for at least 3 visits, but only incidental nest monitoring occurred are considered "sampled" for the purposes of this study. The purpose of the surveys was to gather abundance (territory, pairs and fledgling data) and distribution data. These sites included SAR Upstream (SAR-Riverside Ave to Van Buren, Hidden Valley South, and Hidden Valley North), Mockingbird Canyon, and Temescal Canyon.



### ***Upstream Santa Ana River***

This site extends from the boundary of Riverside and San Bernardino Counties at Riverside Ave. to the SAR Goose Creek Golf Club (Norco). This section of the mainstem includes sites previously reported as Riverside Ave. to Van Buren Blvd., North and South Hidden Valley.

### ***Mockingbird Canyon***

Mockingbird Canyon was surveyed from Wood Road to just downstream of Mariposa Ave. including multiple tributaries in-between. The reservoir and basin were not surveyed this year.

### ***Temescal Canyon***

Temescal Canyon Wash is approximately 26 miles (42 km) long and located along Interstate 15 between Lake Elsinore and Highway 91. Survey areas include Lake Elsinore and Railroad Canyon downstream to approximately two miles upstream of the intersection of Magnolia Avenue and Temescal Wash where it becomes channelized and flows into Prado Basin.

### **Incidental Sites**

Those sites where territories were surveyed on one or two visits and no nest monitoring occurred are considered “incidental” for the purposes of this study. These sites were visited only late in the season in an attempt to obtain at least some numbers for territory, pairs, and fledgling abundance. A full list of these sites can be found in Table 1 and the location coordinates in Appendix A.

### **Vireo Monitoring**

The primary purpose of surveys at monitored sites was to locate all vireos and willow flycatchers to determine their breeding status and enhance their breeding output through management. Survey techniques and data analysis follow Pike et al. (1999). Potential habitats were carefully and slowly traversed along the edges and open trails. The vegetation community in areas of detection, including dominant native and exotic vegetation species, were recorded. Vegetation classifications follow nomenclatures listed in [A Manual of California Vegetation](#) (Sawyer et al. 2009). All vireos encountered were noted as to location, behavior, reproductive status, etc. GPS coordinates were taken in the core area of the territory (approximate middle) if accessible. However, often the extent of the territory was not known for birds observed only a few times during the season. Coordinates for those territories were placed where the birds

were observed. Nest locations were not marked or reported by GPS points. Each ArcGIS converted GPS point denotes a vireo territory, not just a sighting. A territory range was estimated for monitored sites. Additional data for each territory, if applicable, can be found in the attribute table attached to each point. Attributes included are as follows: unique ID, notes, survey location, surveyor name, agency, category (monitored/ sampled/incidental), breeding status, GPS location (nest or approximate middle), fledged (y/n), number fledged, and parasitism (y/n). A complete attribute table with detailed metadata was submitted with the shapefiles to the U. S. Army Corps of Engineers (Corps) and the U. S. Fish and Wildlife Service (USFWS). Banded vireos are reported annually to Barbara Kus of the U. S. Geological Survey (USGS) and the appropriate agencies. Surveys were conducted five days per week throughout the nesting season (March through August). Occasional visits to determine continued vireo presence occurred through September. 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. Survey dates and times were variable depending on individual pair's reproductive stage. No playbacks of taped vocalizations were used during any surveys for the Least Bell's Vireo.

Successful nesting is defined as fledging at least one chick per nest. Only pairs for which nests were located, who were observed nest building or were observed with fledglings were considered breeding pairs. 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 and their outcomes during the season. This usually meant an effort of at least five visits per nesting attempt, several of which were needed to check for fledglings. In areas subject to parasitism, nests were visited once every seven to eight days to check for cowbird eggs. Cowbird eggs and nestlings were removed from nests. GPS points were taken for cowbirds detected in vireo habitat.

A complete list of wildlife species detected on-site is provided. Listed species found were GPS marked and reported to the appropriate agencies. All sensitive species found were counted and reported to the appropriate agencies. The search for willow flycatchers was done incidentally and in conjunction with visual and auditory searches for vireos and other species. 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-839480-4 and a Memorandum of Understanding with the California Department of Fish and Wildlife (CDFW).

Over 3,300 hours were spent in 2015 for the vireo management program during the season March 9 through September 15. Over 2,300 field hours were spent on vireo surveys. Approximately 985 hours were spent on vireo management for the USFWS/Corps Mainstem Project including 532 field hours spent on vireo nest monitoring at monitored sites, 325 field hours spent at the sampled sites, and 128 field hours spent at the incidental sites. A minimum of 233 hours were spent on vireo management funded by the Orange County Water District, including 77 field hours in Mockingbird Canyon, 96 field hours in Temescal Canyon, and 60 hours in Chino Hills. Three hundred fifty-two hours were spent at Norco and 750 hours were spent in Reach 3B San Timoteo Canyon.

A minimum of 2,500 hours were spent on the Brown-headed Cowbird Program from March 9 through July 31, 2015 including over 2,050 field hours. Sixteen hundred hours were spent on cowbird management for the USFWS/Corps Mainstem Project including over 1,300 field hours. Four hundred field hours were spent at San Timoteo, 118 at Norco Goose Creek, 123 at the Meridian Conservation Area, and 95 at Chino Hills English Channel. An additional 100 hours were spent on trap maintenance after the 2014 season.

Approximately 606 field hours were spent on winter trapping in the Santa Ana Canyon, San Jacinto and Temescal from August through November 2014, when they were closed due to lack of funding. SAWA usually runs traps throughout the winter.

## **Cowbird Trapping**

Thirty-six cowbird traps were deployed in or near riparian habitat in drainages throughout the watershed (Figure 3). Traps are designed after modified Australian crow traps. The cage is constructed out of wood and covered in wire mesh, fitted with shade cloth on the top of the trap to provide shade for the birds. Ideal trap locations are in an open area near riparian habitat, or near feeding areas such as stables and dairies. Preferred locations were inaccessible to the general public, to protect the trap from vandalism. Traps were also to be accessible enough for daily servicing. Traps were kept free from weeds and vegetation. Traps were labeled with signs identifying the organization and the purpose for the trap, as well as SAWA contact information. Consequences for tampering with the trap, according to the Migratory Bird Treaty Act, were also specified on these signs.

Trapping procedures followed the “Santa Ana Watershed Association and Orange County Water District Cowbird Trapping Protocol” (Tenant et al. Revised 2008). Each trap was

provided with a food bowl, 1-gallon water dispenser, and a large paint tray to be used as a bath. The cowbirds were fed with a basic millet seed mixture. Traps where European Starlings (*Sturnus vulgaris*) were held are provided with turkey crumble and small dog kibble. Daily inspections were conducted to release non-targeted birds and provide fresh food and water. Field assistants were hired and trained by SAWA biologists to perform daily maintenance, the safe handling of birds and to properly identify non-target species. Non-target species were released at the beginning of the check, to minimize stress. Datasheets record non-target species, the number of cowbirds in the trap, and the number of cowbirds removed. Cowbirds were recorded as the number of males, females, and juveniles; hatch year birds were considered “juveniles” even as their adult coloring starts to show. Traps were inspected for structural integrity daily, and assistants were in constant contact with their supervising biologist for quick resolution of any problems.

Traps were typically baited with male and female cowbirds that were captured over the winter. The ideal ratio is 2 males to 3 females for smaller habitat traps, and 2 males to 5 females for larger habitat traps. Large traps placed on dairies were typically baited with 5 males to 9 females. The flight feathers on each cowbird were trimmed so they were more likely to return to the trap if they escaped. A padlock was placed on the cage door to prevent unauthorized access. Removed cowbirds were transferred to a licensed falconer for dispatch, or temporarily housed in a holding trap until the falconer could collect the birds. Holding traps were regular full sized traps with extra food and water containers, and closed to entry by additional birds. Banded cowbirds were reported to the U.S. Bird Banding Laboratory, but only banded males were released. At the end of July, all birds were removed from all traps, food and water removed, and the trap entry was closed and the door locked open to prevent unintended captures. SAWA’s field technicians collected traps after they had been closed.

In August 2014, SAWA was instructed by the CDFW to not release European Starlings (starlings) or House Sparrows (*Passer domesticus*). This change in the policy presented SAWA with additional considerations for trapping. Extra traps had to be placed to house starlings with special food, so they would not die while waiting to be picked up by the licensed falconer. This change in protocol and need for additional preparations led to some starlings being released at the beginning of the trapping season to avoid over-crowding and un-safe conditions.

## RESULTS

### Vireo Abundance

In 2015, SAWA and cooperators documented a total of 962 territories, including 429 known pairs and 623 known fledglings at all sites (Table 1 and Figure 5). These numbers do not include the vireo detected by OCWD in Prado Basin, or by County of San Bernardino biologists. Since survey efforts were reduced in 2015, watershed-wide abundance is not comparable to last years reported 1,582 territories. The Santa Ana Canyon and San Timoteo Canyon are the only two sites that had the same nest monitoring effort as compared to prior years. Biologists documented 121 vireo territories in SAC and 176 vireo territories in San Timoteo. Abundance in the Santa Ana Canyon increased by 8% from 2014 (n = 112), and abundance in San Timoteo increased by 17% from 2014 (n = 151).

Sampled sites also showed increases in abundance. The SAR Upstream site, which consists of three sections (Hidden Valley North and South and SAR Riverside Ave to Van Buren Blvd.), were monitored (> 8 visits) sites in 2014 and only sampled ( $\geq 3$  visits) in 2015. Territory numbers at each of these sites increased in 2015. One hundred and four territories were detected in Hidden Valley South, an increase of 22% from 2014 (n=85). Thirty-nine territories were detected in Hidden Valley North, an increase of 86% from 2014 (n=21). One hundred and nine territories were detected in SAR-Riverside Ave. to Van Buren Blvd., an increase of 65% from 2014 (n=66) (Table 1). The vireo populations in Mockingbird Canyon showed an increase of 61%. Temescal territory numbers were similar to 2014.

### Chronology of Breeding Activity

Surveys at monitored and sampled sites began between 3/10 and 4/16 and ended between 7/20 and 9/11 (Table 2). The first vireos were detected 3/17 Norco and the Santa Ana Canyon at Green River Golf Club. The earliest date for the arrival of 50% of the subpopulation at monitored sites was 3/31 in San Timoteo Canyon. The earliest date for 50% paired was 4/6 in San Timoteo Canyon. The first nest was found on 3/24 and the last nest was found on 6/30, both in the Santa Ana Canyon at Green River Golf Course. The first fledging occurred on 4/22 and the last fledging occurred on 7/29, both in San Timoteo Canyon. Survey dates for incidental sites can be found on Table 3.

### 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. Five species of willow (*Salix* spp.) dominated the nest placement preference for vireos with 40% (85/211) of nests in 2015. Arroyo willow was the most preferred of the willows holding 30 nests. Mulefat held 23% (49/211) of nests (Table 5). Other preferred nest-host species in 2015 included blue elderberry (*Sambucus nigra caerulea*) (9%), wild grape (*Vitis girdiana*) (8%), and Fremont cottonwood (7%). Non-native vegetation used by vireos in the watershed include mustard (*Brassica* spp.), tree of heaven (*Ailanthus altissima*), tamarisk, Peruvian pepper tree (*Schinus molle*), tree tobacco (*Nicotiana glauca*), lollypop tree (*Myoporum luteum*), perennial pepperweed, cocklebur (*Xanthium strumarium*), (now considered native but of weedy growth habit) and poison hemlock (Appendix B-2). The use of non-native vegetation for nesting by vireos documented in this report support the need for careful monitoring when invasive plant spraying is done during the nesting season.

## Reproductive Success

Reproductive success, as measured by productivity of well-tracked pairs, was 2.8 in 2015 (Table 6). This rate represents an increase from 2.2 in 2014. Nesting success was 55% (103/188), an increase from 48% (72/149) in 2014 (Appendix B). Average clutch size was 3.3 based on 183 nests. See Appendix C for individual site data over time.

At two sites with similar monitoring efforts in 2014 and 2105; SAC nesting success was only 40% overall, a 10% decline from 2014 and 16% below the historical 56% nesting success for this site from 2001 to 2015. San Timoteo nesting success increased from 48% in 2014 to 58% in 2015, which is consistent with the historical nesting success of 57% for this site from 2001 to 2015.

## Predation Rates

Depredation is defined as a complete nest loss. In 2015, the depredation rate was 36% (67/188). Rates varied among sites (Table 6, row M.c.). At sites with more than 5 nests monitored, rates varied between 15% and 63%. Historically, watershed-wide, nest loss due to depredation is 32% (Appendix B, Table B-3, row M.c.). Most nest losses were due to unknown predators. In 2015, a Western Scrub-jay (*Aphelocoma californica*) was observed carrying off 7-day old nestlings. Scrub-jays have also been observed carrying eggs in their bills. A California Kingsnake (*Lampropeltis californiae*) has also been observed eating a nestling vireo. Suspected nest predators include Western Scrub-jay, Greater Roadrunner (*Geococcyx californianus*), long-tailed weasel (*Mustela frenata*), raccoon (*Procyon lotor*), and snakes. These species occur at most sites throughout the watershed.

Feral hogs (*Sus scrofa*) are another potential predator. This species occurs in high numbers in San Timoteo Canyon and SAR. Isolated sightings have been made in other areas throughout the watershed. Feral hogs are extremely disruptive to habitat, by creating wallows, possibly trampling or knocking over nests, and eating a wide range of vegetation and animals.

### **Brown-headed Cowbird Parasitism**

In 2015, 2% (4/188) of tracked nests were parasitized by cowbirds, but none of these nests failed as a result of parasitism, due to biologists' removal of eggs (manipulation). These nests were located at the SAR Van Buren to Riverside Ave. site, and in Chino Hills. The rate has ranged from 4% to 5% in the last few years. Previous nest losses due to parasitism have ranged between 1-3%. The criteria for judging nest failure being due to parasitism is the loss or abandonment of vireo eggs in the presence of a cowbird egg. In 2015, 4 nests were manipulated, 1 of which successfully fledged 2 young. Since SAWA began nest monitoring, SAWA has manipulated 9% of tracked nests and 198 vireos have fledged from those nests (Appendix B, Table B-3). Additionally, 1 vireo was observed feeding a cowbird fledgling in 2015.

### **Repaired Vireo Nests**

No nests required repair in 2015. Since SAWA has managed vireo nests in the watershed, 34 nests have been repaired and 70 young have fledged from those nests (Appendix B, Table B-3).

## **Results by Site**

### **Monitored Sites**

#### ***San Timoteo Canyon***

San Timoteo Canyon is located near the city of Redlands within San Bernardino and Riverside Counties. San Timoteo Creek originally contained many invasive plant species, most notably giant reed and tamarisk. A program initiated by SAWA removed 239 acres of invasive plants from 1997 to 2001, and continues a maintenance program to control regrowth. Restoration of the native plant community through natural recruitment has taken place throughout the canyon resulting in a healthy riparian under-story, the effects of natural storm cycles notwithstanding. The canyon's immediate uplands contain citrus groves and remnants of over-grazed coastal sage scrub and chaparral. A railroad and a two-lane road border the canyon. Development of portions of the uplands continues to occur.

The entire riparian zone can be classified as a *Salix laevigata* Woodland Alliance (Sawyer et al. 2009), with arroyo willow as a co-dominant. However, the creek is also interspersed with Fremont cottonwood, black willow and mulefat. The dominant invasive plant in the riparian zone is tamarisk. Dominant invasives in the adjacent upland zone are Russian thistle (*Salsola tragus*), mustard, and perennial pepperweed.

In 2015, 176 vireo territories were documented in San Timoteo, up 17% from the 151 documented in 2014. A possible reason for this increase could be that a more intense survey effort was undertaken in 2015. Historically SAWA spent between 480 to 600 hours monitoring San Timoteo with one or two biologists. This year, two biologists spent an estimated 750 hours. However, the population in San Timoteo has also experienced an over 30-fold increase in 15 years. This increase can be attributed to the removal of invasive species and subsequent restoration of native vegetation, nest monitoring, and cowbird management. In 2015, estimated territory size of the vireo in San Timoteo ranged between 0.6 to 2.7 acres.

One hundred forty-one pairs and 287 fledglings were detected in 2015 (Table 4). Nesting success was 58%, up from 48% in 2014 but similar to 57% in 2013. Nest losses were primarily due to predation (32%). Fifty-six well-monitored pairs had a 3.2 reproductive success rate, up from 2.5 in 2014. Twelve of the 56 well-monitored pairs had successful second clutches and produced a total of 73 fledglings. Nesting success is 57% over 15 years of monitoring (n=771 well-tracked nests), ranging from a low of 29% in 2004 (n=31 nests) to a high of 100% in 2001 (n=4 nests). Depredation has been the major cause of nest loss in the last 15 years (34%). Reproductive success based on productivity of well-tracked pairs in the last 15 years is 2.9 and has ranged from a low in 2004 of 0.8 to a high of 3.9 in 2009. Mulefat (28%), arroyo willow (21%) and red willow (16%) have been the primary plant species used for nest placement in San Timoteo since 2001 (n= 845 nests). Black willow and wild grape held another 8% and 7%, respectively. Only nine nests found from 2001-2015 were placed in non-native vegetation.

Cowbird trapping has occurred in San Timoteo Canyon since 2001, and a total of 2,388 cowbirds have been removed during this time. In 2015, no parasitism occurred in San Timoteo for the first time since 2011 and for only the second time in 15 years. In 2014, five of 88 well-tracked nests (6%) were parasitized by cowbirds; two nests successfully fledged vireo after nest manipulation, one nest failed due to predation after removal of the cowbird egg, and two were abandoned (one before nest manipulation and one after). In 2013, 2 of 76 well-tracked nests (3%) were parasitized however neither nest failed due to parasitism; one nest was successful after removal of a cowbird egg and the second failed due to predation after removal of the egg. These low rates remain a marked decrease from a high of 75% in 2001. Although parasitism by cowbirds still occurs, at a rate of 15% over fifteen years (114 of 771 nests), only 4% of nests (28



of 771) have failed due to parasitism. This low failure rate is primarily a result of intensive nest monitoring efforts which include nest manipulation. A Brown-headed Cowbird was observed in one location during the season (see separate shapefile).

Although the riparian area is protected under existing laws, residential and utility development continues in San Timoteo Canyon. Current threats to the riparian habitat include removal of vegetation by landowners, human encroachment (i.e. paintball and all-terrain vehicle activities), and sheep and cattle grazing. Feral pigs continue to disturb the habitat throughout the canyon. Another potential threat to the habitat is the reduction in volume of surface water discharge into San Timoteo Creek. A local water district began the phased reduction of 3 million gallons per day (mgd) of tertiary-treated discharge to the creek in the Fall/Winter 2012. Hydrology and water use studies were conducted to identify the amount of discharge necessary to maintain existing riparian conditions in the creek and studies determined that discharge could be cut to 1.6 mgd. A Habitat Management Plan was established which calls for management (i.e. increasing discharge to the creek) if a decline in native riparian cover or an increase in non-native invasive species is detected.

### ***SAR Goose Creek, Norco to I-15 Summary***

The Goose Creek, Norco to I-15 site is located along the Santa Ana River just downstream of Hidden Valley. Previously this site extended all the way to River Road but has been adjusted this year to end at the I-15. This summary discusses the data from this site which are summarized below.

This section of river flows from northeast to the southwest and contains habitat-altering flows depending on precipitation. The surrounding land use includes former dairy land, residential, cattle grazing, agricultural, and a golf course. An active construction zone, that will eventually become a new housing development, borders the habitat to the north of this site. Open water and riparian habitat border the site to the south, southwest and southeast. Interstate 15 crosses the river and passes over vireo habitat. In 2002, the area near I-15 was heavily infested with the invasive giant reed (arundo). A fire later in 2002 burned much of the biomass, and SAWA took advantage of the opportunity to begin spraying the remaining arundo. SAWA continued to manage the vegetation for nine years, after which the area was managed by the Inland Empire Resource Conservation District. Vireo nest monitoring and cowbird management began in 2004.

According to the California Manual of Vegetation (Sawyer et al. 2009), the site is classified as a *Salix gooddingii* Woodland Alliance, with Fremont cottonwood as a co-dominant.

Vireo can be found throughout the site, including the landscaped golf course. The territories found in the Goose Creek Golf Club are within riparian strips containing native plants.

In 2015, 71 vireo territories were documented along the Santa Ana River from Goose Creek, Norco to I-15, an increase of 4% from the 68 vireos documented in 2014. This follows the trend of surrounding areas along the Santa Ana River which also experienced an increase in vireo occupancy in 2015. Thirty-six pairs and 63 fledglings were detected in 2015 (Table 4). Nesting success for 13 well-tracked nests was 77%. Nest losses were due to predation (15%) and reproductive failure (8%). The productivity of well-tracked pairs was 2.5. Nest placement occurred primarily in black willow (22%), wild grape (22%) and mulefat (22%).

Brown-headed Cowbird trapping has occurred in Norco since 2004. Trapping data can be found in Tables 9 and 10, as well as Appendix Table C-1. Five hundred and forty-six brown-headed cowbirds have been removed from Norco over 2,430 trap days. Parasitism has occurred on the site in seven out of the fourteen years surveyed. Individual cowbirds were detected in the habitat, but no significant numbers observed. No monitored nests were parasitized during the 2015 nesting season.

At this time, work has begun on a residential development adjacent to the northern edge of the riparian habitat. Potential risks to the vireo habitat from this development are the unauthorized removal of vegetation for additional equestrian trails, dumping, noise and other human related disturbances. Continued active management of this area will maintain optimum conditions for its native species.

### *Norco Bluffs*

The area referred to as “Norco Bluffs” is comprised of the 3-mile long riparian zone located along the river between the 15 Freeway and River Road. Vireos were monitored in select areas within Norco Bluffs. Corps mitigation areas were not in SAWA’s scope of work delineated in the Corps contract for the 2015 breeding season and therefore not surveyed (Figure 4).

SAWA removed arundo in the winter of 2006/2007 from a 15-acre area located immediately south of Eastvale Community park. No maintenance or removal was conducted within the area SAWA monitored in 2015.

Past construction activities were conducted by the City of Norco (City) on the east and west sides of Hamner Ave. on the north side of the river. In the spring of 2011, the City constructed a large, protective stone levee east of Hamner as a result of damaging floods during the winter of the same year. Construction of the levee resulted in the removal of

riparian habitat and noise disturbance to nearby vireo territories. Additional habitat was removed by the City in the spring of 2012 to allow for the widening of Hamner Ave. In the spring of 2015 the City conducted construction activities at a site located in the riparian area approximately 50 yards beyond the end of Old Hamner Rd. No existing riparian vegetation was removed.

The Norco Bluffs habitat monitored for vireos is almost exclusively composed of riparian plant species without adjacent upland. Native species of willow, predominantly black willow, dominate much of the landscape, but large swaths are still heavily dominated by invasive arundo. According to the California Manual of Vegetation, the habitat encompassed within the Norco Bluffs survey area is classified as *Salix gooddingii* Woodland Alliance with arundo as a co-dominant (Sawyer et al. 2009). Areas not dominated by mature black willow or arundo consist of early successional riparian woodland. These areas are where the river previously changed course and destroyed habitat, which has since regrown. Species in the more recently disturbed areas are composed of black willow, arroyo willow, yellow willow, and sandbar willow.

In 2015, a total of 30 vireo territories were detected in the area monitored by SAWA. Seventeen were known to be paired and 43 fledged young were documented (Table 4). A total of 14 nests were found, 13 of which were well-tracked. Nesting success of the tracked nests was 69% with an average reproductive success rate of 3.7, and an average clutch size of 3.4. Of the 13 well-tracked nests, 2 (15%) were lost due to depredation, and 2 (15%) failed due to reproductive failure. No tracked nests were lost due to parasitism (Appendix C-3). The size of the territories ranged from approximately 0.5-1.5 acres. The area surveyed in 2015 differed from that of previous years making data comparison impractical.

SAWA did not conduct cowbird trapping at this location because a different contractor had previously been retained by the Corps to trap this area. Brown-headed Cowbirds were detected in vireo habitat on three occasions over the course of the season (see separate shapefile for coordinates). All detections occurred in the riparian area immediately south of Eastvale Community Park; two on June 4 and the third on July 6. All three were singing males.

The primary source of habitat degradation at this site is caused by invasive plants. The Norco Bluffs habitat can be characterized as healthy where arundo has yet to become dominant, but some significantly large areas are completely dominated by arundo and provide little habitat value to native wildlife. In addition to arundo, there is a relatively small and highly dense stand of mature Mexican fan palm (*Washingtonia robusta*) that appears to have a rapid rate of recruitment. The understory within the stand of palms consists primarily of younger

palms with no significant presence of native plant species. Much like the arundo, the palms provide relatively low-quality habitat compared to the surrounding areas dominated by native plant species. Removal of the arundo and palms would allow for passive recruitment of the native riparian plant species, and thereby dramatically increase the total area of functional habitat for vireo and other sensitive species.

### *Chino Hills*

The patchy riparian habitat in Chino Hills along Hwy 71 has been surveyed annually since 2003. Nine fragments of riparian habitat were monitored in Chino Hills including fragments at Butterfield Ranch which includes two drainages on both sides of Butterfield Ranch Road, a small ravine off Butterfield Ranch Road, Slaughter Canyon Creek at Butterfield Park, a flood basin at Brookwood Lane and a patch of habitat at Slate Dr. Habitat at Soquel Canyon, the Community Park at English Channel, and Rancho Hills and Del Monte were also surveyed. One section that historically held three territories was lost to development. Most of these locations occur on private property for which access is restricted. Therefore, few territories can be closely monitored and monitoring does not occur every year.

In 2015, 24 territories, 6 pairs, and 4 fledglings were documented (Table 4). This count represents a 20% increase of the population in these same fragments of habitat from the 20 territories detected in 2014 (Appendix C) and may be due to an increased monitoring effort. The maximum number of territories documented before 2015 was 13 territories in 2013.

Five nests were monitored in 2015. Nesting success was 20%. The depredation rate was 60%. One of the nests was parasitized and the bird was observed incubating the nest after manipulation but the nest was later abandoned and failed due to reproductive failure.

Three cowbird traps were active in Chino Hills in 2015. Two traps near the Community Center at English Channel captured 76 cowbirds. The third trap at the Chino Hills water tank was unsuccessful in 2015 but has caught birds in past years. Cowbird trapping has occurred in Chino Hills since 2008 when one secure location was found at the fenced-in water tank with the assistance of the City of Chino Hills. Before 2015, parasitism ranged from 43% (3/7 nests) in 2004 to 60% (3/5 nests) in 2007. No parasitism had been detected since 2008, when cowbird control began, until 2015 (Appendix C). Although little nest monitoring has been done at this site, no vireo have been found with cowbird fledglings and few juveniles cowbirds have been trapped. Cowbirds were seen in the habitat at two locations during the season (see separate shapefile). Parasitism, development, human activity, cattle grazing and small fragmented habitat patches are factors that confront vireo and likely reduce productivity throughout the Chino Hills area.

### *Santa Ana Canyon*

The Santa Ana Canyon is located along the Santa Ana River, downstream of the Prado Dam to the Weir Canyon/Yorba Linda Blvd. bridge. The SAC is divided into three different sites referred to here as the Upper Canyon, Green River Golf Club and Featherly Regional Park. This summary discusses the compiled data from these sites which are summarized individually below.

The Freeway Complex Fire of November 2008 destroyed habitat for an estimated 43 territories in SAC. However, this did not deter the vireo returning the following spring as expected with only moderate decreases in 2009 at the Upper Canyon and Featherly Park. The Corps riverbank stabilization project (Reach 9) started in the winter of 2009/2010 near the western half of Green River Golf Club, removing over 16 acres of mature riparian habitat that survived the fire. This particular project directly affected six territories due to excavations that were needed to reconstruct the riverbed and banks in order to protect the 91 Freeway and adjacent homes. There were additional riparian impacts in the fall/winter of 2011 as the next phase of the riverbank stabilization project got underway further upstream, removing several more acres of mature riparian habitat. In 2014, Phase 3 of the Corps project began which impacted the habitat of ten more vireo territories. Additional disturbances in SAC include the on-going County of Orange SARI-line project activities in Featherly Park and Green River Golf Club. No work from either of these projects occurred during the 2015 nesting season.

There is a variety of habitat types throughout the SAC. Vireos typically inhabit the riparian zone along the river, but also use the adjacent upland habitats for nesting and foraging. According to the California Manual of Vegetation (Sawyer et al. 2009), the riparian zone is classified as a *Salix gooddingii* Woodland Alliance, with Fremont cottonwood as a co-dominant. The least disturbed adjacent upland is classified as a *Sambucus nigra* Shrubland Alliance. There are several areas adjacent to the riparian habitat that are in various stages of restoration that cannot be classified at this time. Additionally there are some adjacent areas that are non-native dominant, such as the Green River Golf Club and Chino Hills State Park areas. The dominant invasive plant in the riparian zone is arundo. The dominant invasive plant species in the adjacent upland zone is Russian thistle, mustard, and tocalote (*Centaurea melitensis*). Other invasive plant species in SAC include tamarisk tree of heaven, castor bean, perennial pepperweed, gum tree (*Eucalyptus* sp.) and Peruvian pepper tree.

One hundred and twenty-one vireo territories were detected in the Santa Ana Canyon in 2015, an increase of 8% from the 112 territories detected in 2014. Vireo territory size in SAC is estimated to be between 0.51 acre and 6.39 acres. Past construction activities do not appear to

be affecting vireo presence, though they likely affect the productivity of pairs that are close to the disturbance. There were no construction activities impacting vireo in SAC during the 2015 nesting season. However, this region is currently affected by an increasingly severe drought in its fourth consecutive year. In 2015, the vireos mean clutch size was 3.1, the same as it was in 2014, and the lowest since 2005. Nesting success for 35 well-tracked nests in the Santa Ana Canyon was 40% overall, a 10% decline from 2014 and 16% below the historical 56% nesting success for this site from 2001 to 2015 (Appendix C3). Nineteen of 35 tracked nests were lost to depredation (54%) and two were lost to reproductive failure (6%). No tracked nests were lost due to parasitism (Table 6). The reproductive success rate in SAC for 2015 was 1.5. The overall productivity rate of well-tracked pairs from 2001 to 2015 in SAC is 2.2. Eighty-two fledglings were documented in 2015, a decrease from the 92 detected in 2014. A total of 969 fledglings have been documented in SAC over the last 15 years. Vireo here used a large variety of plant species (n=16) for nest substrate. Of the 39 total nests found, the highest number of nests were found in cottonwood (n=7) and blue elderberry (n=8), not the expected willows and mulefat, as is typical for this species in other areas (Table 5). Five banded vireo were detected in SAC.

SAWA cowbird trapping began in the Santa Ana Canyon in 2001 when parasitism was detected in five of 19 nests (26%). Parasitism was again documented in one of 21 nests (5%) in 2009 after five years of no occurrences (Appendix D). SAWA deployed two traps within a mile of that location and no parasitism has been recorded since. In 2015, seven traps were deployed at the request of the Corps (instead of our usual four) and 90 cowbirds were removed over 861 trap days. However in 2014, with only four traps, we caught 112 cowbirds over 509 trap days (Appendix C). Although capture rates can fluctuate year by year, it appears that four traps cover this location adequately and perhaps the extra traps would be more useful at another site. Since 2001, a total of 2,134 cowbirds have been removed from the canyon over 11,067 trap days during the vireo's breeding season (Appendix C). There were no cowbirds detected in vireo habitat in the Santa Ana Canyon.

At this time, riparian habitat in the Santa Ana Canyon is becoming infested with arundo at all three sites. The restoration edges between the golf course and the homes have opened new areas for arundo to infest along the river, while the upper canyon arundo patches continue to spread. In the lower section (Featherly Park) the arundo had been treated with Imazapyr, which damaged many of the surrounding native trees. Though much, not all, of the arundo at this location is dead, the biomass remains, hampering native regeneration at this site. The County of Orange has implemented the Santa Ana River Canyon Habitat Management Plan and SAWA biologists sit on two subcommittees overseeing implementation of the plan. Although both the Corps riverbank stabilization (Reach 9) project and the SARI-line project are expected

to continue for several years, we hope active management of the canyon will improve and maintain optimum conditions for its native species.

#### UPPER CANYON – DOWNSTREAM OF PRADO DAM TO THE GREEN RIVER GOLF CLUB

The Upper Canyon is located adjacent to Highway 91, from downstream of Prado Dam past Highway 71 to the northeast edge of Green River Golf Club and is within the County of Riverside. This site is the upstream portion of what is considered the Santa Ana Canyon. The Upper Canyon has undergone native habitat removal, restoration, subsequent removal and a devastating fire in the last decade. Heavy construction around and just below Prado Dam occurred from 2005 to 2008. Due to this construction, habitat for ten territories was removed in 2005. Some of the habitat that was restored after construction is now upland habitat and vireo have not used it, but other restored riparian habitat is maturing and is being used by the vireo. In November 2008 the Complex Fire destroyed a wide swath of habitat that had held six territories that were not detected in 2009 or 2010 (post-fire). These areas were part of Phase 2A of the Corps riverbank stabilization project which is complete in the Upper Canyon portion of the project and restoration activities have begun.

In 2015, this section of the canyon held 25 vireo territories, two less than last year. Of the 25 males found, nine were known to be paired and ten fledglings were documented in 2015 (Table 4). Nest monitoring was minimal in this section of SAC in 2015 due mostly to the timing of unusual spring weather events and access issues. Nesting success for one well-tracked nest was 100% (Table 6). One pair closely monitored throughout the season had a successful nest that produced two fledglings. The other two nestlings were found as skeletons still in the nest. It is likely that they were consumed by Argentine ants (*Linepithema humile*), but the cause of death is unknown. This pair did not attempt a second clutch, though there was adequate time during the season. Overall nesting success of tracked nests for this site from 2001 to 2015 is 68%. The overall reproductive success rate of well-tracked pairs during the same time is 2.6. A total of 286 fledglings have been documented over the last 15 years (Appendix C-3). No fledgling cowbirds were detected in the habitat. One banded vireo was detected in this section.

Cowbird trapping has occurred in the Upper Canyon since 2001 when the first vireos were detected on-site. Over 3,140 trap days, 678 cowbirds have been removed from this area. Parasitism has only been documented two of the 15 years surveyed and reached its highest rate in 2003 (18%). There has been no parasitism detected in the Upper Canyon since 2003 (Appendix C-3).

There were no construction activities from the Reach 9 project this season. However, there was a Cal Trans project near one active and one historical vireo territory this season.

Reach 9 restoration activities were ongoing and did not appear to impact vireo nesting. Unfortunately, this site continues to be plagued by other human-generated impacts including fisherman intrusion, trash dumping and branch-cutting, as well as large areas of invasive species (i.e. arundo) infestation.

### GREEN RIVER GOLF CLUB

The Green River Golf Club site is located along the Santa Ana River, between the Upper Canyon site and Featherly Park at Coal Canyon to the west, in Riverside, San Bernardino and Orange Counties. This site is the middle portion of what is considered the Santa Ana Canyon.

Habitat at the Green River Golf Club has recovered well since the devastating Complex Fire that swept through the Santa Ana Canyon in November 2008. The Corps Bank Stabilization-Reach 9 project removed almost 16 acres of habitat that the fire missed and was occupied by six vireos. The next phase of the bank stabilization project started during the fall/winter of 2011 with several more acres of riparian habitat removed that included mature willow and cottonwood trees that had been spared by the 2008 wildfire. This area supported an additional 13 vireo territories in 2011. The 2010 project phase was roughly 75% complete at the end of the 2012 season with some replanting underway, but the net result for the 2012 season was still a large loss of habitat and much construction activity, which most likely contributed to the decline in vireo activity that season. In 2014, no additional habitat was removed. However, construction continued adjacent to occupied habitat upstream of the railroad bridge in the beginning of the nesting season. On May 1, a vireo nest was found within 100 feet of construction activities that were moving toward the nest. The Corps and USFWS were both notified immediately but work continued toward the nest. By the next week the nest was abandoned leaving two eggs. Subsequently, other vireo nests were found near construction activities and work eventually stopped in this area for the rest of the season. There were no Corps-related construction activities at this site during the 2015 nesting season. However, in the beginning of the season a Cal Trans project occurred along Highway 91 and adjacent to a Corps mitigation area with five vireo territories.

In 2015, the vireo population at this location increased 19% from 2014 to 31 territories (Table 1). This increase is mostly due to the new territories that settled in the Corps restoration area at the western section of the site (n=3 in 2014; n=2 in 2015). One new territory was found in a field of Russian thistle with a few elderberry trees. The vireo population at Green River Golf Club has more than tripled since monitoring began in 2001 when only ten vireos were detected (Appendix D-1). Of the 31 males found, 23 were known to be paired and 35 fledglings were documented in 2015 (Table 4). Nesting success for 15 well-tracked nests was only 47%, as



compared to 63% (5 of 8) in 2014. Seven of the tracked nests (47%) were lost to depredation and one abandoned nest was categorized as reproductive failure (7%). No tracked nests were lost due to parasitism (Table 6). The highest number of nests were found in mulefat (n=4) and elderberry (n=3) at this site (Table 2). Overall nesting success for the site from 2001 to 2015 is 61%. The overall reproductive success rate of well-tracked pairs during the same time is 2.3. A total of 324 fledglings have been documented over the last 15 years (Appendix C-3). Two banded vireo were detected in this section.

Cowbird trapping has occurred at the golf club since 2001 when the first vireos were detected on-site. During 4,249 trap days, 1,004 cowbirds have been removed from this site. When SAWA began monitoring this site, the parasitism rate was 44%. There has been no parasitism detected since 2001 when cowbird trapping was initiated (Appendix C-1).

Management at the Green River Golf Club has continued its cooperative relationship with SAWA and is supportive of SAWA's efforts to control cowbirds, manage the vireo and other sensitive species and enhance habitat. In addition to the continued support of our program, Troy Thompson, Green River Golf Club Superintendent, has generously offered to allow SAWA to store over 50 cowbird traps in their maintenance yard for the last 2 winters. We are incredibly grateful.

#### FEATHERLY REGIONAL PARK

Featherly Regional Park is located along the Santa Ana River, between the west end of the Green River Golf Club and the Yorba Linda Blvd. /Weir Canyon Rd. bridge in the County of Orange. This site is the downstream portion of what is considered the Santa Ana Canyon.

The Santa Ana River Trail and Bikeway runs adjacent to the park. Public access is restricted, however there is no fencing to deter entry into the riparian habitat. Phase 3 of the Corps reinforcement project began in 2014. Habitat was removed on the south side of the river, upstream from the Canyon RV Park. Additional riparian die-off has occurred in the surrounding area due to the project-related river diversion. Restoration is now in progress for this phase of the Reach 9 Project. There were no construction activities from the Corps project or the County of Orange SARI-line project during the 2015 nesting season.

In 2015, 65 territorial vireos were detected in Featherly Park, a 10% increase over the 59 detected in 2014. Thirty-eight of these males were known to be paired and 37 fledglings were detected (Table 4). These numbers continue to emphasize that the vireo population recovery in Featherly Park is a success story over the last decade given that no vireos were detected in

2001, the first year of monitoring. The population's first major increase came in 2004 when it quadrupled from six in 2003 to 24 (Appendix D).

Nesting success for 19 well-tracked nests was only 32%, comparable to last year's 29% but far below the overall nesting success from 2002 to 2015 of 44%. Nine pairs closely monitored throughout the season had a low 1.3 reproductive success rate. Vireo in the adjacent Green River site fared a little better with a reproductive success rate of 1.6 and nesting success of 47%. A total of 359 fledglings have been observed over the last 15 years and the overall reproductive success rate of well-tracked pairs during the same time is 1.7 (Appendix C-3). Twelve of 19 tracked nests (63%) were lost to depredation (Table 6). This site typically has high depredation rates. The western scrub jay, a well-known avian nest-predator, occurs in large numbers throughout Featherly Park. One such depredation was observed as a lone scrub jay took three 7-day old nestlings from one nest. Another nest invader found in large numbers throughout the site is the Argentine ant. One nest was found with ants entering a small hole in the eggs on hatch day. A later visit found the eggs to be completely empty with only the same small hole in each egg. One of 19 tracked nests (5%) was lost due to reproductive failure when a four-egg nest was abandoned for unknown reasons. While in the fourth year of a severe drought, vireos watershed-wide seemed to struggle again this year presumably due to drought-induced resource shortages. No tracked nests were lost due to parasitism. Two banded vireos were detected in this section, both of which held territories in 2013 and 2014.

In November 2008 the devastating Complex Fire roared through the canyon and destroyed up to 90% of the riparian habitat in Featherly Park. Thirty-four vireos, only two less than the 2008 season, returned the following season and remained in or near their former territories. Most of the breeding vireos found nest sites in unburned vegetation or the reemerging native vegetation although three pairs used non-native vegetation which included black mustard (*Brassica nigra*), waxleaf privet (*Ligustrum* sp.), and a small orange tree (*Citrus sinensis*) on the edge of a burned area. Of the 22 nests found in 2015, all but two were placed in native vegetation, with the highest number of nests placed in Fremont cottonwood (n=5) and blue elderberry (n=4). The two non-native species used as nest substrate this year were black mustard and poison hemlock (Table 2).

Cowbird trapping has occurred in Featherly Park since 2001 when the first vireos were detected on-site. Over 3,678 trap days, 452 cowbirds have been removed from Featherly Park. Parasitism has been documented three out of the 15 years surveyed, reaching its highest rate in 2002 (67%). There has been no parasitism detected in Featherly Park since 2009 (Table C-1).

The highly invasive arundo began re-sprouting two weeks after the Complex Fire. In an effort to take advantage of the arundo biomass removed by the fire, Orange County Parks management was able to get approval to spray herbicide on the rapid arundo regrowth before the following nesting season, which helped control a large amount of regrowth. Unfortunately, many patches have re-established since that time and a large amount of dead arundo biomass remains, hampering native plant regeneration. Additionally, the use of Imazapyr on arundo was found to be damaging nearby native trees in 2013. Trees damaged by Imazapyr continue to suffer in 2015. The County of Orange is working to remedy the problem and strives toward restoration of the entire park, which should enhance the habitat for vireo and other native birds in the future. Future disturbance from the multiple construction projects slated to continue for several years may challenge future vireo recovery in the impact areas. However, proposed mitigation should expand and enhance vireo habitat in the post-construction years.

## Sampled Sites

### *Mockingbird Canyon*

Mockingbird Canyon is located in the city of Riverside in Riverside County and the arroyo serves as drainage tributary to the Santa Ana River. The riparian zone can be classified as a *Salix gooddingii* Woodland Alliance (Sawyer et al. 2009), with Fremont cottonwood as a co-dominant. However, the arroyo is also interspersed with red willow and arroyo willow. The dominant invasive plant in the riparian zone is perennial pepperweed with mustard being the dominant invasive in the adjacent upland zone.

In 2015, thirty-seven vireo territories were detected in Mockingbird Canyon, up from 23 territories in 2014 and 31 in 2013. Twenty-three pairs and 19 fledglings were detected (Table 4). Monitoring efforts have been greatly reduced over the past two years, and in 2015 only five nests were found incidentally. Two nests were successful and produced five fledglings. Measures of reproductive success have varied over the years due in part to differential monitoring efforts. Since 2003, overall success rate of tracked nests is 53% (81 out of 153) and 415 vireo fledglings have been documented during this time in Mockingbird Canyon.

When monitoring began at this site, nest parasitism was high, with 8 out of 13 tracked nests parasitized and 4 of those nests failing as a result. Beginning in 2003, an intensive cowbird management program was initiated. The parasitism rate decreased sharply after this program began. Parasitism continues to occur episodically, but seems to be controlled. Since 2003, a total of 1,915 cowbirds have been removed from Mockingbird Canyon.

Although the reservoir and basin are protected from development at this time, residential development continues throughout Mockingbird Canyon. Damage to the habitat and potential harm to nesting vireos occur from residents extending their living space out into the arroyo. Most of the adjacent upland habitat will soon be lost and the arroyo is becoming more fragmented by culverts and bridges. The riparian habitat throughout the entire site is continually threatened by ATV and paintball activities, as well as large amounts of trash dumping and other illegal activities. SAWA recently acquired an 11-acre easement in Mockingbird Canyon at Roosevelt St. and Markham St., and will continue to work with local property owners to enhance the canyon’s natural resources.

***SAR Upstream***

The upstream section is located along the Santa Ana River floodplain between Riverside Ave. in Riverside and the Goose Creek Golf Club in Norco. The upstream is divided into three different sections to maintain the historically presentation of SAWA abundance and distribution data. These sections are: Riverside Ave. to Van Buren Blvd. and the Hidden Valley Wildlife Preserve, located between Van Buren Blvd. and Goose Creek Golf Club, which is composed of Hidden Valley-North and Hidden Valley-South. This summary discusses the compiled data from these sites which are summarized below. In 2015, SAWA completed at least three surveys of the Upstream section of the Santa Ana River. The number of territories for the last three years is shown below:

<b>Santa Ana River - Upstream</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
SAR - Riverside Ave. to Van Buren Blvd.	78	66	109
SAR - HV North (side of river)	21	21	39
SAR - HV South (side of river)	75	85	104
<b>Total Number of Territories</b>	<b>174</b>	<b>172</b>	<b>252</b>

SAWA has been monitoring Hidden Valley on the south side of the river between approximately Tyler St. and the Edison service road at the powerhouse since 2000. Data reported as "Hidden Valley" refers to this area. The north side of Hidden Valley has been surveyed at least three times each season since 2005, but with the initiation of the arundo removal project, the north side of Hidden Valley has been added to the nest monitoring schedule. Historically SAWA has surveyed and nest monitored the habitat from Mission Blvd. to

Van Buren Blvd., but in 2013 this area was extended upstream to include the newly established habitat from Riverside Ave. to Mission Blvd. In 2015, only three surveys were done in this section. SAR is comprised of several land owners who are engaged in different stages of restoration or mitigation. The surrounding land use includes commercial, residential, bike and running trails, parks and a golf course. Perhaps the most notable land use is found within the habitat itself where several large homeless encampments occur. These camps vary from a single tent to areas of cleared vegetation with walls built with arundo. Running water is pumped from the river using hydroelectric water mill charged generators.

There are a variety of habitat types throughout the Santa Ana River. The riparian zone is classified as a *Salix gooddingii* Woodland Alliance with Fremont cottonwood as a co-dominant. (Sawyer et al. 2009). The dominant invasive plant in the riparian zone is arundo. Other invasive plant species in the Santa Ana River include tamarisk, tree of heaven, castor bean, perennial pepperweed, and various palm species.

Two-hundred fifty-two vireo territories were detected in the Santa Ana River-upstream in 2015, which is up 46% from the 174 and 172 territories detected in 2013 and 2014, respectively. Vireo abundance has increased throughout the upstream section of the SAR. In Hidden Valley, north and south, increases are most likely due to the clearing of invasive species and a general increase in numbers. In 2000, most vireos were located around the ponds in Hidden Valley south. Now this subpopulation extends throughout the preserve. Vireo abundance in the Hidden Valley Wildlife Preserve has doubled since 2008. A major project to remove arundo in Hidden Valley has opened up the habitat on both sides of the river but restoration and recruitment of native vegetation is only beginning and the growth of non-natives requires management. In spite of this, an increase in vireo territories around those removal areas has been documented. Riparian habitat has established itself in the dry duck ponds and vireos occupy the habitat now. The vireo abundance upstream of Van Buren Blvd. over the last few years can be attributed to habitat establishment and the extension of the monitored area from Mission Ave. to Riverside Ave. and the more thorough monitoring effort with the addition of a second biologist when monitoring the homeless camps.

Monitoring efforts throughout the Upstream section of the river have differed year to year. Over time, 245 nests have been followed. The overall parasitism rate is 11%. The nesting success rate is 64%. Nesting failures due to depredation is 27%, failure due to parasitism is 7%, and failure due to reproductive failure is 2%. Based on 300 nests, 53% of nests have been placed in *Salix* spp. and 30% in mulefat. The reproductive success rate based on 164 well-tracked pairs is 2.5.

Cowbird trapping began in the Upstream section of the river at Hidden Valley in 2000. In 2015, three of the funded Corps traps were located in this section. Thirty cowbirds were

removed over 302 trap days. Since 2000, 1,362 cowbirds have been removed from the Santa Ana River-upstream over 12,114 trap days. This region is currently experiencing an increase in the cowbird population specifically near Mission Blvd. and Van Buren Blvd. Several large cowbird flocks were observed in the habitat. This increased detection of cowbirds in the Santa Ana River is uncharacteristic for the area in the recent years. After observing a vireo feeding a cowbird fledgling and several flocks in the habitat adjacent to Rancho Jurupa Park and Crestmore Rd, an additional trap was deployed in hopes of capturing some of these birds. Trapping on this part of the river should continue.

Drought, invasives, and homeless camps also threaten the quality of the riparian habitat. There are initiatives in progress to continue the programs to remove the arundo and other invasives. The presence of several large homeless encampments throughout the entire site continues to plague the area. Previously the winter rains kept the size of encampments low because the risk of being washed out was high but with the current drought this risk is reduced. Various agencies evict the homeless from an area and clean up habitat but the homeless either reestablish themselves or move to new areas and alter or destroy new habitat. Current efforts by the Riverside County Flood Control, in the area from Riverside Blvd. to Mission Blvd., have been to find temporary housing for those who are qualified and desire placement. With this effort the hope is to reduce the risk of these homeless returning to habitat or destroying other areas within the riverbed. Vireos and other species in this area will be at risk if the human and cowbird populations are not managed.

#### [Santa Ana River – Riverside Ave. to Van Buren Boulevard Summary](#)

In 2015, 109 vireo territories were documented along the Santa Ana River from Riverside Ave. to Van Buren Blvd, an increase of 65% from the 66 vireos documented in 2014. While surrounding areas along the Santa Ana River also experienced an increase in vireo occupancy in 2015, some of the increase at this site can likely be attributed to the staffing of two biologists to survey in areas where the homeless camp.

Nest monitoring did not occur here in 2015, with the exception of 3 nests that were observed to have been parasitized by brown-headed cowbirds. Thirty-seven pairs and 33 fledglings were detected in 2015 (Table 4). One of three tracked nests was successful. The two losses were due to predation. While efforts are made to ensure all territories and pairs are accounted for, the dangers in some parts of the river, e.g. homeless camps, limit the number of sites that can be safely monitored.

Brown-headed Cowbird trapping has occurred on private business and residential properties since 2002. Trapping data can be found in Tables 6 and 7, as well as Appendix C-1. Many large flocks of cowbirds were observed throughout this survey site and at least one brown-headed cowbird fledgling was observed being fed by a vireo.

### Hidden Valley –North (north side of river)

Thirty-nine territories were documented in 2015, up 86% from the 21 documented in both 2013 and 2014. Surrounding areas along the Santa Ana River also experienced an increase in vireo occupancy in 2015. Twenty-three pairs and 15 fledglings were detected on the north side in 2015 (Table 4). This area flooded during the winter of 2010-2011 and much of the acreage was scoured. However, native vegetation is returning to the scoured area and control of non-natives in some areas has also helped to restore native vegetation. Nest monitoring occurred in 2014 but was not done in 2012, 2013, and 2015. In 2014, two of three tracked nests were successful. The one loss was due to predation from ants.

Cowbird trapping has occurred in this section since 2003. Trapping data can be found in Tables 6 and Appendix Table C-1. A few Brown-headed Cowbirds were detected in the habitat at two locations (see separate shapefile).

### Hidden Valley - South (south side of the river)

In 2015, 104 vireo territories were documented on the south side of the river in Hidden Valley. This number represents 68% increase in abundance since 2012 when 62 territories were detected. That only 27 pairs and 22 fledglings were detected is an artifact of the limited field time (Table 4). Four surveys were done at this site in 2015 and no nests were monitored.

This subpopulation has shown increases since monitoring began in 2000. Large increases in abundance (by at least 10 territories) took place between 2001-2002, 2007-2008 and 2009-2010 and now 2012-2015. The population increased to 75 territories in 2013 and to 85 territories in 2014.

No pairs were followed closely enough in 2014 or 2015 to obtain reproductive success data (# of fledglings per pair). Nesting success in Hidden Valley is variable and has ranged from 41% to 88% and the nesting success rate has been 65% over the last 15 years. Depredation remains the main cause of nest failure at 28%.

Willows are the most common plant species used for nest placement. Fifty-eight percent of all nests found in the last 15 years were placed in willows, mainly arroyo willow and black willow. Mulefat, has held 29% of all nests.

Management strategies at Hidden Valley usually include cowbird trapping as well as nest monitoring and manipulation. SAWA did not conduct brown-headed cowbird trapping at Hidden Valley in 2015, as it was understood that Riverside Parks and Open Space District would do so. Since 2000, 708 cowbirds have been removed from Hidden Valley over more than 6,200 trap days.

There is a need to manage the growth of invasive species. A pilot program to control wild grape, that is growing on and killing mature native trees was initiated in October 2013. Two sites were selected and grape at the base of large trees or growing in low carpets were sprayed with a mixture containing a 4% solution of roundup PROMAX and a 2% solution of Monterrey Super & surfactant. The SAWA Invasive Species Removal crew did the spraying with SAWA biologists monitoring the effort. Translocation of the herbicide up into the vines growing into the trees did not occur to any great extent. However, the lower lying vines were affected. Regrowth of these vines was limited during the 2015 season. Funding to continue these activities would benefit native riparian species.

In 2008, SAWA began a project to remove 475 acres of arundo from the 728 acre Hidden Valley Wildlife Preserve. The project was halted in March 2008 due to the onset of the breeding season. At that time, 150 acres on the south side of the river, north of the former agricultural field, had been cleared. Removal of arundo was expected to continue during the winter of 2008-2009 but state budget problems caused a postponement. The removal project began again in October 2009 and halted at the beginning of the 2010 season. A small amount of hand work cutting arundo began again in August 2010 and the final cutting was completed in November 2010. Herbicide applications continued for five more years. In 2011, additional habitat was put under contract for arundo removal. Removal took place during the winter of 2011-2012. Spraying continued through the early season 2012 and later in the 2013 season in the presence of biologists. With the completion of the project more habitat has opened up for monitoring and the expected increases in the extent of native habitat and vireo population are beginning to be realized.

Opening up of the habitat at Hidden Valley has had other benefits. Illegal activities within the dense stands of arundo were stopped in 2008 and 2009. With more open habitat at Hidden Valley, it is hoped that illegal human activity can be lessened and the quality of the natural resources will be enhanced for the benefit of wildlife.

Signs of drought were obvious throughout the habitat. Riverside County Parks and Open Space District manages Hidden Valley and has plans with the City of Riverside to restore water flow to the ponds and creeks in Hidden Valley (D.McLain, pers. comm.). This action will benefit riparian species greatly, even though the riparian vegetation now growing in the dry ponds has created nesting habitat for those species. The river flow changed during the storms of 2010-2011. Large swaths of land were eroded from Hidden Valley and the adjacent river including the intake to the Department of Fish and Wildlife ponds which was lowered 4 feet in some places (J. Vint, personal comm.). The levee system that brings water to the ponds and creek system was washed out. The water flow to the ponds was maintained during the 2009 season but has



not occurred since 2010. In 2014, Riverside County Parks and Open Space installed a well system to support a small pond for its school programs but the water does not extend to the creek system.

Incidental surveys for other species of concern take place during vireo monitoring. In 2015, 157 Yellow Warbler (*Setophaga petechia*), and 68 Yellow-breasted Chat (*Icteria virens*), territories were detected. A decline in numbers of a common bird, the marsh wren (*Cistothorus palustris*), is due to the loss of cattails in dry and silted ponds. Only a few marsh wrens have been detected in the last several years. None were observed in 2015. Before the 2005 flooding, 50 territories were estimated.

In 2015, after five years of occupation, vireos were not documented in habitat adjacent to Hidden Valley at Rancho La Sierra. In 2013, two pairs were documented, one pair had a fledgling. In 2014, one vireo territory was documented. In 2015, only one survey was done and no vireos were detected. A motocross track created in the open space directly adjacent to the two territories may have impacted the site's suitability for the vireos. Documentation of these territories is not included in the data for Hidden Valley South but is reported Rancho La Sierra as Miscellaneous Sightings in Tables 1A and 1B in previous years' reports (Appendix E). Documentation of this year's surveys is reported in Table 3.

### *Temescal*

Temescal Canyon Wash is approximately 26 miles (42 km) long and located along Interstate 15 between Lake Elsinore and Highway 91. Survey areas include Lake Elsinore and Railroad Canyon downstream to approximately two miles upstream of the intersection of Magnolia Avenue and Temescal Wash where it becomes channelized and flows into Prado Basin.

SAWA has monitored vireo in Temescal Canyon since 2001 when it began its arundo removal program. Temescal Wash is currently being managed for giant reed regrowth and native vegetation has been allowed to reestablish. Currently, a sampled site, five biologists covered the canyon over three visits in both 2014 and 2015 with the goal of documenting an accurate territory count and as much data on reproductive status as time allowed.

Temescal Canyon habitat is characterized by patchy, dense riparian vegetation. Privately owned sand and gravel mines operate downstream adjacent to the creek. A commercial fishing lake occurs near the middle section of the wash. Areas of complete channelization without riparian habitat occur downstream of Lake Elsinore and the most downstream section of the wash. Many sections of the wash are channelized by riprap and berms, but do allow some

meandering for good quality riparian habitat. According to the California Manual of Vegetation, the riparian zone in Railroad Canyon and the wash downstream of Lake Elsinore is classified as a *Salix gooddingii* Woodland Alliance (Sawyer et al. 2009). The riparian habitat surrounding Lake Elsinore is classified as *Tamarix* spp. Semi-natural Shrubland Stands also occur with sections of sparse black willow. Although SAWA has been effectively treating arundo since 2000, tamarisk has now become a dominant exotic throughout the wash, especially in areas surrounding Lake Elsinore.

Temescal was sampled by several biologists, each assigned to a section of the canyon. One hundred twenty-three territorial vireo males were detected, similar to the 126 territories detected in 2014. Twenty one of those males were known to be paired and 22 fledglings were detected (Table 4). This count represents a 6% decrease from the count of 131 territorial vireos in 2013 (Appendix C), which to date, was the peak year. This decrease may be due to the reduced effort since 2014. During these surveys cowbirds were detected in the habitat (see separate shapefile).

In 2015, only one trap was open in Temescal. This trap was located at a small dairy near Lake Elsinore, where the highest parasitism rates typically occur. This single dairy trap caught 435 cowbirds during the nesting season over 93 trap days for a capture rate of 4.68 (Table 9). Cowbird trapping has occurred at Temescal annually since 2001. During these 15 years, 11,515 trap days have resulted in the removal of 3,260 Brown-headed Cowbirds from Temescal (Appendix C). Even with on-site cowbird trapping, parasitism has been documented in Temescal in nine out of the 12 years it was closely monitored, reaching its highest rate in 2007 (42%) (Appendix C). Literature suggests that cowbirds have different regional dialects and female cowbirds tend to prefer older males that use local flight whistles, to younger males or older males that have a foreign dialect (O'Loughlen & Rothstein 1995 and O'Loughlen 1995). From 2012-2014, we stocked the traps with bait birds that were caught locally. We kept local, second-year male birds in the traps for the remainder of the season as they became available. This methodology was tested in San Timoteo beginning in 2007 and has shown promise with increased captures and decreased parasitism.

Drought stress is obvious throughout Temescal Wash, especially downstream of Dos Lagos Golf Course where effluent release by City of Corona Wastewater Treatment Plant #3, was suspended in 2013. In 2014 a SAWA biologist familiar with that area reported to CDFW massive vegetation die-off due to lack of water from the historical water treatment outflow. This die-off has been amplified by the current drought conditions. In addition to these stressors, the habitat in Temescal and Lake Elsinore is regularly impacted during the nesting season by off-road vehicle use, illegal vegetation removal and understory clearing to deter homeless

encampments around Lake Elsinore. Management recommendations for this area include removal of *Tamarix* spp., continued cowbird trapping, especially at the dairy in Lake Elsinore, re-established outflow to the creek near Dos Lagos and establishment of a plan to regulate illegal vegetation removal during avian nesting season.

### Incidental Sites

Incidental sites were only visited once or twice late in the season due to funding constraints. Twenty-nine sites were surveyed and 128 additional vireo territories documented (Table 1). No vireos were detected in nine of the incidental sites visited, though six of these locations were occupied in previous years (Appendix E). Knowing that vireos may not be singing later in the season, we expect these sites may still have been occupied. Both Peters Canyon and Carbon Canyon Regional Park were surveyed assessment sites (3 visits, during appropriate times) in 2015 and had a 20% and 33% increase in number, respectively, from 2014. Some sites that typically have larger numbers, such as Chino Hills State Parks (2014, n=21), Lake Perris (2014, n=20) and Alessandro Arroyo (2014, n=19) were not surveyed in 2015 (Appendix E). In 2005, SAWA expanded its monitoring program to all vireo habitat in the watershed in an attempt to capture watershed-wide population numbers. In 2014, SAWA biologists surveyed 58 of these sites and documented 208 vireo territories (Appendix B). These “assessment surveys” have proven valuable to SAWA, as well as local, state and federal resource agencies, by detecting previously unknown vireo occurrences and by identifying new areas in need of restoration. It is our hope that all assessment survey locations will be funded in the future.

### Southwestern Willow Flycatcher

In 2015, SAWA biologists detected 14 individual Willow Flycatchers within the watershed. No breeding pairs were detected. Two singing males were detected at the Green River Golf Club on 5/12. Three singing males were detected at three different sites on 5/14: Mockingbird Canyon, SAR-Goose Creek-Norco to the 1-15, and San Timoteo Canyon. An additional singing male was detected in San Timoteo Canyon on 5/20. “Whitting” Willow Flycatchers, whose sex could not be determined, were observed in San Timoteo Canyon at different locations on the following dates: 5/20 (2 birds), 5/21 (2 birds), and 6/9 (2 birds). A singing male was detected on 5/28 in the Norco Bluffs area. It was later seen being chased by a second Willow Flycatcher. All migrant Willow Flycatcher sightings are reported electronically to USGS Riparian Birds Working Group.

Southwestern Willow Flycatchers have been documented sporadically in Prado Basin since 1996. In 2015, 2 territorial males and no females were documented in the Prado Basin (Pike et al. 2015). This species has been observed sporadically throughout the watershed over

the years, most often in San Timoteo Canyon, Hidden Valley, Norco, Lake Perris, and the Meridian Conservation Area (former March SKR Preserve). SAWA has not documented any breeding attempts at well monitored or assessment sites.

### **Sightings of Interest - Incidental Species Observations**

Incidental species sightings were documented at selected sites throughout the watershed during vireo monitoring. An emphasis was placed on sensitive species. One hundred nineteen avian, 22 mammal, and 17 herpetological species were observed at the monitored and sampled sites (Table 7). In addition to all species observed, biologists attempted to count many of the sensitive species observed by site. A combined total of 28 sensitive species were detected (Table 8). Sensitive species are defined as those listed as endangered, threatened, or species of concern by the resource agencies and those covered by the Western Riverside County Multiple Species Habit Conservation Plan (MSHCP). Observations are verified detections and counts are considered a minimum for each location and should not be considered as a complete species list for each site or total population numbers. For example, 16 California Gnatcatcher territories were detected adjacent to vireo habitat. However, many more gnatcatchers likely occur in adjacent areas biologists do not frequent. Similarly, some species are difficult to detect, such as the American badger (*Taxidea taxus*), and may occur in other locations than reported here. Two species that are easily detected within vireo habitat that biologists count annually are the Yellow Warbler and the Yellow-breasted Chat. At two sites that had similar monitoring efforts as 2014 (San Timoteo and Santa Ana Canyon), both species increased in number. In 2015, observed Yellow Warbler territories increased by 56% and Yellow-breasted Chat territories increased by 115% in San Timoteo. Similarly, observed Yellow Warbler territories increased by 60% and Yellow-breasted Chat territories increased by 25% in the Santa Ana Canyon (Table 9 and Appendix E). These sightings are reported annually to the appropriate resource agencies.

## **BROWN-HEADED COWBIRD TRAPPING RESULTS**

### **Brown-headed Cowbird Trapping, March-July 2015**

Thirty-six cowbird traps were deployed during the 2015 vireo season and 1,245 cowbirds were removed from all sites over 4,282 trap days (Table 9 and Figure 6). The sex and ages of the cowbirds removed in 2015 were: 678 adult males, 440 adult females, and 127 juveniles. SAWA biologists and field assistants spent 2,052 hours servicing traps during the vireo season.

In 2015, SAWA was only able to deploy traps to sites that were directly funded. The Corps and the USFWS funded 18 habitat traps and four dairy traps. The IERCD funded two traps at Goose Creek. The SAWA/IERCD Reach 3B project funded eight traps in San Timoteo and the remaining traps were contracted. The areas trapped and the number of traps in each area, are as follows: San Timoteo, eight; Meridian Conservation Area, two; City of Chino Hills, two; Prado/Santa Ana River, eight plus two in Mockingbird Canyon (ten total); Santa Ana Canyon, seven plus one in upper SAR (eight total). Four dairy traps were run during the nesting season, three in Prado Basin and one in Temescal (Lake Elsinore). All of the traps were opened by mid to late March and closed by 7/31.

In 2015, cowbird captures decreased 2% from 2014 (1,271); however, there were ten fewer traps deployed in 2015. Several traps were placed at new locations, such as the City of Chino Hills-English Channel area, which had not previously been trapped. The two traps at this site had the highest capture rates (0.3/0.4) of all non-dairy traps. Fourteen percent fewer males, 13% more females, and 11% more juveniles were trapped during the 2015 breeding season. In 2014, captures decreased 35% from 2013 (1,945). The decreased captures could be attributed to fewer trap days (5,408 in 2014 to 6,355 in 2013). However, captures had also decreased in 2013 from 2012 despite an increase of one trap and 882 trap days. The overall capture rate rose from 0.2 in 2014 to 0.3 in 2015.

In 2015, one trap was vandalized in the Santa Ana Canyon and one trap was destroyed by a super-cell storm in San Timoteo Canyon. Vandalism did not occur at any other traps in the watershed.

### **Non-Target Captures in Cowbird Traps, March-July 2015**

Twenty-two non-target species, consisting of 1,670 individual trapping occurrences, were captured in the 36 cowbird traps. The most common species were California Towhee (*Melospiza crissalis*), House Finch (*Haemorhous mexicanus*), Red-winged Blackbird (*Agelaius phoeniceus*), Lark Sparrow (*Chondestes grammacus*), and Song Sparrow (*Melospiza melodia*). The mortality of non-targets in 2015 averaged 2.6% (Table 10).

Due to new permit conditions, dated August 8, 2014, SAWA is now required to dispatch all European Starlings and House Sparrows (sparrows) caught in the traps (Table 10). Since starlings require a different type of food and don't survive well in the traps, this permit condition required additional resources in supplies, time, and effort where these birds congregated and may hamper trapping of cowbirds. For instance, one non-dairy trap caught 80 starlings in two days. It is expected that cowbirds would not enter a trap with that many starlings present. Due to these extenuating circumstances, some of these non-native species

were released to avoid unnecessary distress to the birds. Biologists altered routes and personnel attending traps once these unexpected problems arose in order to resolve this situation in the future.

### **Fall 2014 Brown-headed Cowbird Trapping and Non-Target Captures**

Cowbird trapping took place in the Santa Ana Canyon (SAC), Temescal and San Jacinto during the non-breeding season (fall/winter) of 2014-2015 but only from July 28, 2014 to November 21, 2014, after which the traps were closed due to lack of funding. One trap was located at a large horse stable in SAC, one at a dairy in Lake Elsinore, and seven at various dairies in the San Jacinto valley.

A total of 5,094 cowbirds were removed (1,487 adult males, 1,783 adult females, and 1,824 juveniles) over 908 trap days (Table 11). These numbers represent a three percent increase in cowbirds captured during the previous winter (4,072). The capture rate per day was 5.6, up from 3.0 in the winter of 2013-2014, likely due to the fewer number of trap days and the tendency of catching higher numbers earlier in the fall.

The dairy trap in Temescal was only open from 7/28/14 through 10/31/14 and caught 997 cowbirds. This total removed in a relatively short time (62 days) represents a capture rate of 16.1 per day. During the non-breeding season of 2013-2014, this trap was open from 8/5/13 through 3/14/14 and caught 865 cowbirds over 162 trap days (capture rate of 5.3 per day). The number of cowbirds caught (997) from 7/28-10/31/14 increased 60% from roughly the same time period the previous winter (622 cowbirds).

Thirteen native and non-native species, consisting of 246 individual trapping occurrences, were captured in the 9 cowbird traps located in SAC, Temescal and San Jacinto (Table 12). The most common species captured was the European Starling (173). SAWA spent 658 field hours on winter trapping.

## **DISCUSSION**

Given the increases in abundance at individual sites reported here, the total count of 962 LBVI in the watershed is low compared to years previously reported by SAWA, likely due to reduced or no effort in some heavily occupied areas this year, such as Chino Hills State Park and Lake Perris. San Timoteo reported a 17% increase, the Norco area reported a 4% increase, the Santa Ana Canyon and the Upstream section of the Santa Ana River reported 8% and 46% increases respectively. Prado (Pike et al. 2015) reported 532 LBVI, a number similar to 2014. Given these numbers, the population in the watershed is probably well over 1,500 territories.

Vireo abundance increased by 4% in 2014 in the upper watershed which continued the 2013 reversal of the downward trend from 2011 and 2012. With the exception of a few years, the vireo abundance has increased since monitoring began in 2000. In 2014, 1,582 territories were documented in the Santa Ana Watershed. The dramatic population increase over 14 years is illustrated for four sites in Figure 7. The two main causes of vireo decline, the lack of habitat and parasitism by the Brown-headed Cowbird, are being successfully managed by SAWA and the vireos in some areas are responding to the point that SAWA biologists have detected vireos in backyards above Featherly Park and in patchy habitat surrounded by homes in Chino Hills.

In terms of field hours, the monitoring effort was equivalent for 2015 and 2014, 2,320 hours vs. 2,333 field hours. In 2015, more hours were spent nest monitoring at San Timoteo, Norco, and Norco Bluffs. At all nest monitored sites, the detectability rate was .25 (422 LBV observed/1694 hours). At sampled sites, the detectability rate was .83 (412 LBVI observed/498 hours). The lower detectability rate for the areas with nest monitoring is due to the time spent nest monitoring versus simply surveying for numbers. The total 2015 effort shows a 0.41 detectability rate (962 LBVI observed/2,320 hours). The 2014 detectability rate at sites with nest monitoring was .37 (661 LBVI observed/1,773 field hours). A separate 2015 detectability rate of vireo sighted at our 'incidental' sites was not calculated as surveys were only done late in the season, and results are not reflective of actual vireo occupancy.

SAWA has removed over 5,000 acres of invasive arundo from the watershed. Tributaries which have been restored have had explosive growth in vireo numbers. San Timoteo Canyon increased its vireo population from five in 2000 to 176 in 2015. Temescal Canyon has shown similar increases with a vireo population increasing from seven in 2001 to 126 in 2014.

SAWA and OCWD biologists have removed a minimum of 150,000 cowbirds from the watershed, including Prado Basin, to date and the parasitism rates are no longer in double-digit figures since the cowbird management programs began. The disappearance of dairies from the watershed should be an additional aid to the decline in parasitism.

Nesting success for all sites combined was 55% in 2015, an increase from 48% in 2014 but lower than the 61% in 2013. Possible causes of lower success include a four-year drought, resulting in a lack of food and good nesting sites, and disturbance from construction projects and homeless people. Overall, in the last fourteen years, the nesting success rate is 59% for 2,154 nests. Depredation remains the main cause of nest failure, with a surprisingly small 36% of nests lost to depredation in 2015, although some sites were as high as 63% (Featherly Park). Nest loss from reproductive failure was 10%, an increase from the 5% in 2014. Historically reproductive failure rate is a single digit rate. It could be that the environmental pressures are

affecting the birds' ability to complete incubation. Examples of nest loss due to reproductive failure are egg abandonment, failure of all eggs to hatch, or failure of the vegetation to support the nest to a successful hatching. Only 3% of nests were lost to parasitism in 2014 and none in 2015. Since SAWA began its cowbird trapping program, the parasitism rates have ranged between 2% to 5%. Parasitism is episodic throughout the watershed. It continues to be a problem in San Jacinto, San Timoteo, and Sycamore Canyon. Documentation of continued cowbird parasitism in the San Jacinto Wildlife Area, where cowbird traps are no longer placed, lends support for the continued need for cowbird trapping. Figure 8 compares nesting success, predation, and parasitism rates from 2003-2015.

The lack of documented nesting Southwestern Willow Flycatchers in the watershed is not surprising given the continuing low numbers throughout the watershed. No breeding activity was documented in 2014 or 2015. The mountain canyons have held flycatcher territories in the past, and should be under management and monitoring, but without funding such work is not possible for SAWA.

## **MANAGEMENT RECOMMENDATIONS**

At end of the 2014 season, the outlook for continued funding for SAWA's vireo management program looked bleak. However, with many thanks to the USFWS, the Corps, the OCWD, and the IERCD for providing funding, SAWA was able to continue its vireo nest monitoring program in 2015 at several sites. Should this funding continue, monitoring could continue and return to the more intensive efforts SAWA has historically been able to do. While the documented number of vireo territories did not exceed 1,000 as in the past two years, the closely monitored and sampled sites showed increases. Therefore, it may be expected that the non-surveyed areas increased as well. These increases at individual sites however, were somewhat offset by lower nesting success rates. Monitoring, nest manipulation, and cowbird trapping should continue along with management and removal of non-native vegetation. The removal of non-native vegetation and the resulting establishment of riparian habitat has had a positive influence on vireo numbers. Since invasive plants like arundo cannot typically be eradicated within a 5-year mitigation term, it is extremely important that the maintenance of invasive regrowth continue to be funded. We recommend that funding invasive maintenance become a mitigation requirement much like cowbird trapping.

Restoration of riparian habitat through the removal of non-native invasives such as arundo, tamarisk, and pepperweed continues to be important to the ongoing recovery of the vireo and other riparian species. However, with the loss of daily surveys throughout the entire



watershed, the notification procedure to make natural resource agency managers aware of local infestations of exotics at an early stage is curtailed and this lack of awareness may lead to future massive infestations. SAWA biologists will continue to notify SAWA project managers and other agencies when infestations are detected and can be managed in a timely fashion.

Along with restoration, maintenance 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 off-highway vehicle (OHV) tracks and the activity is damaging 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 CDFW. In 2014 and 2015, SAWA and the Riverside County Parks and Open Space District are restoring acres of habitat destroyed by OHV near Jack Rabbit Trail. There is also increasing awareness of the need to control feral pigs throughout the watershed. Some multi-organizational planning attempts have been publicized. SAWA and OCWD are planning a pilot study to track feral pig populations in the Prado Basin. Laws meant to prevent other human disturbances such as laws against streambed alteration must also be enforced. There are too many examples of the devastating effects of the lack of enforcement. A positive development in this area is the County of Riverside's code enforcement program that targets illegal dumping. Enforcement of these laws is sorely needed to protect riparian habitat from degradation.

SAWA has had unprecedented success in the scale of riparian habitat restoration that has been achieved on the Santa Ana River. The vireo is truly on the road to recovery in our watershed with ample habitat developing for occupation. However, we will not be ultimately successful without rallying more support from the people living next to and using the river. Too little of the riparian resources on the river are in public ownership. Setting aside and enhancing habitat does little good when that land is transformed for other uses by trespassers. Although existing laws should protect these resources, even on private land, the ability to enforce the laws and regulations is inadequate and untimely. As we continue to recover our natural resources, we will endeavor to confront this, perhaps our greatest challenge. We must strive to invest the public in these resources and identify effective ways to ensure that the floodplains are put only to appropriate human uses. We will attempt this through a combination of public education, public involvement thorough volunteerism, and partnerships with enforcement

agencies and landowners. Priorities for SAWA's vireo recovery program in the near future will continue to be based primarily on cowbird trapping which we believe provides the most support for the recovering population, the availability of ample invasive-free lush riparian habitat notwithstanding. Vireo surveys and nest monitoring will be done as funding allows. SAWA will attempt to provide accurate annual data on status and distribution of the vireo in the watershed. SAWA will continue to coordinate with other agencies for a watershed-wide documentation of vireo abundance and assessment of all potential vireo habitats.

## **FUNDING ACKNOWLEDGEMENTS**

SAWA depends on many organizations for funding. In 2015 the USFWS and US Army Corps of Engineers provided funding for the vireo monitoring along the Santa Ana River from Riverside Ave in Riverside to the Santa Ana Canyon in Yorba Linda, Orange County, excluding some parts of the Norco area and Prado Basin. OCWD funds were used to monitor and manage Temescal Wash, Mockingbird Canyon, and Chino Hills. The IERCD funds vireo monitoring and cowbird trapping at the Goose Creek Golf Club in Norco and in 2015 extended funding to cover the remaining habitat to I-15. Funding for monitoring and cowbird trapping in San Timoteo Canyon is from an endowment provided by the Corps, held by SAWA, and managed through the IERCD. The Riverside Lands Conservancy and the City of Chino Hills provided funding for cowbird trapping in 2015. The majority of the funding for the extensive monitoring efforts and cowbird trapping that took place between 2012 and 2014 was provided by the Department of Water Resources through SAWPA's One Water One Watershed Program.

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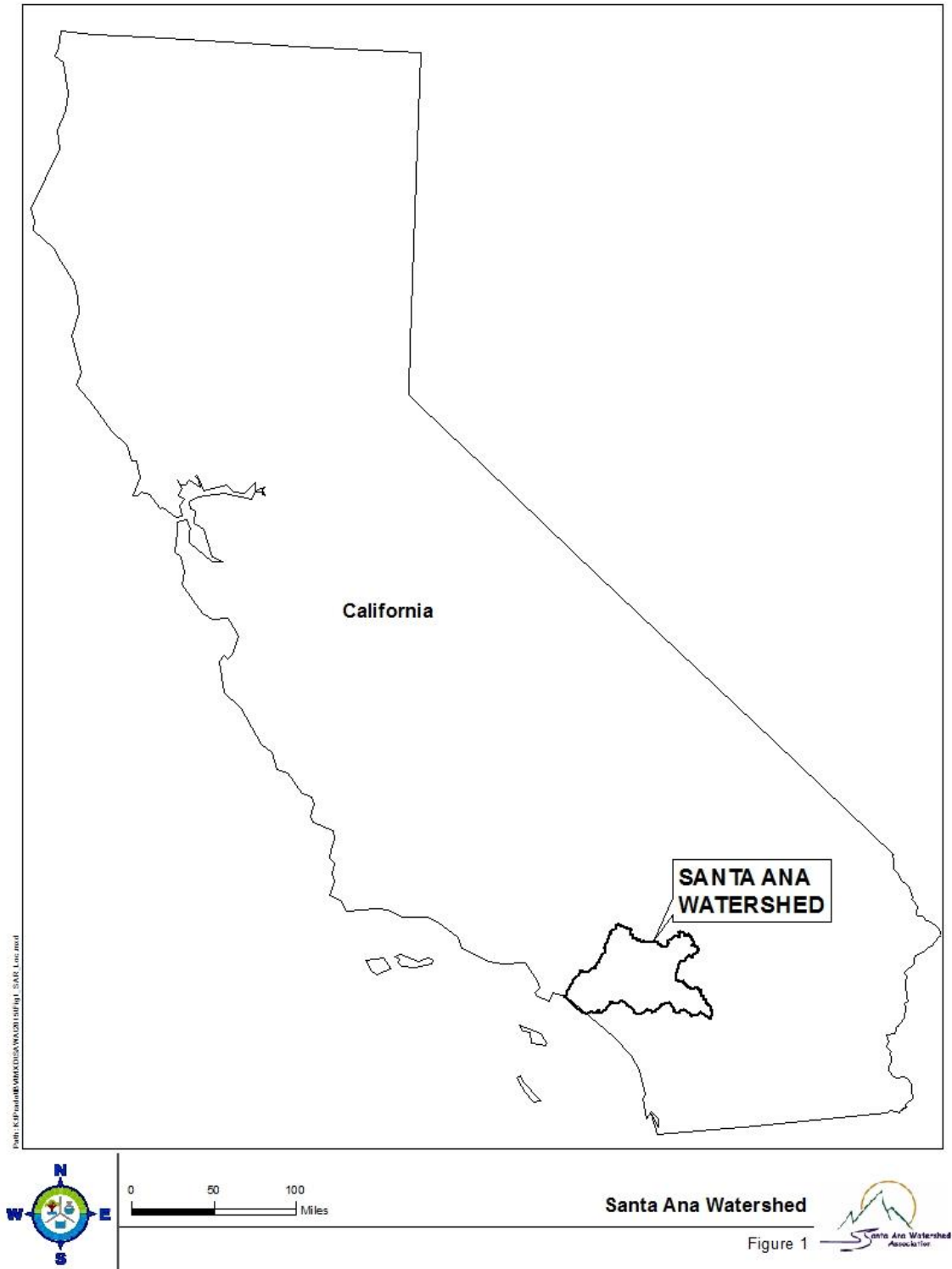
Conservancy, Adam Malisch and the MSHCP monitoring program, The Regional Conservation Authority, Dustin McLain, Natural Resource Manager of the Riverside County Regional Parks and Open-space District, Northwestern Vector Control, Orange County Flood Control, Orange County Park Rangers: Kelly Lewis and Joannette Willert, Theresa Sims of San Bernardino County Flood Control, Troy Thompson and the staff of Green River Golf Club, Hidden Valley Golf Club, Lori Askew and Robin Shepard of the City of Norco, Brian and Dana Busch and the staff at the Canyon RV Park, Sherrie Chandler, Park Interpreter for Riverside County Parks, Dayna Whitaker, Area Manager for Riverside County Regional Park and Open-Space District, City of Chino Hills Public Works Department, Boys Republic Youth Organization, Mike Cravens, Herman DeJong and family at the DeJong Dairy, the Inland Empire Utilities Agency, Dan Ebert, Euclid Dairy, Ross Fisher and the staff of Goose Creek Golf Club, the staff at Fisherman's Retreat, Bob Fontaine and John Gericke of Prado Regional Park, Gage Canal, Johnny Garcia, Donna Hart, Dennis Hayes, J and M Oostdam Dairy, KB Home, Bob King, the staff at Canyon Lake Water Treatment Plant, Ranger Robert Williams of the Riverside County Regional Parks and Open-space District, and the staff at the Hidden Valley Wildlife Preserve, Beth Martinez and Scott Holbrook of PCR Services Corporation, City of Riverside Public Works Department Water Quality Control Plant, Ramona Farms Dairy, Roberta Reed and the 3M Company, R & J Dairy, Riverside County Flood Control, Scott Brothers Dairy, Lynn Stafford, Gary Stockwell and the Elsinore Valley Municipal Water District, John Trotter and the City of Chino Hills, Vanderwoude Dairy, and the Western Municipal Water District.

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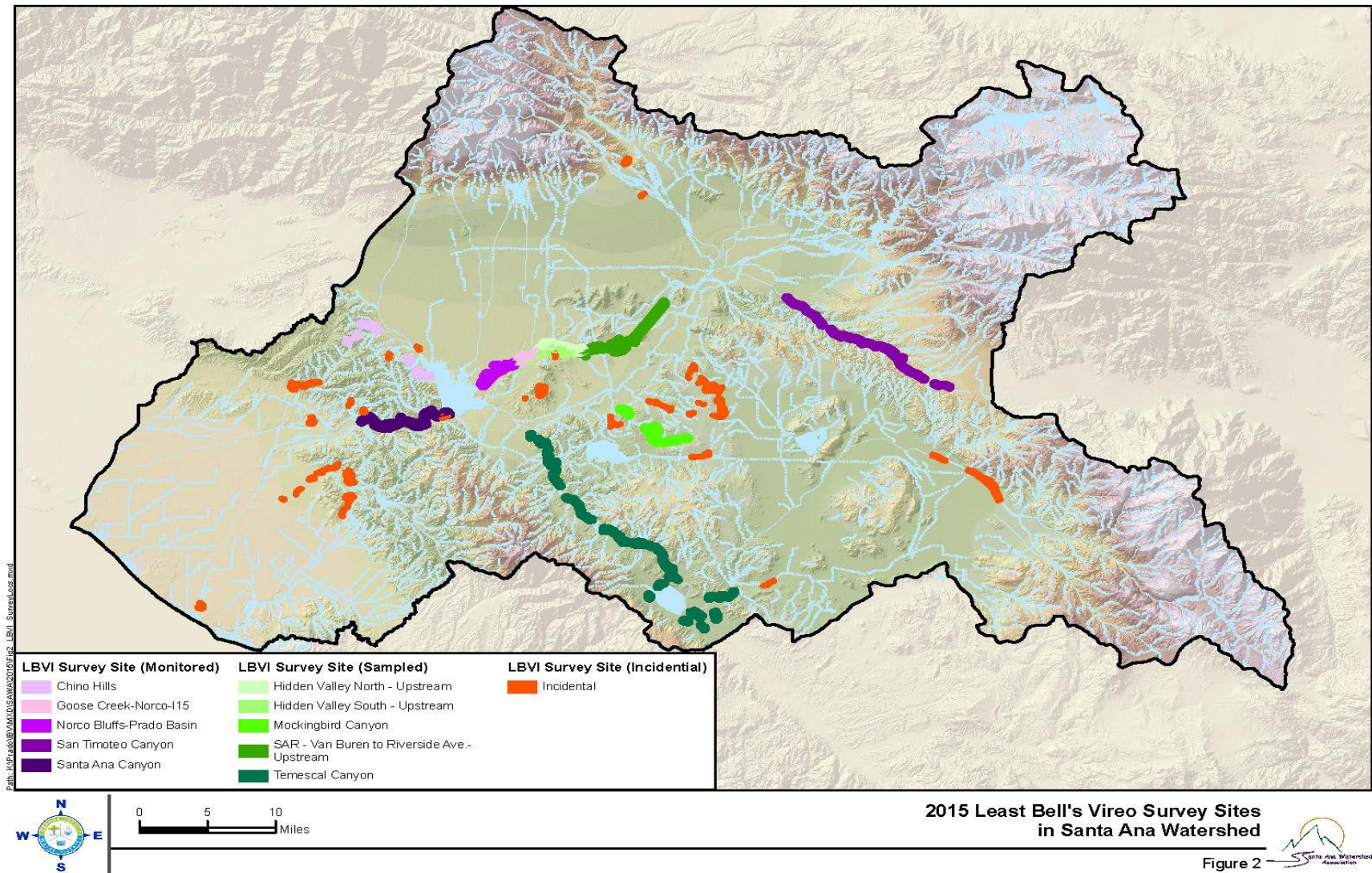
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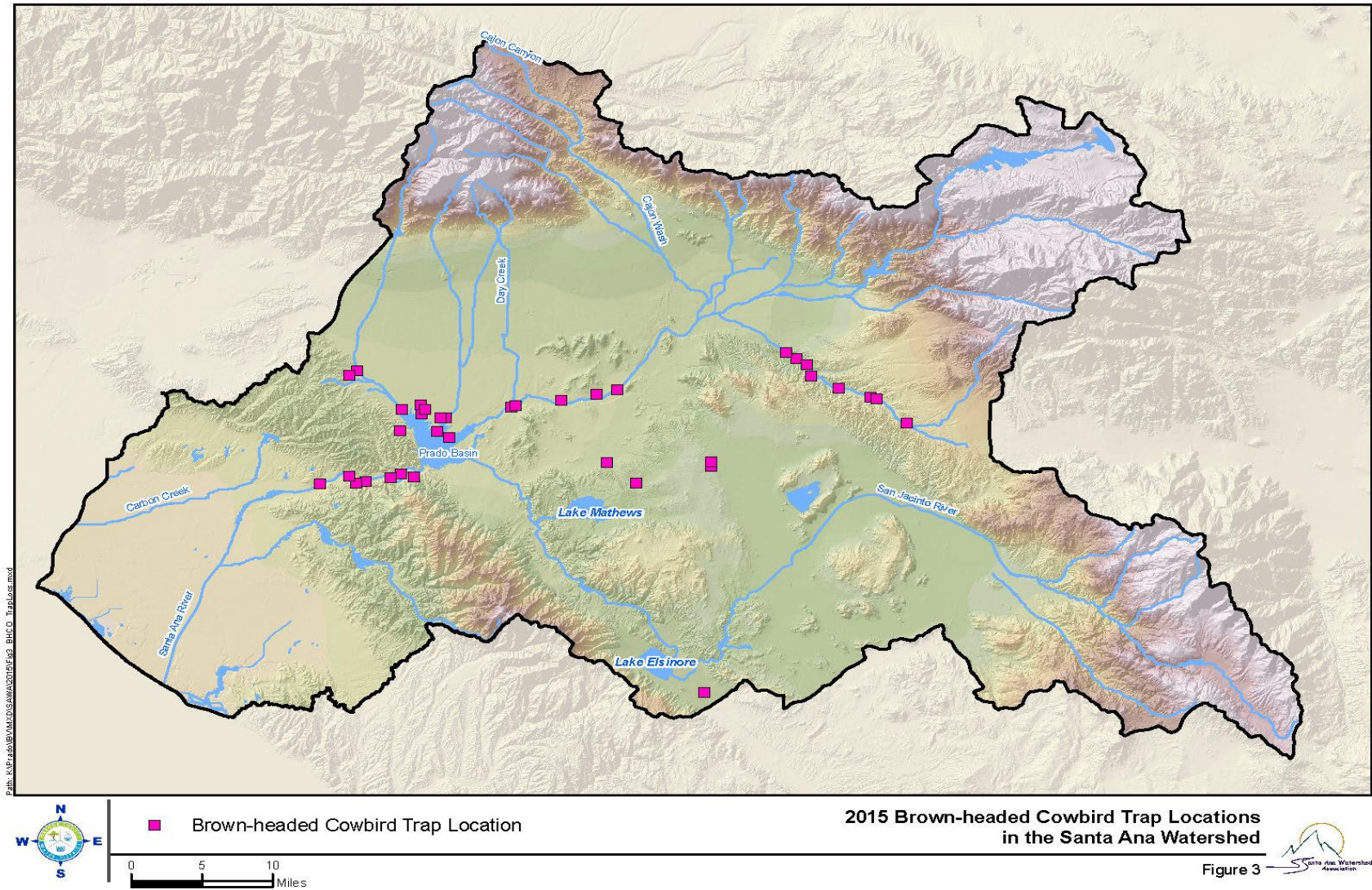
**Figure 1: Map of the Santa Ana Watershed**



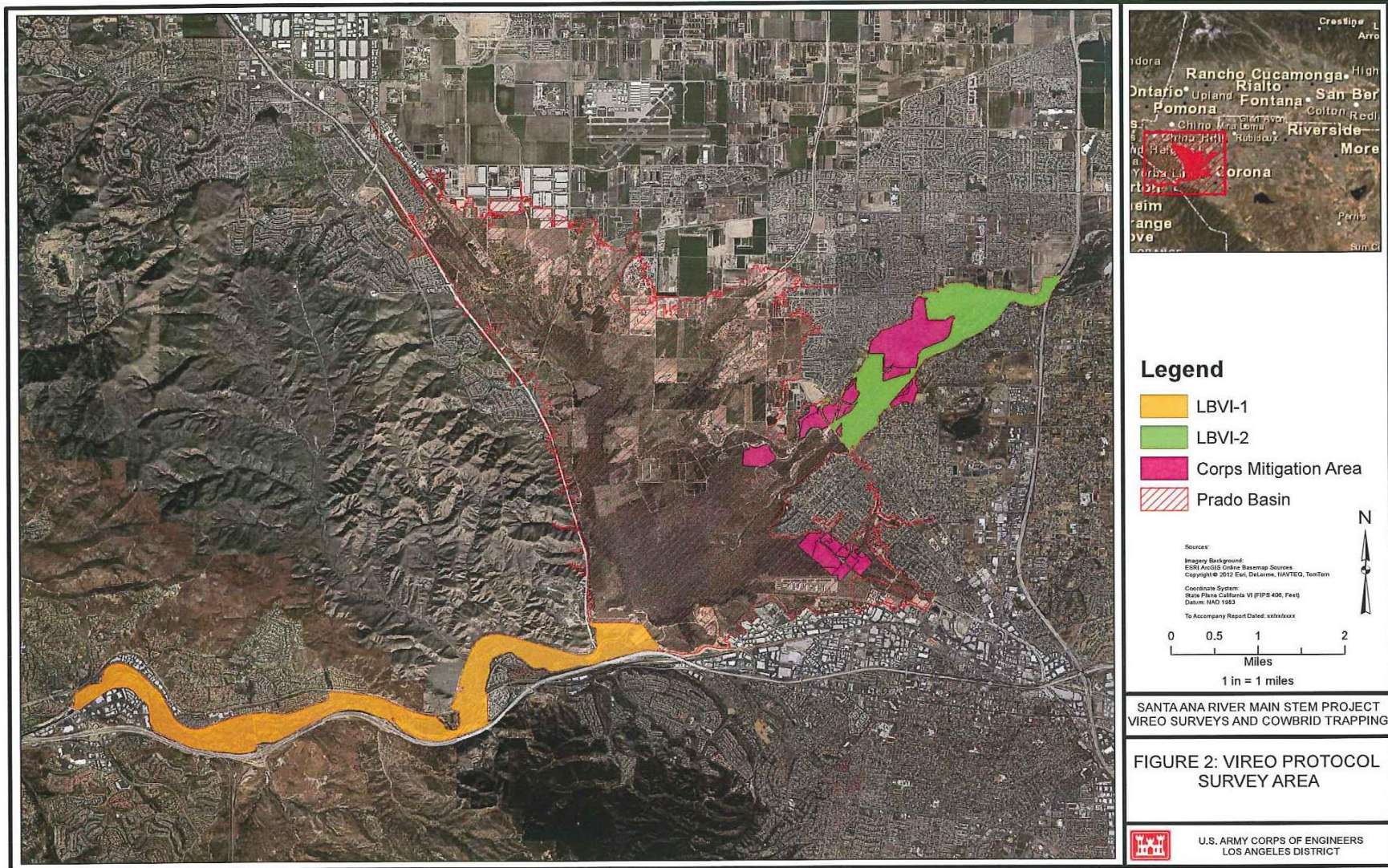
**Figure 2: Least Bell's Vireo Survey Sites in the Santa Ana Watershed**



**Figure 3: Brown-headed Cowbird Trap Locations in the Santa Ana Watershed**

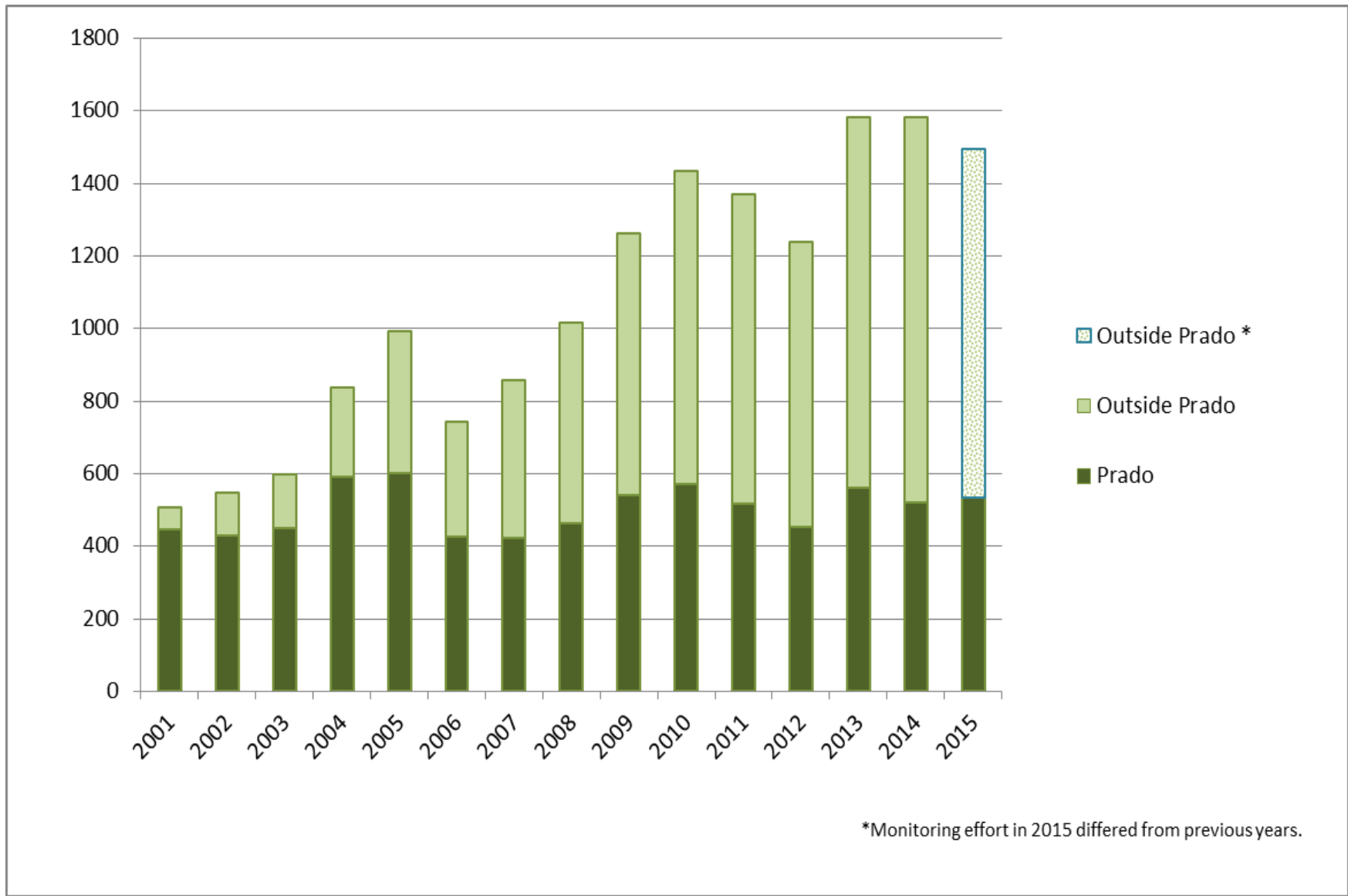


**Figure 4: Norco Bluffs Vireo Survey Area. Map adapted from USFWS/Corps draft *Scope of Work Least Bell's Vireo surveys and Cowbird Trapping Santa Ana River Main Stem Project YF 2015 Figure 2***

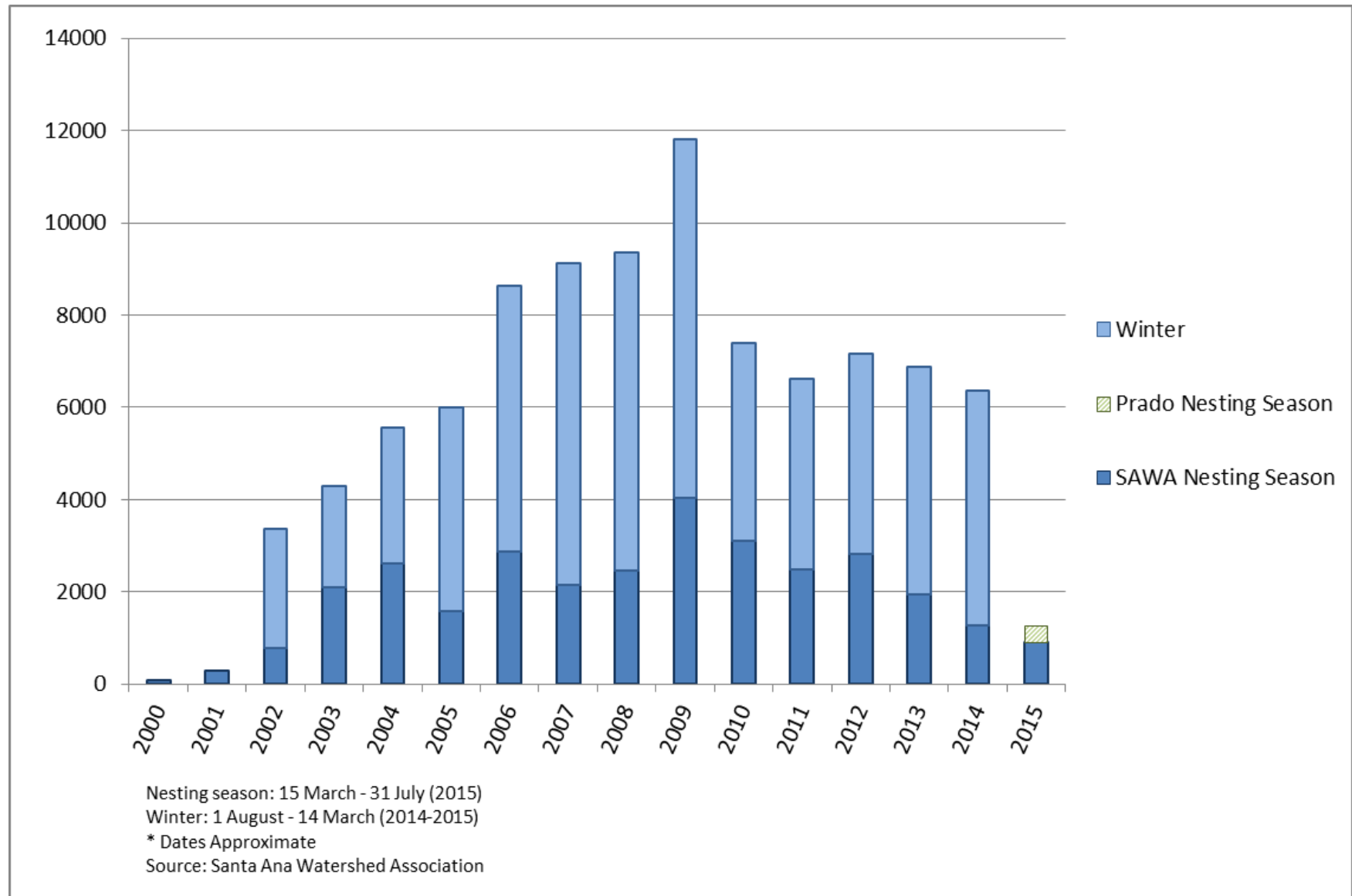




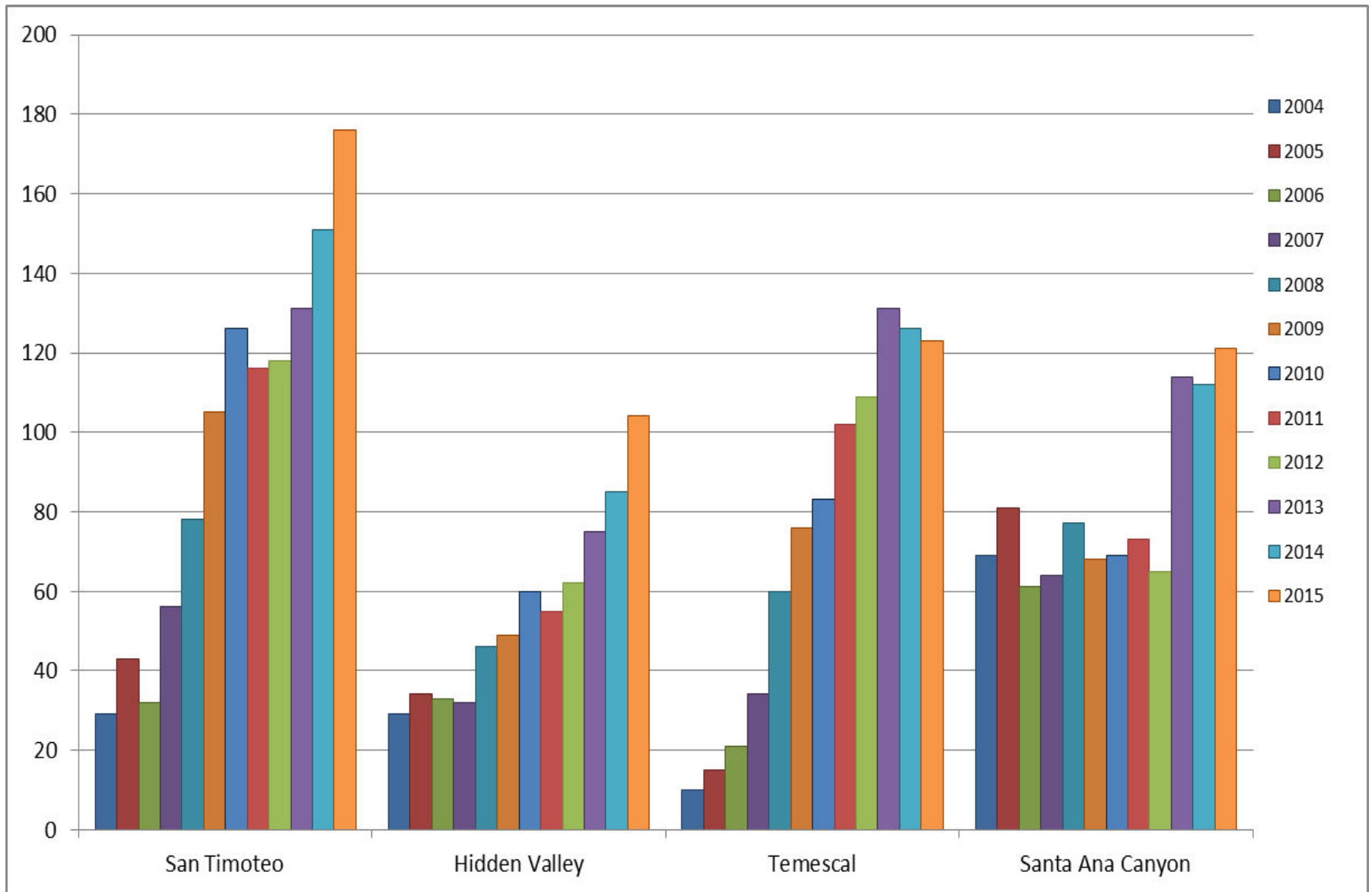
**Figure 5: Vireo Abundance in the Santa Watershed, Prado and Outside Prado, 2001-2015**



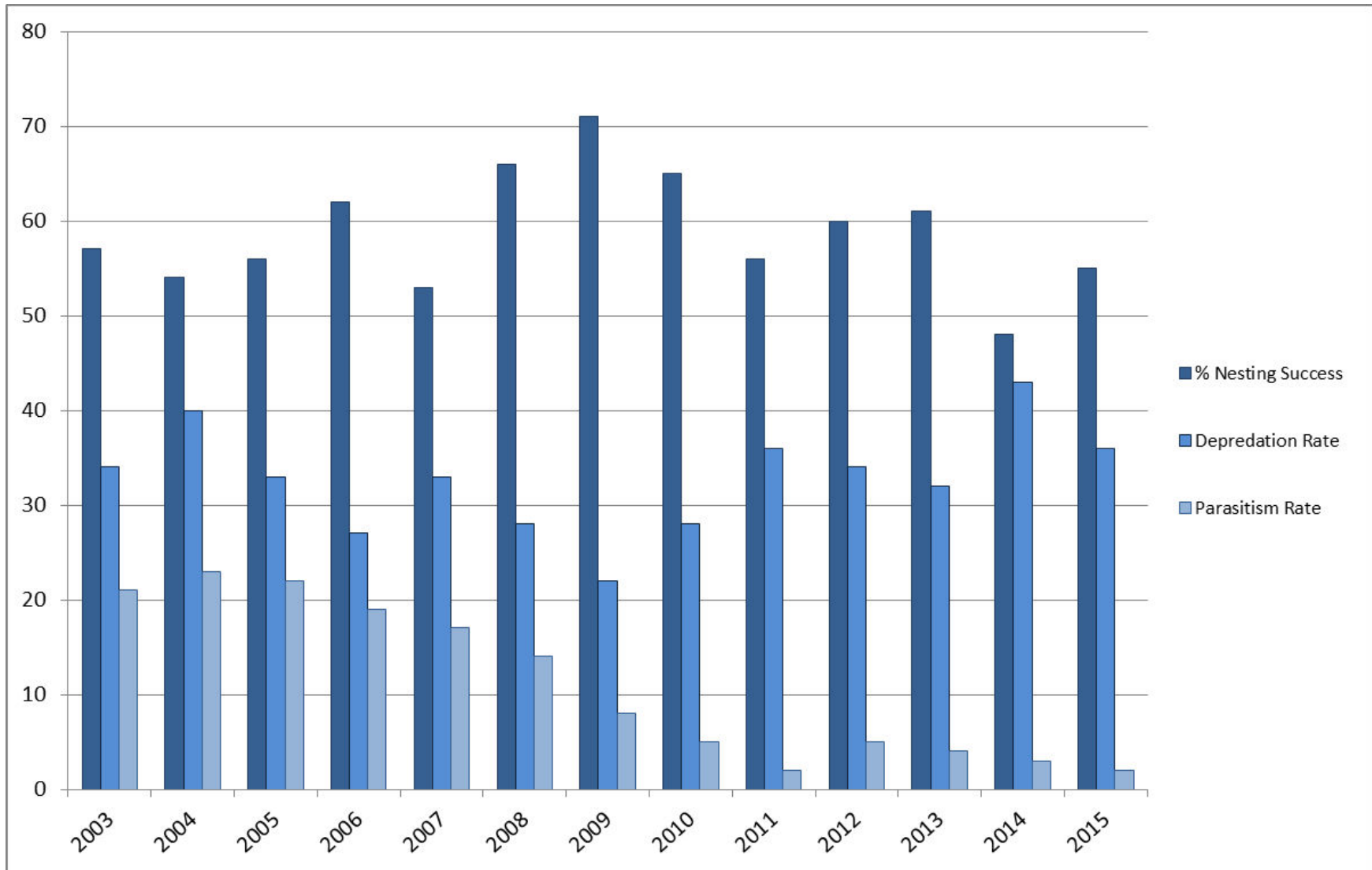
**Figure 6: Number of Cowbirds Removed from SAWA Monitoring Sites in the Santa Ana Watershed, 2000-2015**



**Figure 7: Number of Least Bell's Vireo Territories at Four Sites in the Santa Ana Watershed, 2004-2015**



**Figure 8: Least Bell's Vireo Nesting Success, Depredation Rates, Parasitism Rates in the Santa Ana Watershed, 2003-2015**



**Table 1: Least Bell's Vireo Abundance and Distribution in the Santa Ana Watershed, 2015**

Funding	Site	LBVI Abundance			Effort	
		# Territories	# Known Pairs	# Fledglings		
USACOE	Prado Basin - Norco Bluffs	30	17	43	monitored	
	Santa Ana Canyon (SAC)	121	70	82	monitored	
	Upper Canyon	(25)	(9)	(10)	monitored	
	Green River Golf Club	(31)	(23)	(35)	monitored	
	Featherly Park	(65)	(38)	(37)	monitored	
	Santa Ana River: Upstream	252	87	70	sampled	
	Hidden Valley North	(39)	(23)	(15)	sampled	
	Hidden Valley South	(104)	(27)	(22)	sampled	
	SAR Van Buren to Riverside Ave.	(109)	(37)	(33)	sampled	
	<b>Riverside/San Bernardino Counties</b>					
	Chino Creek Wetlands Park @ IEUA	1	0	0	incidental*	
	Clearwater Pkwy at Glen Helen	0	0	0	incidental*	
	Fontana Power Plant, Fontana	0	0	0	incidental*	
	Fresno Canyon, Orange County	2	0	0	incidental*	
	Goldenstar, Riverside	0	0	0	incidental*	
	Harrison Reservoir, Riverside	3	1	0	incidental*	
	Hidden Valley Golf Club, Norco	5	2	2	incidental*	
	Mead Valley (Cajalco/aqueduct), Riverside	4	0	0	incidental*	
	Menifee (Salt Creek)	6	1	1	incidental*	
	Meridian Conservation Area, Riverside	7	3	3	incidental*	
	Rancho La Sierra West, Riverside	0	0	0	incidental*	
	San Jacinto (river only)	29	7	8	incidental*	
	Sycamore Canyon, Riverside	4	1	1	incidental*	
	Van Buren Blvd at Bountiful, Riverside	2	0	0	incidental*	
	Woodcrest, Riverside	1	1	3	incidental*	
	Wyle Labs @ El Paso only, Norco	0	0	0	incidental*	
	<b>Orange County</b>					
	Carbon Canyon Regional Park	12	4	4	incidental*	
	Irvine Trust Management Area	1	0	0	incidental*	
	Peter's Canyon	18	4	6	incidental*	
	Talbert Marsh	1	0	0	incidental*	
	Yorba Linda Lakebed Park	0	0	0	incidental*	
	Yorba Linda (San Antonio Rd.)	1	1	2	incidental*	
Yorba Linda (Starlight Dr.)	4	1	1	incidental*		
<b>Total</b>	<b>504</b>	<b>200</b>	<b>226</b>			
IERCD	SAR-Goose Creek Norco-I15	71	36	63	monitored	
	San Timoteo Canyon	176	141	287	monitored	
	<b>Total:</b>	<b>247</b>	<b>177</b>	<b>350</b>		
OCWD	Chino Hills	24	6	4	monitored	
	Conrock Basin, OCWD, FHQ, OC	0	0	0	incidental*	
	Irvine Regional Park	24	1	2	incidental*	
	Mockingbird Canyon	37	23	19	sampled	
	Santiago Basin (Santiago Pits)	1	0	0	incidental*	
	Santiago Creek (Chapman Ave)	0	0	0	incidental*	
	Santiago Creek (Cambridge Ave.)	0	0	0	incidental*	
	Santiago Creek (Cannon Ave + Smith Basin)	2	1	0	incidental*	
	Temescal Canyon	123	21	22	sampled	
<b>Total:</b>	<b>211</b>	<b>52</b>	<b>47</b>			
Totals	962	429	623			
( ) subset of SAC and SAR Upstream data						
*Note-incidental sightings only report presence during 1-2 late season visits and do not confirm absence.						

**Table 2: Least Bell’s Vireo, Survey Dates and Breeding Chronology, Monitored & Sampled Sites, 2015**

Santa Ana River & Tributaries	Survey Start Date	Survey End Date	First Arrival Date	50% Arrived	50% Paired	First Nest Found	Last Nest Found	First Fledge Date	Last Fledge Date	Date Last Detected
<b>Monitored Sites</b>										
Prado-Norco Bluffs (Prado Basin)	3/19	7/20	3/19	4/10	4/18	4/8	6/15	4/30	7/10	7/20
Santa Ana Canyon (SAC)	--	--	--	--	--	--	--	--	--	--
Upper Canyon	3/19	8/20	3/19	4/10	n/a	4/10	n/a	5/17	n/a	7/21
Green River Golf Club	3/18	9/11	3/18	4/1	5/6	4/1	6/30	5/3	6/28	8/20
Featherly Park	3/17	9/11	3/17	4/7	4/23	3/24	6/29	5/7	7/6	8/12
Chino Hills	3/10	7/30	4/1	4/15	4/27	4/27	6/16	6/18	6/18	7/30
San Timoteo Canyon	3/18	8/27	3/18	3/31	4/6	3/25	7/2	4/22	7/29	9/6
Santa Ana River: Goose Creek Norco-I-15	3/17	8/4	3/17	4/3	5/29	4/2	6/12	4/29	7/7	8/24
<b>Sampled Sites</b>										
Mockingbird Canyon	4/9	7/31	4/9	4/28	4/28	4/28	6/11	6/17	6/30	8/20
Santa Ana River: Upstream	--	--	--	--	--	--	--	--	--	--
Hidden Valley South	3/19	7/31	3/19	4/28	n/a	n/a	n/a	n/a	n/a	8/20
Hidden Valley North	4/16	7/20	4/16	4/30	4/30	n/a	n/a	n/a	n/a	7/20
SAR Van Buren Blvd. to Riverside Ave.	3/25	7/29	3/25	4/24	6/10	4/20	6/16	4/20	6/26	8/5
Temescal Canyon	4/15	7/28	4/15	4/29	n/a	n/a	n/a	n/a	n/a	7/28

**Table 3: Survey Dates of Sites Listed as Incidental Sites**

<b>Santa Ana River &amp; Tributaries</b>	<b>Survey Date</b>
Carbon Canyon Regional Park	6/19/15 - 7/14/15
Chino Creek Wetlands Park	4/15/15
Clearwater Pkwy @ Glen Helen	7/10/15
Conrock Basin FHQ	6/10/15
Fontana Power Plant	7/10/15
Fresno Canyon	6/30/15
Goldenstar	7/17/15
Harrison Reservoir (aka Mcallister Creek)	6/22/15
Hidden Valley Golf Club	7/16/15
Mead Valley (Cajalco/Aqueduct)	7/10/15
Meridian Conservation Area	4/22/15 - 7/9/15
Sycamore Canyon	7/9/15
Talbert Park	6/24/15 - 7/29/15
Van Buren Blvd. (Bountiful)	6/26/15
Woodcrest	7/17/15
Wyle Labs (at El Paso only)	7/10/15
Yorba Linda (San Antonio Rd)	7/13/15
Yorba Linda (Starlight Dr.)	5/13/15 - 7/8/15
Yorba Linda Lakebed Park	7/15/15
<b>San Jacinto River Sub-Watershed</b>	
Menifee (Salt Creek)	7/28/15
San Jacinto River	7/23/15
<b>Santiago Creek Sub-Watershed</b>	
Irvine Regional Park	4/1/15 - 6/17/15
Irvine Trust Management Area	4/9/15
Peter's Canyon	4/9/15 - 7/9/15
Santiago Basin	3/31/15 - 4/30/15
Santiago Creek (Cambridge Rd)	6/10/15
Santiago Creek (Cannon, incl. Smith Basin)	3/31/15 - 7/8/15
Santiago Creek (Chapman Ave)	6/10/15

**Table 4: Least Bell’s Vireo status and management data, at closely monitored and sampled sites in the Santa Ana River Watershed, California, 2015**

Parameter	USACOE								IERCD		OCWD			Total
	SAR Upstream				Prado Basin – Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)	Chino Hills (monitored)	
	SAR Riverside Ave. to Van Buren Blvd.(sampled)	SAR - Hidden Valley So (sampled)	SAR - Hidden Valley No (sampled)	Upper Canyon (monitored)		Green River Golf Club (monitored)	Featherly Reg. Park (monitored)							
A.	Number of territorial males	109	104	39	30	25	31	65	176	71	37	123	24	834
B.	Number of known pairs (breeding and non-breeding)	37	27	23	17	9	23	38	141	36	23	21	6	401
C.	Number of fledged young observed	33	22	15	43	10	35	37	287	63	19	22	4	590
D.	Projected total recruitment of vireo young (a)	n/a	n/a	n/a	62.9	4.5	36.8	49.4	451	87.5	n/a	n/a	1.8	693.8
E.	Average number of fledglings per pair (C/B)	0.8	0.8	0.7	2.5	1.1	1.5	1.0	2.0	1.8	0.9	1.0	0.7	1.5
F.	Projected number of fledglings per pair (D/B)	n/a	n/a	n/a	3.7	0.5	1.6	1.3	3.2	2.5	n/a	n/a	0.3	1.7
G.	This row purposefully omitted.													
H.	Rate of cowbird nest parasitism	100% (3/3)	n/a	n/a	0% (0/13)	0% (0/1)	0% (0/15)	0% (0/19)	0% (0/114)	0% (0/13)	0% (0/5)	n/a	20% (1/5)	2% (4/188)
I.	This row purposefully omitted.													
J.	This row purposefully omitted.													
K.	This row purposefully omitted.													
L.	This row purposefully omitted.													
M.	Number of field hours –LBV (+)	175	133	17	124	64	130	214	750	352	77	96	60	2192
N.	This row purposefully omitted.													

(a) Survival rate of fledglings in well-tracked nests was applied to nests not visited as frequently by the function (avg. # 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.”



**Table 5: Least Bell's Vireo nest placement preferences at monitored and sampled sites in the Santa Ana River Watershed, 2015**

Host Plant Species (listed in taxonomic order)	USACOE						IERCD		OCWD			Total	Percentage of Total	
	SAR Upstream			Prado Basin - Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)			Chino Hills (monitored)
	SAR Riverside Ave. to Van Buren Blvd. (sampled)	Hidden Valley So (sampled)	Hidden Valley No (sampled)		Upper Canyon (monitored)	Green River Golf Course (monitored)	Featherly Regional Park (monitored)							
Wild Grape ( <i>Vitis girdiana</i> )	2					1		10	4				17	8%
Fremont Cottonwood ( <i>Populus fremontii</i> )						2	5	8					15	7%
Black Cottonwood ( <i>Populus trichocarpa</i> )							1						1	<1%
Narrowleaf Willow ( <i>Salix exigua</i> )							1	2	1	1			5	2%
Black Willow ( <i>Salix gooddingii</i> )				3		2	1	5	4			5	20	9%
Red Willow ( <i>Salix laevigata</i> )						1		20	3	2			26	12%
Arroyo Willow ( <i>Salix lasiolepis</i> )				5			1	24					30	14%
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )								1	1				2	1%
Willow sp. ( <i>Salix</i> sp.)								1	1				2	1%
Toyon ( <i>Heteromeles arbutifolia</i> )								3					3	1%

**Table 5: Least Bell's Vireo nest placement preferences, monitored and sampled sites in the Santa Ana River Watershed, 2015**

	USACOE							IERCD		OCWD			Total	Percentage of Total
	SAR Upstream			Prado Basin - Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)	Chino Hills (monitored)		
	SAR Riverside Ave. to Van Buren Blvd. (sampled)	Hidden Valley So (sampled)	Hidden Valley No (sampled)		Upper Canyon (monitored)	Green River Golf Course (monitored)	Featherly Regional Park (monitored)							
Scrub Oak ( <i>Quercus berberidifolia</i> )								1				1	2	1%
Oak sp. ( <i>Quercus</i> sp.)								1					1	<1%
Black Walnut ( <i>Juglans californica</i> )							1						1	<1%
Laurel Sumac ( <i>Malosma laurina</i> )							1						1	<1%
Peruvian Pepper Tree ( <i>Schinus molle</i> )					1	1							2	1%
Poison Oak ( <i>Toxicodendron diversilobum</i> )						1	2						3	1%
Boxelder ( <i>Acer negundo</i> )								1					1	<1%
Black Mustard ( <i>Brassica nigra</i> )							1						1	<1%
Perennial pepperweed ( <i>Lepidium latifolium</i> )								1					1	<1%
Tamarisk ( <i>Tamarix</i> sp.)								1					1	<1%

**Table 5: Least Bell's Vireo nest placement preferences, monitored and sampled sites in the Santa Ana River Watershed, 2015**

	USACOE							IERCD		OCWD			Total	Percentage of Total
	SAR Upstream			Prado Basin - Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)	Chino Hills (monitored)		
	SAR Riverside Ave. to Van Buren Blvd. (sampled)	Hidden Valley So (sampled)	Hidden Valley No (sampled)		Upper Canyon (monitored)	Green River Golf Course (monitored)	Featherly Regional Park (monitored)							
Mugwort ( <i>Artemisia douglasiana</i> )								1					1	<1%
Mulefat ( <i>Baccharis salicifolia</i> )				5		4	1	34	4			1	49	23%
Poison Hemlock ( <i>Conium maculatum</i> )							1						1	<1%
Blue Elderberry ( <i>Sambucus nigra</i> ssp. <i>caerulea</i> )						3	4	9		2			18	9%
Thick-leaved Yerba Santa ( <i>Eriodictyon crassifolium</i> )							2						2	1%
Wild Grape and Mulefat ( <i>V. girdiana</i> / <i>B. salicifolia</i> )				1									1	<1%
Deadfall								1					1	<1%
Unknown/No data						1		2					3	1%
<b>Total</b>	2	0	0	14	1	16	22	126	18	5	0	7	211	100%

**Table 6: Least Bell's Vireo reproductive success and breeding biology data, monitored and sampled sites in the Santa Ana River Watershed, 2015**

		USACOE							IERCD		OCWD			
		SAR Upstream			Prado Basin- Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)	Chino Hills (monitored)	Total
		SAR Riverside Ave. to Van Buren Blvd. (sampled)	Hidden Valley So (sampled)	Hidden Valley No (sampled)		Upper Canyon (monitored)	Green River Golf Club (monitored)	Featherly Reg. Park (monitored)						
A.	Number of known pairs	37	27	23	17	9	23	38	141	36	23	21	6	401
B.	Number of known breeding (nesting) pairs	27	18	11	17	6	19	30	126	29	16	20	3	322
C.	Number of breeding pairs that were well-monitored throughout the breeding season	0	0	0	3	1	8	9	56	13	0	0	3	93
D.	Number of 'known fledged young' OBSERVED	33	22	15	43	10	35	37	287	63	19	22	4	590
E.	Number of known fledged young produced by pairs monitored throughout the breeding season	n/a	n/a	n/a	11	2	13	12	181	33	n/a	n/a	4	256
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.2	1.2	1.4	2.5	1.7	1.8	1.2	2.3	2.2	1.2	1.1	1.3	1.8
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C) equal reproductive success	n/a	n/a	n/a	3.7	2.0	1.6	1.3	3.2	2.5	n/a	n/a	1.3	2.8
H.	Number of nests that were discovered	11	0	0	14	1	16	22	126	18	5	0	7	220
I.	Number of nests that were regularly monitored or 'tracked'	3	n/a	n/a	13	1	15	19	114	13	5	n/a	5	188
J.	Number of 'tracked' nests that were successful I (% = J/I x 100)	33% (1/3)	n/a	n/a	69% (9/13)	100% (1/1)	47% (7/15)	32% (6/19)	58% (66/114)	77% (10/13)	40% (2/5)	n/a	20% (1/5)	55% (103/188)
K.	This row purposefully omitted.													
L.	Number of 'tracked' nests that were parasitized by cowbirds (%=L/I x 100)	100% (3/3)	n/a	n/a	0% (0/13)	0% (0/1)	0% (0/15)	0% (0/19)	0% (0/114)	0% (0/13)	0% (0/5)	n/a	20% (1/5)	2% (4/188)

**Table 6: Least Bell's Vireo reproductive success and breeding biology data, monitored and sampled sites in the Santa Ana River Watershed, 2015**

		USACOE						IERCD		OCWD				
		SAR Upstream			Prado Basin- Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)	Chino Hills (monitored)	Total
		SAR Riverside Ave. to Van Buren Blvd. (sampled)	Hidden Valley So (sampled)	Hidden Valley No (sampled)		Upper Canyon (monitored)	Green River Golf Club (monitored)	Featherly Reg. Park (monitored)						
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	0% (0/3)	n/a	n/a	15% (2/13)	0% (0/1)	7% (1/15)	5% (1/19)	10% (11/114)	8% (1/13)	20% (1/5)	n/a	20% (1/5)	10% (18/188)
	B. Number of 'tracked" nests that failed as a result of parasitism	0% (0/3)	n/a	n/a	0% (0/13)	0% (0/1)	0% (0/15)	0% (0/19)	0% (0/114)	0% (0/13)	0% (0/5)	n/a	0% (0/5)	0% (0/188)
	C. Number of 'tracked' nests that failed as a result of predation-Predation Rate according to Vireo Working Group	67% (2/3)	n/a	n/a	15% (2/13)	0% (0/1)	47% (7/15)	63% (12/19)	32% (37/114)	15% (2/13)	40% (2/5)	n/a	60% (3/5)	36% (67/188)
	D. Number of 'tracked' nests that failed for unknown reasons	0% (0/3)	n/a	n/a	0% (0/13)	0% (0/1)	0% (0/15)	0% (0/19)	0% (0/114)	0% (0/13)	0% (0/5)	n/a	0% (0/5)	0% (0/188)
N	Average clutch size	3.7	n/a	n/a	3.4	4.0	2.8	3.2	3.3	3.5	3.4	n/a	3.4	3.3
	Number of eggs/Number of clutches	11/3	n/a	n/a	48/14	4/1	42/15	55/17	370/111	42/12	17/5	n/a	17/5	606/183
O.	Number of cowbird eggs found in or near vireo nests	3	n/a	n/a	0	0	n/a	n/a	0	0	0	n/a	1	4
P.	Number of cowbird nestlings removed from 'tracked' nests	0	n/a	n/a	0	0	0	0	0	0	0	n/a	0	0
Q.	Number of cowbird young fledged by vireos	1	n/a	n/a	n/a	n/a	n/a	n/a	0	0	0	n/a	0	1
R.	Number of 'manipulated' parasitized nests	3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1	4
S.	Number of 'successful, manipulated' nests (%=S/R x100)	33% (1/3)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0% (0/1)	25% (1/4)
T.	Number of vireos fledged from "manipulated' parasitized nests	2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	2

**Table 6: Least Bell's Vireo reproductive success and breeding biology data, monitored and sampled sites in the Santa Ana River Watershed, 2015**

		USACOE							IERCD		OCWD			
		SAR Upstream			Prado Basin- Norco Bluffs (monitored)	Santa Ana Canyon			San Timoteo Canyon (monitored)	SAR Goose Creek, Norco to I-15 (monitored)	Mockingbird Canyon (sampled)	Temescal Canyon (sampled)	Chino Hills (monitored)	<b>Total</b>
		SAR Riverside Ave. to Van Buren Blvd. (sampled)	Hidden Valley So (sampled)	Hidden Valley No (sampled)		Upper Canyon (monitored)	Green River Golf Club (monitored)	Featherly Reg. Park (monitored)						
U.	Number of repaired nests	0	n/a	n/a	0	0	0	0	0	0	0	n/a	0	0
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireos fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Table 7: List of all species observed by site**

Species Observed			San Timoteo	MBC	Norco Burn	SAR (upstream)	Norco Bluffs	Temescal	SAC	Chino Hills
<b>Avian Species</b>										
	<b>Common Name</b>	<b>Scientific Name</b>								
1	Canada Goose	<i>Branta canadensis</i>							X	
2	Wood Duck	<i>Aix sponsa</i>							X	
3	Mallard	<i>Anas platyrhynchos</i>	X		X	X	X	X	X	X
4	Bufflehead	<i>Bucephala albeola</i>							X	
5	Ruddy Duck	<i>Oxyura jamaicensis</i>						X		
6	California Quail	<i>Callipepla californica</i>	X	X	X	X		X	X	X
7	Double-crested Cormorant*	<i>Phalacrocorax auritus</i>				X		X	X	
8	Great Blue Heron*	<i>Ardea herodias</i>				X		X	X	
9	Great Egret	<i>Ardea alba</i>	X			X	X	X	X	
10	Snow y Egret	<i>Egretta thula</i>				X		X	X	
11	Green Heron	<i>Butorides virescens</i>	X			X	X			
12	Black-crow ned Night-Heron*	<i>Nycticorax nycticorax</i>				X			X	
13	Turkey Vulture	<i>Cathartes aura</i>	X		X	X		X	X	X
14	White-tailed Kite*	<i>Elanus leucurus</i>	X						X	
15	Sharp-shinned Haw k	<i>Accipiter striatus</i>							X	
16	Cooper's Haw k	<i>Accipiter cooperii</i>	X	X	X	X	X	X	X	X
17	Red-shouldered Haw k	<i>Buteo lineatus</i>	X	X		X		X	X	
18	Red-tailed Haw k	<i>Buteo jamaicensis</i>	X	X	X	X	X	X	X	X
19	Sora	<i>Porzana carolina</i>						X		
20	American Coot	<i>Fulica americana</i>				X		X	X	
21	American Avocet	<i>Recurvirostra americana</i>				X				
22	Killdeer	<i>Charadrius vociferus</i>	X	X		X		X	X	X
23	Spotted Sandpiper	<i>Actitis macularius</i>							X	
24	Wilson's Snipe	<i>Gallinago delicata</i>	X							
25	Forster's Tern	<i>Sterna forsteri</i>						X		
26	Band-tailed Pigeon	<i>Patagioenas fasciata</i>							X	
27	Eurasian Collared Dove	<i>Streptopelia decaocto</i>	X					X	x	
28	Common Ground-Dove	<i>Columbina passerina</i>				X	X		X	
29	Mourning Dove	<i>Zenaida macroura</i>	X	X	X	X	X	X	X	X
30	Greater Roadrunner	<i>Geococcyx californianus</i>	X		X	X	X		X	X
31	Barn Owl	<i>Tyto alba</i>	X		X	X				X
32	Great Horned Owl	<i>Bubo virginianus</i>			X	X				
33	White-throated Sw ift	<i>Aeronautes saxatalis</i>					X	X	X	
34	Black-chinned Hummingbird	<i>Archilochus alexandri</i>	X	X		X		X	X	X
35	Anna's Hummingbird	<i>Calypte anna</i>	X	X	X	X	X	X	X	X
36	Costa's Hummingbird	<i>Calypte costae</i>		X						X

**Table 7: List of all species observed by site cont.**

Species Observed		San Timoteo	MBC	Norco Burn	SAR (upstream)	Norco Bluffs	Temescal	SAC	Chino Hills
<b>Avian Species</b>									
37	Allen's Hummingbird	<i>Selasphorus sasin</i>	X		X	X		X	X
38	Belted Kingfisher	<i>Megaceryle alcyon</i>				X		X	
39	Acorn Woodpecker	<i>Melanerpes formicivorus</i>	X	X	X		X	X	X
40	Nuttall's Woodpecker	<i>Picoides nuttallii</i>	X	X	X	X	X	X	X
41	Dow ny Woodpecker*	<i>Picoides pubescens</i>	X		X	X	X	X	
42	Northern Flicker	<i>Colaptes auratus</i>	X	X	X	X	X	X	
43	American Kestrel	<i>Falco sparverius</i>	X		X		X	X	
44	Western Wood-Pew ee	<i>Contopus sordidulus</i>	X		X			X	X
45	Willow Flycatcher*	<i>Empidonax traillii</i>	X	X	X	X		X	
46	Pacific-slope Flycatcher	<i>Empidonax difficilis</i>	X	X	X			X	
47	Black Phoebe	<i>Sayornis nigricans</i>	X	X	X	X	X	X	X
48	Say's Phoebe	<i>Sayornis saya</i>	X	X	X		X	X	X
49	Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>	X	X	X	X	X	X	X
50	Cassin's Kingbird	<i>Tyrannus vociferans</i>	X						X
51	Western Kingbird	<i>Tyrannus verticalis</i>	X	X	X		X	X	X
52	Least Bell's Vireo*	<i>Vireo bellii pusillus</i>	X	X	X	X	X	X	X
53	Cassin's Vireo	<i>Vireo cassinii</i>				X			
54	Hutton's Vireo	<i>Vireo huttoni</i>	X		X	X			
55	Warbling Vireo	<i>Vireo gilvus</i>	X	X	X			X	X
56	Western Scrub-Jay	<i>Aphelocoma californica</i>	X	X	X	X	X	X	X
57	American Crow	<i>Corvus brachyrhynchos</i>	X	X	X	X	X	X	X
58	Common Raven	<i>Corvus corax</i>	X	X	X	X	X	X	X
59	Horned Lark	<i>Eremophila alpestris</i>		X					X
60	Tree Sw allow *	<i>Tachycineta bicolor</i>	X		X	X	X	X	
61	Northern Rough-w inged Sw allow	<i>Stelgidopteryx serripennis</i>	X		X	X	X	X	
62	Cliff Sw allow	<i>Petrochelidon pyrrhonota</i>					X	X	
63	Barn Sw allow	<i>Hirundo rustica</i>	X		X	X			
64	Oak Titmouse	<i>Baeolophus inornatus</i>	X						
65	Bushtit	<i>Psaltriparus minimus</i>	X	X	X	X	X	X	X
66	Rock Wren	<i>Salpinctes obsoletus</i>					X		
67	House w ren	<i>Troglodytes aedon</i>	X	X	X	X	X	X	X
68	Marsh Wren	<i>Cistothorus palustris</i>					X		
69	Bew ick's Wren	<i>Thryomanes bewickii</i>	X	X	X	X	X	X	X
70	Cactus Wren	<i>Campylorhynchus brunneicapillus</i>						X	
71	California Gnatcatcher*	<i>Polioptila californica</i>					X	X	
72	Ruby-crow ned Kinglet	<i>Regulus calendula</i>	X					X	
73	Wrentit	<i>Chamaea fasciata</i>	X	X	X	X		X	X



**Table 7: List of all species observed by site cont.**

Species Observed		San Timoteo	MBC	Norco Burn	SAR (upstream)	Norco Bluffs	Temescal	SAC	Chino Hills
<b>Avian Species</b>									
74	Western Bluebird	<i>Sialia mexicana</i>	X		X			X	X
75	Swainson's Thrush	<i>Catharus ustulatus</i>				X			
76	Hermit Thrush	<i>Catharus guttatus</i>	X			X		X	X
77	American Robin	<i>Turdus migratorius</i>		X	X			X	X
78	California Thrasher	<i>Toxostoma redivivum</i>	X	X	X	X	X	X	X
79	Northern Mockingbird	<i>Mimus polyglottos</i>	X	X	X		X	X	X
80	European Starling	<i>Sturnus vulgaris</i>	X		X		X	X	X
81	Cedar Waxwing	<i>Bombcilla cedrorum</i>						X	
82	Phainopepla	<i>Phainopepla nitens</i>	X	X	X	X		X	
83	Orange-crowned Warbler	<i>Oreothlypis celata</i>	X					X	
84	Nashville Warbler	<i>Oreothlypis ruficapilla</i>						X	
85	MacGillivray's Warbler	<i>Geothlypis tolmiei</i>	X						
86	Common Yellowthroat	<i>Geothlypis trichas</i>	X	X	X	X	X	X	X
87	Yellow Warbler*	<i>Setophaga petechia</i>	X	X	X	X	X	X	X
88	Yellow-rumped Warbler	<i>Setophaga coronata</i>	X		X	X		X	X
89	Black-throated Gray Warbler	<i>Setophaga nigrescens</i>	X					X	
90	Townsend's Warbler	<i>Setophaga townsendi</i>	X			X			
91	Wilson's Warbler	<i>Cardellina pusilla</i>	X	X	X		X	X	X
92	Yellow-breasted Chat*	<i>Icteria virens</i>	X	X	X	X	X	X	X
93	Spotted Towhee	<i>Pipilo maculatus</i>	X	X	X	X	X	X	X
94	California Towhee	<i>Melospiza crissalis</i>	X	X	X	X	X	X	X
95	Lark Sparrow	<i>Chondestes grammacus</i>	X					X	
96	Savannah Sparrow*	<i>Passerculus sandwichensis</i>	X						
97	Song Sparrow	<i>Melospiza melodia</i>	X	X	X	X	X	X	X
98	Lincoln's Sparrow	<i>Melospiza lincolnii</i>	X						
99	White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	X	X	X	X		X	X
100	Dark-eyed Junco	<i>Junco hyemalis</i>			X				
101	Western Tanager	<i>Piranga ludoviciana</i>	X				X	X	X
102	Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	X	X	X	X	X	X	X
103	Blue Grosbeak	<i>Passerina caerulea</i>	X	X	X	X		X	
104	Red-winged Blackbird	<i>Agelaius phoeniceus</i>	X				X	X	
105	Tri-colored Blackbird*	<i>Agelaius tricolor</i>						X	
106	Western Meadowlark	<i>Sturnella neglecta</i>	X		X			X	
107	Yellow-headed Blackbird*	<i>Xanthocephalus xanthocephalus</i>	X						
108	Brewer's Blackbird	<i>Euphagus cyanocephalus</i>							X
109	Great-tailed Grackle	<i>Quiscalus mexicanus</i>					X	X	
110	Brown-headed Cowbird (I)	<i>Molothrus ater</i>	X	X	X	X	X	X	X

**Table 7: List of all species observed by site cont.**

Species Observed		San Timoteo	MBC	Norco Burn	SAR (upstream)	Norco Bluffs	Temescal	SAC	Chino Hills
<b>Avian Species</b>									
111	Hooded Oriole	<i>Icterus cucullatus</i>	X		X		X	X	X
112	Bullock's Oriole	<i>Icterus bullockii</i>	X	X		X	X	X	X
113	House Finch	<i>Haemorhous mexicanus</i>	X	X	X	X	X	X	X
114	Lesser Goldfinch	<i>Spinus psaltria</i>	X	X	X	X	X	X	X
115	Lawrence's Goldfinch	<i>Spinus lawrencei</i>	X			X	X		X
116	American Goldfinch	<i>Spinus tristis</i>	X	X	X			X	X
117	House Sparrow (I)	<i>Passer domesticus</i>	X	X			X	X	X
118	Nutmeg Mannikin (I)	<i>Lonchura punctulata</i>			X	X		X	X
119	Pin-tailed Whydah	<i>Vidua macroura</i>						X	X
<b>Mammals (tracks/traps and other evidence used)</b>									
	<b>Common Name</b>	<b>Scientific Name</b>							
1	Virginia Opossum (I)	<i>Didelphis virginiana</i>				X			
2	Desert Shrew	<i>Notiosorex crawfordi</i>	X						
3	Bats	n/a						X	
4	San Diego Black-tailed Jackrabbit*	<i>Lepus californicus bennettii</i>	X	X			X		
5	Desert Cottontail	<i>Sylvilagus audubonii</i>	X	X	X	X	X	X	X
6	Western Gray Squirrel	<i>Sciurus griseus</i>	X						
7	Eastern Fox Squirrel	<i>Sciurus niger</i>						X	X
8	California Ground Squirrel	<i>Otospermophilus beecheyi</i>	X	X	X	X	X	X	X
9	Botta's Pocket Gopher	<i>Thomomys bottae</i>	X					X	
10	California Meadow Vole	<i>Microtus californicus</i>	X						
11	Dusky-footed Woodrat (nest)	<i>Neotoma fuscipes</i>	X						
12	Deer Mouse	<i>Peromyscus maniculatus</i>	X						
13	Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	X						
14	Coyote	<i>Canis latrans</i>	X		X	X	X	X	
15	Domestic Dog (loose in habitat)	<i>Canis familiaris</i>			X				
16	Raccoon	<i>Procyon lotor</i>	X		X	X	X	X	
17	Striped Skunk	<i>Mephitis mephitis</i>	X		X	X			
18	Bobcat*	<i>Lynx rufus</i>	X					X	
19	Long-tailed Weasel*	<i>Mustela frenata</i>	X						
20	Mule Deer	<i>Odocoileus hemionus</i>	X		X			X	
21	Feral Pig (I)	<i>Sus scrofa</i>	X		X	X			
22	Wild Burro (I)	<i>Equus asinus</i>	X						
<b>Herpetofauna (tracks/traps and other evidence used)</b>									
	<b>Common Name</b>	<b>Scientific Name</b>							
1	California Toad	<i>Anaxyrus boreas</i>	X		X			X	
2	Baja California Treefrog	<i>Pseudacris hypochondriaca</i>	X		X			X	

**Table 7: List of all species observed by site cont.**

Species Observed		San Timoteo	MBC	Norco Burn	SAR (upstream)	Norco Bluffs	Temescal	SAC	Chino Hills
<b>Herpetofauna</b> (tracks/traps and other evidence used)									
3	Bullfrog (I)	<i>Lithobates catesbeiana</i>	X		X	X	X	X	
4	African Claw ed Frog (I)	<i>Xenopus laevis</i>			X			X	
5	Southern Alligator Lizard	<i>Elgaria multicarinatus</i>	X	X	X	X			
6	Orange-throated Whiptail*	<i>Aspicoscelis hyperythra beldingi</i>	X	X			X		
7	Tiger Whiptail	<i>Aspidoscelis tigris</i>	X				X	X	
8	Western Fence Lizard	<i>Sceloporus occidentalis</i>	X	X	X	X	X	X	X
9	Granite Spiny Lizard*	<i>Sceloporus orcutti</i>		X			X		
10	Side-blotched Lizard	<i>Uta stansburiana</i>	X	X	X	X	X	X	X
11	Blainville's Horned Lizard*	<i>Phrynosoma blainvillii</i>		X	X		X	X	
12	California Kingsnake	<i>Lampropeltis californiae</i>	X		X				
13	Coachw hip/Red Racer	<i>Coluber flagellum</i>	X	X	X			X	
14	San Diego Gopher Snake	<i>Pituophis catenifer</i>	X		X		X	X	
15	Southern Pacific Rattlesnake	<i>Crotalus oreganus helleri</i>	X					X	
16	Red-eared Slider Turtle (I)	<i>Trachemys scripta elegans</i>			X		X	X	
17	Texas Spiny Softshell Turtle (I)	<i>Apalone spinifera</i>						X	
<b>Fish</b>									
	<b>Common Name</b>	<b>Scientific Name</b>							
1	Arroyo Chub*	<i>Gila orcuttii</i>			X				
2	Santa Ana Sucker*	<i>Catostomus santaanae</i>			X				
3	Non-native Fish	<i>various species</i>	X		X	X		X	
(*) - Denotes Threatened, Endangered and Sensitive species listed by the U.S. Fish and Wildlife Service, California Department of Fish and Wildlife and multiple Habitat Conservation Plans covering the watershed. (I) - Denotes non-native, invasive species. <b>Note:</b> This list is not intended as a complete species list for these sites. This is a list of species observed in the riparian zone and adjacent habitat, caught in cowbird traps, caught in herpetofauna traps (San Timoteo only) or otherwise observed during vireo monitoring from March 15 to August 15, 2015.									

**Table 8: 2015 Observations of Sensitive Species by Location**

Common Name	Scientific Name	USACOE				IERCD			Orange County				
		Santa Ana Canyon (SAC)	Santa Ana River: Upstream	Norco Bluffs, I-15 to River Rd	Other*	SAR-Goose Creek, Norco to I-15	San Timoteo Canyon	Other*	Chino Hills	Mockingbird Canyon	Santiago Creek - Irvine Park	Temescal Canyon	Other*
<b>Avian</b>													
White-tailed Kite	<i>Elanus leucurus</i>	1					1						
Northern Harrier	<i>Circus cyaneus</i>							1					
Cooper's Hawk	<i>Accipiter cooperii</i>	1	3	1	3	5	2				1		
California Least Tern	<i>Stemula antillarum browni</i>											1 (nest)	
Downy Woodpecker	<i>Picoides pubescens</i>	2	9		1	8	4						
Merlin	<i>Falco columbarius</i>						1						
Willow Flycatcher	<i>Empidonax traillii</i>	2		2		1	10		1				
Loggerhead Shrike	<i>Lanius ludovicianus</i>						1						
Horned Lark	<i>Eremophila alpestris</i>								10-15				
Tree Swallow	<i>Tachycineta bicolor</i>	1			3		4				1		
Coastal Cactus Wren	<i>Campylorhynchus brunneicapillus</i>				1				1				
California Gnatcatcher	<i>Poliptila californica</i>	7			1					1	2	5	
Yellow Warbler	<i>Setophaga petechia</i>	115	190	34	24	51	253		4	18		95	
Wilson's Warbler	<i>Cardellina pusilla</i>						3	1		2			
Yellow-breasted Chat	<i>Icteria virens</i>	30	110	19	17	33	28		5	2		1	
Rufous-crowned Sparrow	<i>Aimophila ruficeps canescens</i>							1					
Lincoln's Sparrow	<i>Melospiza lincolni</i>						1						
Tricolored Blackbird	<i>Agelaius tricolor</i>	1											
<b>Mammal</b>													
San Diego Black-tailed Jackrabbit	<i>Lepus californicus bennettii</i>				2		1			5			
Long-tailed Weasel	<i>Mustela frenata</i>		1				1						
American Badger	<i>Taxidea taxus</i>				1								
Coyote	<i>Canis latrans</i>						5						
<b>Reptiles</b>													
Blainville's Horned Lizard	<i>Phrynosoma blainvillii</i>		2			1						1	
Granite Spiny Lizard	<i>Sceloporus orcutti</i>								5			1	
Orange-throated Whiptail	<i>Aspidoscelis hyperythra beldingi</i>				1		12		2			1	
Tiger Whiptail	<i>Aspidoscelis tigris</i>				1		1						
<b>Fish</b>													
Arroyo Chub	<i>Gila orcuttii</i>		2										
Santa Ana Sucker	<i>Catostomus santaanae</i>		130										

Other\* - Includes incidental sightings at sites other than those within managed or sampled areas

Sensitive species are those listed as endangered, threatened, or species of concern by the resource agencies and/or covered by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP). Observations are minimum numbers of territories and/or individuals observed. Detailed information is reported to the California Natural Diversity Database (CNDDDB).

**Table 9: Brown-headed Cowbird Trapping Results, March-July 2015 (grouped by funding source)**

Site Name	Trap/Location	2015 Dates of Operation	Number of Trap Days	Cowbirds Removed				Daily Removed Averages		BHCO Field Hours
				Total	Male	Female	Juveniles	Adults	All	
<b>USFWS/Corps/SARM Project</b>										
<b>Santa Ana River (upstream)</b>	15Prado-Jurupa Trap	3/30-7/29	112	0	0	0	0	0.00	0.00	
	15Prado-Riverdale Trap	3/30-7/29	112	11	5	4	2	0.08	0.10	
	15SAC_SAR-Crestmore Trap	5/11-7/29	78	19	8	6	5	0.18	0.24	
<b>Subtotal</b>			<b>302</b>	<b>30</b>	<b>13</b>	<b>10</b>	<b>7</b>	<b>0.08</b>	<b>0.10</b>	<b>104</b>
<b>Mockingbird Canyon</b>										
	15Prado-Reservoir	3/19-7/30	128	52	30	19	3	0.38	0.41	
	15Prado-Estates	3/19-7/30	128	11	5	4	2	0.07	0.09	
<b>Subtotal</b>			<b>256</b>	<b>63</b>	<b>35</b>	<b>23</b>	<b>5</b>	<b>0.23</b>	<b>0.25</b>	<b>117</b>
<b>Prado</b>										
	15Prado-Mill Creek Trap	3/30-7/31	114	5	2	2	1	0.04	0.04	
	15Prado-Trailer Trap	3/30-7/31	114	4	2	1	1	0.03	0.04	
	15Prado-Chino Hills Water Tank	3/26-7/25	119	-4	-2	-2	0	-0.03	-0.03	
	15Prado-IEUA	3/26-7/25	119	23	7	15	1	0.18	0.19	
	15Prado-Prado Regional Park	3/26-7/29	123	42	10	32	0	0.34	0.34	
	15Prado-Olive Grove	3/26-7/24	118	1	0	0	1	0.00	0.01	
<b>Subtotal</b>			<b>707</b>	<b>71</b>	<b>19</b>	<b>48</b>	<b>4</b>	<b>0.09</b>	<b>0.10</b>	
<b>Dairies</b>										
	15Prado-Heifer Trap	3/31-7/31	113	17	15	-5	7	0.09	0.15	
	15Prado-Euclid1	3/26-7/30	124	50	24	19	7	0.35	0.40	
	15Prado-Euclid2	3/26-7/31	125	207	99	46	62	1.16	1.66	
	15Prado-DeJong Trap	3/20-7/31	93	435	272	152	11	4.56	4.68	
<b>Subtotal</b>			<b>455</b>	<b>709</b>	<b>410</b>	<b>212</b>	<b>87</b>	<b>1.37</b>	<b>1.56</b>	<b>617</b>
<b>Santa Ana Canyon</b>										
	15SAC-Yorba Trap	4/2-7/27	117	29	18	9	2	0.23	0.25	
	15SAC-Savi Trap	3/26-7/27	124	9	1	7	1	0.06	0.07	
	15SAC-RV-W	3/25-7/29	127	0	0	0	0	0.00	0.00	
	15SAC-RV-E	3/25-7/29	127	6	3	3	0	0.05	0.05	
	15SAC-GR-W	3/24-7/21	109	3	2	1	0	0.03	0.03	
	15SAC-GR-E	3/25-7/30	128	29	15	11	3	0.20	0.23	
	15SAC-GR-Eq	3/24-7/31	129	14	11	3	0	0.11	0.11	
<b>Subtotal</b>			<b>861</b>	<b>90</b>	<b>50</b>	<b>34</b>	<b>6</b>	<b>0.10</b>	<b>0.10</b>	<b>479</b>
<b>TOTAL (USFWS/Corps/SARM)</b>			<b>2581</b>	<b>963</b>	<b>527</b>	<b>327</b>	<b>109</b>	<b>0.33</b>	<b>0.37</b>	<b>1317</b>
<b>IERCD</b>										
<b>San Timoteo</b>	15ST-BHCO-I-18	3/23-7/30	124	-1	0	-1	0	-0.01	-0.01	
	15ST-BHCO-Bees	3/23-7/30	124	1	0	0	1	0.00	0.01	
	15ST-BHCO-English	3/23-7/30	124	2	0	0	2	0.00	0.02	
	15ST-BHCO-Headlee	3/23-7/31	125	100	55	44	1	0.79	0.80	
	15ST-BHCO-Harned	3/24-7/31	125	22	11	8	3	0.15	0.18	
	15ST-BHCO-Fishermans	3/24-7/31	125	32	23	8	1	0.25	0.26	
	15ST-BHCO-YL1	3/24-7/31	125	4	-1	5	0	0.03	0.03	
	15ST-BHCO-YL3	3/24-7/30	124	9	3	6	0	0.07	0.07	
<b>Subtotal</b>			<b>996</b>	<b>169</b>	<b>91</b>	<b>70</b>	<b>8</b>	<b>0.16</b>	<b>0.17</b>	<b>399</b>
<b>Santa Ana River – Norco</b>										
	15GC 1 Trap	3/23-7/27	113	-1	-1	0	0	-0.01	-0.01	
	15GC 2 Trap	3/23-7/27	113	30	13	17	0	0.27	0.27	
<b>Subtotal</b>			<b>226</b>	<b>29</b>	<b>12</b>	<b>17</b>	<b>0</b>	<b>0.13</b>	<b>0.13</b>	<b>118</b>
<b>Riverside Land Conservancy</b>										
<b>Meridian C.A. (former March SKR Preserve)</b>	15Meridian-Meridian 1	3/18-7/30	130	2	2	0	0	0.02	0.02	
	15Meridian-Meridian 2	3/18-7/30	130	6	0	2	4	0.02	0.05	
	<b>Subtotal</b>			<b>260</b>	<b>8</b>	<b>2</b>	<b>2</b>	<b>4</b>	<b>0.02</b>	<b>0.03</b>
<b>City of Chino Hills English Channel</b>										
	15CH-Boys Republic	4/6-7/27	110	34	15	15	4	0.27	0.31	
	15CH-McCoy	4/6-7/27	109	42	31	9	2	0.37	0.39	
<b>Subtotal</b>			<b>219</b>	<b>76</b>	<b>46</b>	<b>24</b>	<b>6</b>	<b>0.32</b>	<b>0.35</b>	<b>95</b>
<b>GRAND TOTAL</b>			<b>4282</b>	<b>1245</b>	<b>678</b>	<b>440</b>	<b>127</b>	<b>0.26</b>	<b>0.29</b>	<b>2052</b>

**Table 10: Non-target Avian Captures in Brown-headed Cowbird Traps, March-July 2015**

2015 Non-target Species*		USFWS/ACOE/SARM										IERCD				Riverside Land Conservancy		City of Chino Hills - English Channel		2015 Total	
		Santa Ana River (upstream)		Mockingbird Canyon		Prado		Dairies		Santa Ana Canyon		San Timoteo		Santa Ana River-Norco		Meridian C.A.		Hills - English Channel		Total	
Common Name	Scientific Name	caught	died	caught	died	caught	died	caught	died	caught	died	caught	died	caught	died	caught	died	caught	died	caught	died
California Towhee	<i>Melospiza crissalis</i>	10	0	79	2	85	3			282	1	204	6	24	0	61	1	12	0	757	13
House Finch	<i>Carpodacus mexicanus</i>	59	1	102	8	115	4	1	0	45	0	36	2	1	0	7	1	6	0	372	16
Red-winged Blackbird	<i>Agelaius phoeniceus</i>			4	0	9	0	99	1	3	0	85	0							200	1
Lark Sparrow	<i>Chondestes grammacus</i>			1	0							129	1			29	3			159	4
Song Sparrow	<i>Melospiza melodia</i>					52	1			2	1	21	0							75	2
Northern Mockingbird	<i>Mimus polyglottos</i>			1	0	17	1	6	0	1	0	1	0					1	0	27	1
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>							10	0			12	0							22	0
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>					8	0					1	0							9	0
House Wren	<i>Troglodytes aedon</i>	2	1			1	1					2	1	3	0					8	3
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>							7	0			1	0							8	0
Hooded Oriole	<i>Icterus cucullatus</i>	1	0	2	0	1	0			2	1									6	1
Cooper's Hawk	<i>Accipiter cooperii</i>									1	0	1	0			3	0			5	0
Bewick's Wren	<i>Thryomanes bewickii</i>									4	2	1	0							5	2
Bullock's Oriole	<i>Icterus bullockii</i>			1	1	3	0													4	1
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>									2	0	1	0							3	0
Western Bluebird	<i>Sialia mexicana</i>									2	0									2	0
Tri-colored Blackbird	<i>Agelaius tricolor</i>									2	0									2	0
Great-tailed Grackle	<i>Quiscalus mexicanus</i>							2	0											2	0
Black Phoebe	<i>Sayornis nigricans</i>							1	0											1	0
Western Kingbird	<i>Tyrannus verticalis</i>			1	0															1	0
California Thrasher	<i>Toxostoma redivivum</i>											1	0							1	0
Spotted Towhee	<i>Pipilo maculatus</i>					1	0													1	0
<b>TOTALS</b>		<b>72</b>	<b>2</b>	<b>191</b>	<b>11</b>	<b>292</b>	<b>10</b>	<b>126</b>	<b>1</b>	<b>346</b>	<b>5</b>	<b>496</b>	<b>10</b>	<b>28</b>	<b>0</b>	<b>100</b>	<b>5</b>	<b>19</b>	<b>0</b>	<b>1670</b>	<b>44</b>
#/trap day		0.2		0.7		0.4		0.3		0.4		0.5		0.1		0.4		0.1		0.4	
Mortality %			2.8%		5.8%		3.4%		0.8%		1.4%		2.0%		0.0%		5.0%		0.0%		2.6%

\*Number of dead non-targets included in number caught

**Non-native Captures in Brown-headed Cowbird Traps, March-July 2015**

2015 Non-native Species**		USFWS/ACOE/SARM										IERCD				Riverside Land Conservancy		City of Chino Hills - English Channel		2015 Total	
		Santa Ana River (upstream)		Mockingbird Canyon		Prado		Dairies		Santa Ana Canyon		San Timoteo		Santa Ana River-Norco		Meridian C.A.		Hills - English Channel		Total	
Common Name	Scientific Name	removed	released	removed	released	removed	released	removed	released	removed	released	removed	released	removed	released	removed	released	removed	released	removed	released
House Sparrow	<i>Passer domesticus</i>	57	0			113	38	166	50			55						1		392	88
European Starling	<i>Sturnus vulgaris</i>			1				341	50	149	109	9								500	159
Nutmeg Mannikin	<i>Lonchura punctulata</i>									4										0	4
<b>TOTALS</b>		<b>57</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>113</b>	<b>38</b>	<b>507</b>	<b>100</b>	<b>149</b>	<b>113</b>	<b>64</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>892</b>	<b>251</b>

\*\*Non-natives removed under CDFW authorization to control Brown-headed Cowbirds

**Table 11: Brown-headed Cowbird Trapping Results, Winter 2014-2015**

Monitored Site	Trap/Location	Dates of Operation	Number of Trap Days	Cowbirds Removed				Daily Removed Averages	
				Total	Male	Female	Juveniles	Adults	All
<b>Temescal</b>	Dejong's Dairy	7/28-10/31/14	62	997	258	348	391	9.8	16.1
<b>Santa Ana Canyon</b>	Green River EQ	7/30-11/21/14	73	541	127	205	209	4.5	7.4
<b>San Jacinto</b>	Oostdam	7/28-11/20/14	110	78	16	37	25	0.5	0.7
	Vanderwoude	7/28-11/21/14	111	786	152	173	461	2.9	7.1
	Vanderwoude 2	7/28-11/21/14	111	757	184	199	374	3.5	6.8
	CBJ 2	7/28-11/20/14	110	157	27	49	81	0.7	1.4
	Tuls 1	7/28-11/20/14	110	659	239	375	45	5.6	6.0
	Tuls 2	7/28-11/21/14	111	822	447	315	60	6.9	7.4
	Scott Brothers	7/28-11/20/14	110	297	37	82	178	1.1	2.7
<b>Subtotal</b>			<b>773</b>	<b>3556</b>	<b>1102</b>	<b>1230</b>	<b>1224</b>	<b>3.0</b>	<b>4.6</b>
<b>TOTAL</b>			<b>908</b>	<b>5094</b>	<b>1487</b>	<b>1783</b>	<b>1824</b>	<b>3.6</b>	<b>5.6</b>

**Table 12: Non-target Avian Captures in Brown-headed Cowbird Traps, Winter 2014-15**

2014-2015 Winter Non-target Species		Temescal		Santa Ana Canyon		San Jacinto		TOTAL	
Common Name	Scientific Name	caught	died	caught	died	caught	died	caught	died
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	7	0			36	1	43	1
California Towhee	<i>Melospiza crissalis</i>			8	0			8	0
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	2	0	1	0	2	0	5	0
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>			5	0			5	0
Cooper's Hawk	<i>Accipiter cooperii</i>					4	0	4	0
House Finch	<i>Carpodacus mexicanus</i>					3	0	3	0
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>					2	0	2	0
Sharp-shinned Hawk	<i>Accipiter striatus</i>					1	0	1	0
American Kestrel	<i>Falco sparverius</i>					1	0	1	0
Tricolored Blackbird	<i>Agelaius tricolor</i>					1	0	1	0
<b>TOTAL</b>		<b>9</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>50</b>	<b>1</b>	<b>73</b>	<b>1</b>
<b>#/trap day</b>		0.1		0.2		0.1		0.4	
<b>Mortality %</b>			0.0%		0.0%		2.0%		1.4%

**Non-native Captures in Brown-headed Cowbird Traps, July-November 2014**

		Temescal		Santa Ana Canyon		San Jacinto		TOTAL	
Common Name	Scientific Name	removed	released	removed	released	removed	released	removed	released
European Starling	<i>Sturnus vulgaris</i>		41		11	5	65	5	117
House Sparrow	<i>Passer domesticus</i>		2			0	48	0	50
Eurasian Collared Dove	<i>Streptopelia decaocto</i>					0	1	0	1
<b>TOTAL</b>		<b>0</b>	<b>43</b>	<b>0</b>	<b>11</b>	<b>5</b>	<b>114</b>	<b>5</b>	<b>168</b>



## APPENDIX A – SURVEY SITES, STARTING AND ENDING COORDINATES

(All coordinates – NAD83 (Zone 11S) except where noted otherwise)

### Monitored and Sampled Locations

<u>Survey Site</u>	<u>Starting Coordinates</u>	<u>Ending Coordinates</u>
<u>Santa Ana Canyon (SAC):</u>		
-Upper Canyon	440677, 3749724	438736, 3749743
-Green River Golf Club	438736, 3749743	436675, 3748403
-Featherly Park	436613, 3748409	430885, 3748343
<u>Santa Ana River (SAR):</u>		
-Riverside Ave. to Hidden Valley	466416, 3765008	455523, 3757886
-Hidden Valley, north side of river	456941, 3758360	451564, 3758587
-Hidden Valley, south side of river	455523, 3757886	451482, 3757751
-SAR-Goose Creek, Norco to I-15	451560, 3758574	448816, 3756435
-Norco Bluffs (I-15 to River Rd, non-mitigation)	448907, 3756725	444876, 3753717
<u>San Timoteo:</u>		
-Riverside County	484684, 3762635	497456, 3754712
-San Bernardino County	480757, 3765851	484684, 3762635
Chino Hills	438975, 3754612	435670, 3757858
Mockingbird Canyon	464564, 3747454	469570, 3747070
Temescal Canyon	471486, 3720612	450724, 3746925

### Incidental Sighting Locations

<u>Survey Site</u>	<u>Starting Coordinates</u>	<u>Ending Coordinates</u>
<u>Santa Ana River &amp; Tributaries:</u>		
Alessandro Arroyo*	465424, 3754439	470391, 3751168
Arlington Falls*	453856, 3748925	454753, 3748301
Box Springs*	472592, 3756430	471538, 3757620
Cajalco Creek*	453805, 3742988	453767, 3743230
Cajon Wash*	457350, 3795730	457285, 3791752
Canyon Crest*	468569, 3757034	468569, 3757034
Carbon Canyon (Chino Hills Pkwy)*	431484, 3760317	430579, 3758914
Carbon Canyon (Western Hills Golf Club)*	429466, 3758320	429755, 3758496
Carbon Canyon Regional Park	425027, 3753806	425732, 3753995
Castlevew Park*	468185, 3754936	468206, 3754970
Chino Creek Wetlands Park	437620, 3758246	437395, 3758840
Chino Hills (Bayberry Dr.)*	432335, 3758297	431780, 3758507
Chino Hills (End of Eucalyptus)*	428612, 3759298	428291, 3759409
Chino Hills (Eucalyptus/Del Monte)****	430160, 3760140	430259, 3760276
Chino Hills (Eucalyptus/Rancho Hills)****	429001, 3759503	429108, 3759352
Chino Hills (Soquel Canyon/Pipeline)****	433994, 3757719	433991, 3757231
Chino Hills Community Park (Euc/Peyton)	432645, 3761036	430652, 3761849

**Incidental Sighting Locations (cont.)**

<b><u>Survey Site</u></b>	<b><u>Starting Coordinates</u></b>	<b><u>Ending Coordinates</u></b>
Chino Hills State Park (Bane Cyn)*	435061, 3757365	435376, 3753499
Chino Hills State Park (Easy Street Trail)*	427838, 3752393	427876, 3752942
Chino Hills State Park (Lower Aliso Cyn)*	435288, 3753302	438033, 3749528
Chino Hills State Park (Telegraph Cyn)*	434818, 3753694	424101, 3753165
Chino Hills State Park (Upper Aliso Cyn)*	435216, 3753358	433824, 3765039
City Creek (Highland) *	482191, 3775640	482706, 3778340
Clearwater Pkwy @ Glen Helen	462009, 3784622	461556, 3783760
Conrock Basin (FHQ)	423314, 3746089	423465, 3746370
Corona St. at Gilmore*	448093, 3750572	448406, 3750398
Fontana Power Plant	463472, 3779349	463819, 3779791
Fresno Canyon	439703, 3749067	440954, 3749370
Gavilan Hills*	466730, 3741552	466846, 3740837
Goldenstar	465377, 3751436	467227, 3750525
Harrison Reservoir (aka McAllister Creek)	473365, 3749501	472669, 3751760
Hidden Valley Golf Club	451644, 3752551	452349, 3753225
La Sierra*	457824, 3747117	457504, 3748808
Little Sand Basin*	478157, 3779714	478805, 3780527
Mead Valley (Cajalco/aqueduct)	471763, 3744714	470180, 3744057
Menifee-Haun Rd*	483716, 3725045	483706, 3724364
Menifee-Paloma H. S.*	482515, 3725307	481557, 3724847
Meridian CA (former March SKR Preserve)	473397, 3749383	470485, 3752133
Motte Rimrock Preserve*	475973, 3740183	475893, 3739398
Norco Hills Park Mitigation*	449570, 3751384	448340, 3751225
Oak Glen Preserve*	505148, 3766841	505153, 3766838
Plunge Creek*	486861, 3774671	487048, 3775724
Poorman Reservoir*	476434, 3758610	477243, 3757320
Prenda Arroyo*	465354, 3752493	470270, 3750320
Promenade*	451350, 3749618	451336, 3749919
Pyrite Channel*	456496, 3762175	453872, 3759586
Quail Run*	470673, 3757379	470399, 3757380
Riverwalk Park*	454365, 3751010	454281, 3752276
San Jacinto	506079, 3738423	502379, 3742413
Santa Rosa Mine Road*	471840, 3737819	471012, 3738146
Steele Valley*	471322, 3736485	471266, 3735608
Sun Canyon Park*	454614, 3749211	454788, 3749119
Sycamore Canyon	470287, 3756422	473225, 3753435
Talbert Park (Orange County)	411746, 3722974	411911, 3723740
Tequesquite Arroyo*	467671, 3756303	467760, 3756586
Van Buren Blvd. (Bountiful)	469933, 3750024	469693, 3750007
Van Buren Blvd. (Plummer Rd-So.)***	471776, 3749514	473308, 3749439
Van Buren (Porter Road)*	467009, 3749689	466508, 3749973

**Incidental Sighting Locations (cont.)**

<b><u>Survey Site</u></b>	<b><u>Starting Coordinates</u></b>	<b><u>Ending Coordinates</u></b>
Wardlow Wash*	443306, 3747252	441873, 3749262
Woodcrest	465362, 3751501	465419, 3751271
Wyle Labs (at El Paso only)	450068, 3751818	450068, 3751818
Yorba Linda (Mud Canyon)*	431693, 3750752	431200, 3750802
Yorba Linda (San Antonio Rd)	429199, 3750653	429322, 3750942
Yorba Linda (Starlight Dr.)	431134, 3749819	430989, 3750218
Yorba Linda Lakebed Park	424530, 3748301	424909, 3749091

**San Jacinto River Sub-watershed:**

Cottonwood Canyon*	475633, 3725415	477503, 3724023
Kabian Park*	475841, 3730880	476184, 3783238
Lake Perris*	483092, 3744484	485461, 3748329
Menifee (Salt Creek)	478164, 3726524	479548, 3727246

**Santiago Creek Sub-watershed:**

Irvine Trust Management Area	429806, 3738346	429896, 3738306
Limestone Canyon*	434012, 3736548	434913, 3735769
Peters Canyon	429752, 3738563	428604, 3735584
Santiago Basin	425344, 3740796	424678, 3740612
Santiago Canyon (Irvine Park)	440662, 3755052	429119, 3741253
Santiago Creek (above Irvine Lake)*	437201, 3736263	435405, 3737556
Santiago Canyon Rd*	434949, 3735740	431995, 3736775
Santiago Creek (Cambridge Road)	421793, 3737067	421619, 3737952
Santiago Creek (Cannon Road, incl. Smith Basin)	425540, 3741436	428079, 3742770
Santiago Creek (Chapman Ave.)	423116, 3738554	423740, 3739316
Santiago Oaks Regional Park*	428069, 3742690	429133, 3742111
Silverado Canyon*	437692, 3734768	438878, 3734047

**Miscellaneous Locations**

<b><u>Survey Site</u></b>	<b><u>Starting Coordinates</u></b>	<b><u>Ending Coordinates</u></b>
East Coyote Hills Preserve*	415417, 3750601	417337, 3751214
Etiwanda Preserve*	451769, 3780654	451186, 3787544
Mount Baldy (Shinn Rd)*	437794, 3781816	437765, 3782398
Murrieta Creek*	476609, 3716171	476299, 3715809
Rancho La Sierra West*	453521, 3757910	453547, 3757077
Santa Ana River (Market St to Mission St)**	464716, 3762626	463659, 3761240
University of California, Riverside*	470131, 3759262	470131, 3759262

\*Denotes sites that were not surveyed this year.

\*\*Site now falls within the 2015 monitored site "SAR - Riverside Dr. to Hidden Valley"

\*\*\*Site now falls within the 2015 monitored site "Meridian CA (former March SKR Preserve)"

\*\*\*\*Sites now fall under 2015 monitored site "Chino Hills"

## **APPENDIX B: WATERSHED ANNUAL RESULTS 2010-2015**

**Appendix B-1: Least Bell's Vireo status and management and Brown-headed Cowbird management data at closely monitored sites in the Santa Ana River Watershed, California, 2000-2014, and at monitored and sampled sites in 2015.**

	Parameter	2000-2009	2010	2011	2012	2013	2014	2015	Total
A.	Number of territorial males	n/a	654	641	599	769	814	834	n/a
B.	Number of pairs (breeding and non-breeding)	1,737	450	407	380	374	390	401	4,139
C.	Number of fledged young observed	3,203	613	626	494	611	472	590	6,609
D.	Projected total recruitment of vireo young (a)	4,584	1,065	1,080	982	830	597	694	9,832
E.	Average number of fledglings per pair (C/B)	1.8	1.4	1.5	1.3	1.6	1.2	1.5	1.6
F.	Projected number of fledglings per pair (D/B)	2.6	2.4	2.7	2.6	2.2	1.5	1.7	2.4
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests)	39% (467/1185)	43% (60/138)	40% (82/204)	39% (48/123)	*40% (67/167)	54% (80/149)	n/a	41% (804/1966)
H.	Rate of cowbird nest parasitism	17% (204/1185)	5% (7/138)	2% (5/204)	5% (6/123)	4% (7/167)	5% (8/149)	2% (4/188)	11% (241/2154)
I.	Numbers of cowbirds removed from study area	18,590	3,093	2,444	2,823	1,945	1,271	1,245	31,411
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	41,691	6,992	6,333	5,190	6,355	5,290	4,252	76,103
L.	Average number of cowbirds trapped per trap day (I/K)	0.5	0.4	0.4	0.5	0.3	0.2	0.3	0.4
M.	Number of field hours –LBV (+)		2,589	2,738	2,364	2,942	1,952	2,192	
N.	Number of field hours – BHCO (+)	39,014	3,239	3,281	2,838	2,879	2,724	2,052	70,804

(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. Projected fledglings statistics in bold were calculated using observed fledglings/pair due to low number of well-tracked pairs.

\* Corrected number

**Appendix B-2. Least Bell's Vireo nest placement preferences at monitored sites in the Santa Ana River watershed, 2000-2014, and at monitored and sampled sites in 2015**

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Total	Percentage of Total
Giant Reed <sup>i</sup> ( <i>Arundo donax</i> )	1							1	<1%
Western Sycamore ( <i>Plantanus racemosa</i> )	2		1			3		6	<1%
Golden Currant ( <i>Ribes aureum</i> )	1				2	1		4	<1%
Wild Grape ( <i>Vitis girdiana</i> )	38	8	17	4	7	21	17	112	4%
Fremont Cottonwood ( <i>Populus fremontii</i> )	49	6	12	6	7	9	15	104	4%
Dead Fremont Cotton Wood ( <i>P. fremontii</i> )				1	1			2	<1%
Black Cottonwood ( <i>Populus trichocarpa</i> )					1		1	2	<1%
Narrowleaf Willow ( <i>Salix exigua</i> )	56	3	12	11	13	8	5	108	4%
Dead Narrowleaf Willow ( <i>S. exigua</i> )					1			1	<1%
Black Willow ( <i>Salix gooddingii</i> )	224	12	20	10	11	3	20	300	12%
Black Willow (dead) ( <i>Salix gooddingii</i> )	1							1	<1%
Dead Black Willow ( <i>S. gooddingii</i> ) covered with living Black Willow	1							1	<1%
Red Willow ( <i>Salix laevigata</i> )	118	22	39	19	23	8	26	255	10%
Arroyo Willow ( <i>Salix lasiolepis</i> )	291	27	39	31	35	28	30	481	19%
Dead Arroyo Willow ( <i>S. lasiolepis</i> )		1						1	<1%
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )	8	1	2		2	1	2	16	1%
Willow sp. ( <i>Salix</i> spp.)	6						2	8	<1%
Dead Willow species ( <i>Salix</i> spp.)	2			1		1		4	<1%
Castorbean <sup>i</sup> ( <i>Ricinus communis</i> )	1							1	<1%
Western False Indigo ( <i>Amorpha fruticosa</i> )		1						1	<1%
Toyon ( <i>Heteromeles arbutifolia</i> )	17		1	1	1	4	3	27	1%
Holly-leaved Cherry ( <i>Prunus ilicifolia</i> )			1					1	<1%
Wild Rose ( <i>Rosa californica</i> )	5							5	<1%

**Appendix B-2. Least Bell's Vireo nest placement preferences at monitored sites in the Santa Ana River watershed, 2000-2014, and at monitored and sampled sites in 2015**

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Total	Percentage of Total
California Blackberry ( <i>Rubus ursinus</i> )				1				1	<1%
Fig <sup>i</sup> ( <i>Ficus</i> sp.)	1							1	<1%
White Mulberry <sup>e</sup> ( <i>Morus alba</i> )						1		1	<1%
Stinging Nettle ( <i>Urtica dioica</i> )	1							1	<1%
Coast Live Oak ( <i>Quercus agrifolia</i> )	1				1			2	<1%
Scrub Oak ( <i>Quercus berberidifolia</i> )	4						2	6	<1%
Oak sp. ( <i>Quercus</i> sp.)							1	1	<1%
Black Walnut <sup>R</sup> ( <i>Juglans californica</i> )	5	2			4		1	12	1%
White Alder ( <i>Alnus rhombifolia</i> )	1							1	<1%
Laurel Sumac ( <i>Malosma laurina</i> )	6				3	2	1	12	<1%
Sugarbush ( <i>Rhus ovata</i> )		1	1					2	<1%
Basketbush ( <i>Rhus trilobata</i> )			1					1	<1%
Peruvian Pepper Tree <sup>i</sup> ( <i>Schinus molle</i> )	5	3	1	1			2	12	<1%
Brazilian Pepper Tree <sup>i</sup> ( <i>Schinus terebinthifolius</i> )				1				1	<1%
Poison Oak ( <i>Toxicodendron diversilobum</i> )	9				4	2	3	18	1%
Boxelder ( <i>Acer negundo</i> )	1						1	2	<1%
Tree of Heaven <sup>i</sup> ( <i>Alianthus altissima</i> )						1		1	<1%
Orange Tree <sup>e</sup> ( <i>Citrus sinensis</i> )	1		1	1				3	<1%
Black mustard <sup>i</sup> ( <i>Brassica nigra</i> )	8	1		1	1		1	12	<1%
Perennial Pepperweed <sup>i</sup> ( <i>Lepidium latifolium</i> )	4			1			1	6	<1%
Dead Perennial Pepperweed ( <i>L. latifolium</i> )	1							1	<1%
Tamarisk <sup>i</sup> ( <i>Tamarix ramosissima</i> )	3	1	1	3			1	9	<1%
Blue Plumbago <sup>e</sup> ( <i>Plubago auriculata</i> )				1	1			2	<1%

**Appendix B-2. Least Bell's Vireo nest placement preferences at monitored sites in the Santa Ana River watershed, 2000-2014, and at monitored and sampled sites in 2015**

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Total	Percentage of Total
Fourwing Saltbush ( <i>Atriplex canescens</i> )	1				1			2	<1%
Ash ( <i>Fraxinus</i> sp.)	1							1	<1%
Waxleaf Privet <sup>e</sup> ( <i>Ligustrum</i> sp.)	1							1	<1%
Lollypop Tree <sup>i</sup> ( <i>Myoporum luteum</i> )	1							1	<1%
Black Sage ( <i>Salvia mellifera</i> )						1		1	<1%
Tree Tobacco <sup>i</sup> ( <i>Nicotiana glauca</i> )			1					1	<1%
California Sagebrush ( <i>Artemisia californica</i> )	1							1	<1%
Mugwort ( <i>Artemisia douglasiana</i> )	18		1	1	1	2	1	24	1%
Emory Baccharis ( <i>Baccharis salicina</i> )	3							3	<1%
Coyote Brush ( <i>Baccharis pilularis</i> )	5		2			1		8	<1%
Mulefat ( <i>Baccharis salicifolia</i> )	418	66	56	29	51	57	49	726	29%
Dead Mulefat ( <i>B. salicifolia</i> )	5							5	<1%
Broom Baccharis ( <i>Baccharis sarothroides</i> )	1							1	<1%
Yellowspine Thistle <sup>i</sup> ( <i>Cirsium ochrocentrum</i> )	2							2	<1%
Brittlebush ( <i>Encelia farinosa</i> )				1				1	<1%
Common Sunflower ( <i>Helianthus annuus</i> )	1							1	<1%
Arrowweed ( <i>Pluchea</i> sp.)	1			1	1			3	<1%
Milk Thistle <sup>i</sup> ( <i>Silybum marianum</i> )	1							1	<1%
Cocklebur ( <i>Xanthium strumarium</i> )	2							2	<1%
Wild Celery ( <i>Apium graveolens</i> )	1							1	<1%
Poison Hemlock <sup>i</sup> ( <i>Conium maculatum</i> )	10						1	11	<1%
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	67	12	17	11	14	15	18	154	6%
Fiddleneck ( <i>Amsinckia</i> sp.)					1			1	<1%
Thick-leaved Yerba Santa ( <i>Eriodictyon crassifolium</i> )					1		2	3	<1%



**Appendix B-2. Least Bell's Vireo nest placement preferences at monitored sites in the Santa Ana River watershed, 2000-2014, and at monitored and sampled sites in 2015**

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Total	Percentage of Total
Yerba Santa species ( <i>Eriodictyon</i> sp.)						1		1	<1%
Wild Grape ( <i>V. girdiana</i> ) and Black Willow ( <i>S. gooddingii</i> )	1							1	<1%
Wild Grape ( <i>V. girdiana</i> ) and Red Willow ( <i>S. lasiolepis</i> )	1							1	<1%
Wild Grape ( <i>V. girdiana</i> ) and Rose ( <i>R. californicus</i> )	1							1	<1%
Wild Grape ( <i>V. girdiana</i> ) and Pepper Tree ( <i>S. molle</i> )			1					1	<1%
Wild Grape ( <i>V. girdiana</i> ) and Mulefat ( <i>B. salicifolia</i> )	2			1			1	4	<1%
Wild Grape ( <i>V. girdiana</i> ) and Elderberry ( <i>S. n. caerulea</i> )	1							1	<1%
Black Willow ( <i>S. gooddingii</i> ) and Pepperweed ( <i>L. latifolium</i> )	1							1	<1%
Black Willow ( <i>S. gooddingii</i> ) and Poison Hemlock ( <i>C. maculatum</i> )	1							1	<1%
Black Willow ( <i>S. gooddingii</i> ) and Blue Elderberry ( <i>S. n. caerulea</i> )			1					1	<1%
Dead Black Willow ( <i>S. gooddingii</i> ) and Nettle ( <i>U. dioica</i> )	1							1	<1%
Red Willow ( <i>S. lasiolepis</i> ) and dead Stinging Nettle ( <i>U. dioica</i> )	1							1	<1%
Red Willow ( <i>S. lasiolepis</i> ) and Fennel ( <i>F. vulgare</i> )	1							1	<1%
Red Willow ( <i>S. lasiolepis</i> ) and Fresh Water Reed	1							1	<1%
Arroyo Willow ( <i>S. lasiolepis</i> ) and Black Mustard ( <i>B. nigra</i> )	1							1	<1%
Willow sp. ( <i>Salix</i> sp.) and Blackberry ( <i>Rubus ursinus</i> )	1							1	<1%
Willow sp./Pepperweed ( <i>Salix</i> sp./ <i>Lepidium latifolium</i> )	1							1	<1%
Castorbean ( <i>R. communis</i> ) and Mulefat ( <i>B. salicifolia</i> )				1				1	<1%

**Appendix B-2. Least Bell's Vireo nest placement preferences at monitored sites in the Santa Ana River watershed, 2000-2014, and at monitored and sampled sites in 2015**

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Total	Percentage of Total
Black Mustard ( <i>B. nigra</i> ) and Mulefat ( <i>B. salicifolia</i> )	1							1	<1%
Coyote Brush ( <i>B. pilularis</i> ) and Mulefat ( <i>B. salicifolia</i> )					1			1	<1%
Mulefat ( <i>B. salicifolia</i> ) and Poison Hemlock ( <i>C. maculatum</i> )				1				1	<1%
Deadfall	2	1	1				1	5	<1%
Unknown/No data			5		3	4	3	15	1%
<b>Total</b>	<b>1,430*</b>	<b>168</b>	<b>234</b>	140	192	174	<b>211</b>	<b>2,549*</b>	<b>100%</b>

\*Includes corrected 2007 total value

<sup>i</sup> = invasive

<sup>e</sup> = non-native

<sup>R</sup> = endangered, threatened, or sensitive

**Appendix B-3. Least Bell's Vireo reproductive success and breeding biology data at closely monitored sites in the Santa Ana River watershed, 2000- 2014, and at monitored and sampled sites in 2015**

	Parameter	2000-2009	2010	2011	2012	2013	2014	2015	Total
A.	Number of pairs	1748	450	407	376	374	390	401	n/a
B.	Number of breeding (nesting) pairs	1567	361	345	287	324	301	322	3,507
C.	Number of breeding pairs that were well-monitored throughout the breeding season	702	87	105	74	92	81	93	1,234
D.	Number of 'known fledged young' OBSERVED	3210	613	626	487	611	472	590	6,609
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	1895	239	308	207	277	178	256	3,360
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.0	1.7	1.8	1.7	1.9	1.6	1.8	1.9
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.7	2.7	2.9	2.8	3.0	2.2	2.8	2.7
H.	Number of nests that were discovered	1447	184	240	142	196	178	220	2,607
I.	Number of nests that were regularly monitored or 'tracked'	1185	138	204	123	167	149	188	2,154
J.	Number of 'tracked' nests that were successful	61% (720/1185)	65% (90/138)	56% (115/204)	60% (74/123)	61% (102/167)	48% (72/149)	55% (103/188)	59% (1276/2154)
K.	Rate of missing eggs/chicks from nests (includes successful and unsuccessful nests)	39% (467/1185)	43% (60/138)	40% (82/204)	39% (48/123)	40% <sup>b</sup> (67/167)	54% (80/149)	n/a	41% (804/1966)
L.	Number of 'tracked' nests that were parasitized by cowbirds	17% (204/1185)	5% (7/138)	2% (5/204)	5% (6/123)	4% (7/167)	5% (8/149)	2% (4/188)	11% (241/2154)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	4% (45/1185)	4% (6/138)	5% (10/204)	3% (4/123)	5% (9/167)	5% (7/149)	10% (18/188)	5% (99/2154)
	B. Number of 'tracked' nests that failed as a result of parasitism	5% (61/1185)	3% (4/138)	1% (3/204)	2% (3/123)	0% (0/167)	3% (5/149)	0% (0/188)	4% (76/2154)
	C. Number of 'tracked' nests that failed as a result of predation <sup>a</sup>	30% (358/1185)	28% (39/138)	36% (74/204)	34% (42/123)	32% (54/167)	43% (64/149)	36% (67/188)	32% (698/2154)
	D. Number of 'tracked' nests that failed for unknown reasons	<1% (1/1185)	0% (0/138)	1% (2/204)	0% (0/123)	1% (2/167)	1% (1/149)	0% (0/188)	<1% (6/2154)
N.	Average clutch size	n/a	n/a	3.6	3.4	3.4	1.5	3.3	n/a
O.	Number of cowbird eggs found in or near vireo nests	248	11	6	9	7	8	4	293
P.	Number of cowbird nestlings removed from 'tracked' nests	15	0	0	0	0	1	0	16
Q.	Number of cowbird young fledged by vireos	8	1	1	0	2	2	1	15
R.	Number of 'manipulated' parasitized nests	169	5	3	4	6	5	4	196
S.	% 'successful, manipulated' nests	45% (76/169)	60% (3/5)	100% (2/2)*	100% (4/4)	83% (5/6)	40% (2/5)	25% (1/4)	47% (93/196)

**Appendix B-3. Least Bell's Vireo reproductive success and breeding biology data at closely monitored sites in the Santa Ana River watershed, 2000- 2014, and at monitored and sampled sites in 2015**

	Parameter	2000-2009	2010	2011	2012	2013	2014	2015	Total
T.	Number of vireos fledged from "manipulated" parasitized nests	158	8	4	10	11	5	2	198
U.	Number of repaired nests	19	2	7	2	1	3	0	34
V.	% successful repaired nests	72% (13/18) <sup>a</sup>	50% (1/2)	86% (6/7)	100% (2/2)	100% (1/1)	67% (2/3)	n/a	76% (25/33)
W.	Number of vireos fledged from repaired nests	37	2	16	6	4	5	n/a	70

<sup>a</sup> Predation Rate according to Vireo Working Group

<sup>b</sup> Corrected number

\*one outcome unknown

## **APPENDIX C: SUMMARY TABLES BY MANAGED SITE, FROM 2000-2015**

**Appendix C-1-A. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SAN JACINTO

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	22	41	42	53	45	29	n/a
B.	Number of known pairs (breeding and non-breeding)	43	18	25	36	29	19	7	177
C.	Number of fledged young observed	104	28	18	49	39	12	8	258
D.	Projected total of recruitment of vireo young (a)	122	n/a	n/a	104	38	n/a	n/a	264*
E.	Average number of fledglings per pair (C/B)	2.4	1.6	0.7	1.4	1.3	0.6	1.1	1.5
F.	Projected number of fledglings per pair (D/B)	2.8	n/a	n/a	2.9	1.3	n/a	n/a	1.7*
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	33% (18/54)	0% (0/3)	80% (8/10)	31% (4/13)	69% (9/13)	0% (0/1)	n/a	41% (39/94)
H.	Rate of cowbird nest parasitism	11% (6/54)	0	10% (1/10)	8% (1/13)	0% (0/13)	100% (1/1)	n/a	10% (9/94)
J.	This row intentionally omitted.								
I.	Numbers of cowbirds removed from study area	11,622	2136	1797	1728	1085	713	n/a	19,081
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	6,405	993	982	984	1058	945	n/a	11,367
L.	Average number of cowbirds trapped per trap day (I/K)	1.8	2.2	1.8	1.8	1.0	0.8	n/a	1.7
M.	Number of field hours –LBVI	4,425.2	79	129	161	155	72	n/a	7,759
N.	Number of field hours - BHCO		525	544	711	496	462	n/a	

\*Excludes 2010 and 2011 data

**Appendix C-1-B. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SAN TIMOTEO

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	126	116	118	131	151	176	n/a
B.	Number of known pairs (breeding and non-breeding)	323	95	101	102	80	135	141	977
C.	Number of fledged young observed	635	137	196	153	179	206	287	1,793
D.	Projected total of recruitment of vireo young (a)	918*	266	343	286	288	338	451	2,890
E.	Average number of fledglings per pair (C/B)	2.0	1.4	1.9	1.5	2.2	1.5	2.0	1.8
F.	Projected number of fledglings per pair (D/B)	2.8*	2.8	3.4	2.8	3.6	2.5	3.2	3.0
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	44% (150/338)	65% (24/37)	30% (22/73)	42% (19/45)	41% (31/76)	52% (46/88)	n/a	44% (292/657)
H.	Rate of cowbird nest parasitism	31% (103/338)	8% (3/37)	0% (0/73)	2% (1/45)	3% (2/76)	6% (5/88)	0% (0/114)	15% (114/771)
I.	Numbers of cowbirds removed from study area	1,487	173	109	143	164	143	169	2,388
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	6,463	1113	1191	982	1198	1058	996	13,001
L.	Average number of cowbirds trapped per trap day (I/K)	0.23	0.16	0.09	0.15	0.1	0.1	0.17	0.18
M.	Number of field hours -LBVI	6,524.6	505	587	407	481	442	750	12,518
N.	Number of field hours - BHCO		503	564	326	525	504	399	

**Appendix C-1-C. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

MERIDIAN CONSERVATION AREA (former March SKR Preserve)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	14	16	13	14	21	7	n/a
B.	Number of known pairs (breeding and non-breeding)	33	12	9	11	12	16	3	96
C.	Number of fledged young observed	75	25	7	8	16	23	3	157
D.	Projected total of recruitment of vireo young (a)	121 (n=4 yrs)	76	n/a	n/a	n/a	48	n/a	245
E.	Average number of fledglings per pair (C/B)	2.3	2.1	0.8	0.7	1.3	1.4	1.0	1.6
F.	Projected number of fledglings per pair (D/B)	4.6* (n=4 yrs)	6.3	n/a	n/a	n/a	3.0	n/a	2.6*
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	38% (6/16) (n=4 yrs)	0% (0/6)	n/a	n/a	n/a	67% (2/3)	n/a	32% (8/25) (N = 6yrs)
H.	Rate of cowbird nest parasitism	0% (0/16) (n=4 yrs)	0% (0/6)	n/a	n/a	n/a	0% (0/3)	n/a	0% (0/25) (n=6 yrs)
I.	Numbers of cowbirds removed from study area	151	13	12	16	15	1	8	216
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	1,203	280	200	235	250	178	260	2,606
L.	Average number of cowbirds trapped per trap day (I/K)	0.13	0.05	0.06	0.07	0.06	<0.01	0.03	0.08
M.	Number of field hours -LBVI	457	62	55	22	60	80.5	n/a	737
N.	Number of field hours - BHCO	504	153	45	60	85	68	123	1,038

\*Excludes 2011-2013 data



**Appendix C-1-D. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SYCAMORE CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	12	9	7	12	17	4	n/a
B.	Number of known pairs (breeding and non-breeding)	35	8	5	7	n/a	5	1	61
C.	Number of fledged young observed	40	11	4	5	n/a	2	1	63
D.	Projected total of recruitment of vireo young (a)	39.6	n/a	n/a	n/a	n/a	n/a	n/a	39.6
E.	Average number of fledglings per pair (C/B)	1.1	1.4	0.8	0.7	n/a	0.4	1.0	1.0
F.	Projected number of fledglings per pair (D/B)	1.6* (39.6/25)	n/a	n/a	n/a	n/a	n/a	n/a	0.7*
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	33% (3/9)	n/a	n/a	n/a	n/a	100% (4/4)	n/a	54% (7/13)
H.	Rate of cowbird nest parasitism	22% (2/9)	n/a	n/a	n/a	n/a	50% (2/4)	n/a	31% (4/13)
I.	Numbers of cowbirds removed from study area	81	n/a	n/a	n/a	n/a	9	n/a	90
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	635	n/a	n/a	n/a	n/a	75	n/a	710
L.	Average number of cowbirds trapped per trap day (I/K)	0.13	n/a	n/a	n/a	n/a	0.1	n/a	0.13
M.	Number of field hours –	474	54	46	22	n/a	43	n/a	639
N.	Number of field hours -	469	n/a	n/a	n/a	n/a	31	n/a	500

\*Excludes 2006 and 2008 data

**Appendix C-1-E. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

MOCKINGBIRD CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	43	37	28	31	23	37	n/a
B.	Number of known pairs (breeding and non-breeding)	120	34	32	26	24	7	23	266
C.	Number of fledged young observed	218	25	67	39	40	7	19	415
D.	Projected total of recruitment of vireo young (a)	418	n/a	93	78	79	n/a	n/a	668
E.	Average number of fledglings per pair (C/B)	1.8	0.7	2.1	1.5	1.7	1.0	0.9	1.6
F.	Projected number of fledglings per pair (D/B)	3.5	n/a	2.9	3	3.3	n/a	n/a	2.5*
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %= $K/I \times 100$ (b)	38% (31/82)	n/a	60% (18/30)	53% (9/17)	47% (8/17)	50% (1/2)	n/a	45% (67/148)
H.	Rate of cowbird nest parasitism	15% (12/82)	n/a	0% (0/30)	6% (1/17)	18% (3/17)	0% (0/2)	0% (0/5)	10% (16/153)
I.	Numbers of cowbirds removed from study area	1,258	149	111	140	123	71	63	1,915
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	5,395	1028	908	495	772	603	256	9,457
L.	Average number of cowbirds trapped per trap day (I/K)	0.23	0.14	0.12	0.28	0.16	0.10	0.25	0.20
M.	Number of field hours -LBVI	3,661	96	302	203	389	62	77	6,240
N.	Number of field hours -BHCO		312	176	215	323	307	117	

\*excludes 2010 data

**Appendix C-1-F. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SANTA ANA RIVER - RIVERSIDE (Riverside Ave to Van Buren Blvd)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	68	49	43	77	66	109	n/a
B.	Number of known pairs (breeding and non-breeding)	167	50	22	11	n/a	19	37	306
C.	Number of fledged young observed	283	58	32	7	7	15	33	435
D.	Projected total of recruitment of vireo young (a)	329.4 (n=5 yrs)	100	71	n/a	n/a	23	n/a	523
E.	Average number of fledglings per pair (C/B)	1.7	1.2	1.5	0.6	n/a	0.8	0.8	1.4
F.	Projected number of fledglings per pair (D/B)	2.7 (121/32)9))	2.0	3.2	n/a	n/a	1.2	n/a	1.7
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	32% (24/75) (n=7 yrs)	36% (4/11)	30% (3/10)	n/a	n/a	67% (2/3)	n/a	33% (33/99)
H.	Rate of cowbird nest parasitism	16% (12/75)	0% (0/11)	10% (1/10)	n/a	n/a	0% (0/3)	100% (3/3)	16% (16/102)
I.	Numbers of cowbirds removed from study area	461	58	30	37	21	17	30	654
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	3,734	530	515	468	540	256	302	6,345
L.	Average number of cowbirds trapped per trap day (I/K)	0.12	0.11	0.06	0.08	0.04	0.1	0.1	0.1
M.	Number of field hours -LBVI	2,333	335	239	144	167	123	175	4,864
N.	Number of field hours - BHCO		277	315	234	230	188	104	

**Appendix C-1-G. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

HIDDEN VALLEY (as of 2010, south side of river)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	60	55	62	75	85	104	n/a
B.	Number of known pairs (breeding and non-breeding)	230	43	36	37	42	32	27	447
C.	Number of fledged young observed	407	53	41	45	66	28	22	662
D.	Projected total of recruitment of vireo young (a)	511.6 (n=9 yrs)	90.3	122	104	109	n/a	n/a	937 (13 yrs)
E.	Average number of fledglings per pair (C/B)	1.8	1.2	1.1	1.2	1.6	0.9	0.8	1.5
F.	Projected number of fledglings per pair (D/B)	2.4* (n=9 yrs)	2.1	3.4	2.8	2.6	n/a	n/a	2.1*
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	36% (31/85)	65% (11/17)	30% (3/10)	50% (4/8)	25% (2/8)	67% (2/3)	n/a	40% (53/131)
H.	Rate of cowbird nest parasitism	7% (6/85)	6% (1/17)	20% (2/10)	0% (0/8)	0% (0/8)	0% (0/3)	n/a	7% (9/131)
I.	Numbers of cowbirds removed from study area	637	24	12	24	8	3	0	708
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	4,298	252	257	348	362	252	0	5,769
L.	Average number of cowbirds trapped per trap day (I/K)	0.15	0.10	0.05	0.07	0.02	<0.1	0	0.12
M.	Number of field hours -LBVI	4,156.7	330	193	261	305	225	133	6,393
N.	Number of field hours -BHCO		196	228	129	136	100	n/a	

\* Calculation excludes 2003, row B= (212+ 43+36+37+42+32), Row F = 828/402 = 2.4

**Appendix C-1-H. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

HIDDEN VALLEY (north side of river)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	15	4	9	21	21	39	n/a
B.	Number of known pairs (breeding and non-breeding)	n/a	12	2	3	2	14	23	56
C.	Number of fledged young observed	n/a	18	2	1	3	19	15	58
D.	Projected total of recruitment of vireo young (a)	n/a	28	n/a	n/a	n/a	28	n/a	56
E.	Average number of fledglings per pair (C/B)	n/a	1.5	1	0.3	n/a	1.4	0.7	1.0
F.	Projected number of fledglings per pair (D/B)	n/a	2.3	n/a	n/a	n/a	2.0	n/a	1.1
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	n/a	11% (1/9)	n/a	n/a	n/a	33% (1/3)	n/a	17% (2/12)
H.	Rate of cowbird nest parasitism	n/a	33% (3/9)	n/a	n/a	n/a	0% (0/3)	n/a	25% (3/12)
I.	Numbers of cowbirds removed from study area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L.	Average number of cowbirds trapped per trap day (I/K)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
M.	Number of field hours -LBVI	n/a	210	8	12	26	133	17	406
N.	Number of field hours -BHCO	n/a	n/a	n/a	--	n/a	n/a	n/a	n/a

**Appendix C-1-I. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SANTA ANA RIVER – GOOSE CREEK , NORCO TO I-15

Parameter	2000-2009	2010	2011	2012	2013	2014	2015*	Totals	
A. Number of territorial males	n/a	101	105	95	108	110	71	n/a	
B. Number of known pairs (breeding and non-breeding)	233	64	59	51	52	32	36	527	
C. Number of fledged young observed	489	113	91	86	109	36	63	987	
D. Projected total of recruitment of vireo young (a)	696.2	211.2	177	184	177	n/a	87.5	1532.9	
E. Average number of fledglings per pair (C/B)	2.1	1.8	1.5	1.7	2.1	1.1	1.8	1.9	
F. Projected number of fledglings per pair (D/B)	2.7	3.3	3.0	3.6	3.4	n/a	2.5	2.9	
G. Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	41% (73/177)	28% (5/18)	45% (10/22)	0% (0/17)	26% (8/29)	56% (5/9)	n/a	37% (101/272)	
H. Rate of cowbird nest parasitism	9% (14/177)	0% (0/18)	0% (0/22)	0% (0/17)	7% (2/29)	0% (0/7)	0% (0/13)	6% (16/285)	
I. Numbers of cowbirds removed from study area	382	49	35	34	23	4	29	556	
J.	This row intentionally omitted.								
K. Number of trap days (1 operative trap in the field for one day = 1 trap day)	1,102	269	228	230	270	218	226	2,543	
L. Average number of cowbirds trapped per trap day (I/K)	0.35	0.18	0.15	0.15	0.09	<0.1	0.13	0.22	
M. Number of field hours -LBVI	2,337	183	197	232	256	204	352	3,761	
N. Number of field hours - BHCO	624	252	n/a	230	135	100	118	1,459	

\*Starting in 2015 Goose Creek Golf Course to I-15 only. Formerly monitored as Goose Creek Golf Course to River Rd.

**Appendix C-1-J. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SANTA ANA RIVER – Prado Basin Norco Bluffs

Parameter		2000-2009	2010	2011	2012	2013	2014	2015*	Totals
A.	Number of territorial males							30	n/a
B.	Number of known pairs (breeding and non-breeding)							17	17
C.	Number of fledged young observed							43	43
D.	Projected total of recruitment of vireo young (a)							62.9	62.9
E.	Average number of fledglings per pair (C/B)							2.5	2.5
F.	Projected number of fledglings per pair (D/B)							3.7	3.7
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)							n/a	n/a
H.	Rate of cowbird nest parasitism							0% (0/13)	0% (0/13)
I.	Numbers of cowbirds removed from study area							n/a	n/a
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)							n/a	n/a
L.	Average number of cowbirds trapped per trap day (I/K)							n/a	n/a
M.	Number of field hours -LBVI							124	124
N.	Number of field hours -BHCO							n/a	n/a

\*Formerly monitored as part of Goose Creek Golf Course to River Rd.

**Appendix C-1-K. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

TEMESCAL CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	83	102	109	131	126	123	n/a
B.	Number of known pairs (breeding and non-breeding)	164	49	65	63	50	24	21	436
C.	Number of fledged young observed	339	73	113	71	48	17	22	683
D.	Projected total of recruitment of vireo young (a)	447.7	151.9	189	189	0	n/a	n/a	978
E.	Average number of fledglings per pair (C/B)	2.1	1.5	1.7	1.1	1.0	0.7	1.0	1.6
F.	Projected number of fledglings per pair (D/B)	2.7	3.1	2.9	3.0	n/a	n/a	n/a	2.5
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %= $K/I \times 100$ (b)	39% (52/133)	20% (3/15)	34% (11/32)	0% (0/12)	n/a	n/a	n/a	34% (66/192)
H.	Rate of cowbird nest parasitism	20% (27/133)	0% (0/15)	3% (1/32)	25% (3/12)	n/a	n/a	n/a	16% (31/192)
I.	Numbers of cowbirds removed from study area	1,350	134	204	566	380	194	435	3,263
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	5,812	1191	1245	851	1246	1077	93	11,515
L.	Average number of cowbirds trapped per trap day (I/K)	0.23	0.11	0.16	0.52	0.30	0.2	4.68	0.28
M.	Number of field hours -LBVI	5,690	335	557	531	420	90	96	10,342
N.	Number of field hours -BHCO		467	685	377	544	550	n/a	



**Appendix C-1-L. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SANTA ANA CANYON – UPPER CANYON BELOW PRADO DAM

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	11	14	10	28	27	25	n/a
B.	Number of known pairs (breeding and non-breeding)	126	4	5	4	14	18	9	180
C.	Number of fledged young observed	208	6	5	6	23	28	10	286
D.	Projected total of recruitment of vireo young (a)	309.1 (n=8 yrs)	n/a	n/a	12	42	54	4.5	421.6 (n=12 yrs)
E.	Average number of fledglings per pair (C/B)	1.7	1.5	1.0	1.5	1.6	1.6	1.1	1.6
F.	Projected number of fledglings per pair (D/B)	2.7* * (n=8 yrs)	n/a	n/a	3.0	3.0	3.0	0.5	2.3 (n=12 yrs)
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	41% (26/64) (n=8 yrs)	0% (0/1)	n/a	0% (0/1)	40% (2/5)	33% (2/6)	n/a	39% (30/77)
H.	Rate of cowbird nest parasitism	6% (4/64) (n=8yrs)	0% (0/1)	n/a	0% (0/1)	0% (0/5)	0% (0/6)	0% (0/1)	5% (4/78) (n=12 yrs)
I.	Numbers of cowbirds removed from study area	301	165	48	62	32	56	14	678
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	2,112	286	238	105	133	137	129	3,140
L.	Average number of cowbirds trapped per trap day (I/K)	0.14	0.58	0.20	0.59	0.24	0.4	0.11	0.22
M.	Number of field hours -LBVI	6,793	324*	350*	325*	396*	365*	408*	11,621
N.	Number of field hours - BHCO		425*	608*	432*	377*	339*	479*	

**Appendix C-1-J. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SANTA ANA CANYON - GREEN RIVER GOLF CLUB

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	24	26	19	22	26	31	n/a
B.	Number of known pairs (breeding and non-breeding)	101	17	14	11	19	19	23	204
C.	Number of fledged young observed	192	19	19	11	19	29	35	324
D.	Projected total of recruitment of vireo young (a)	279.3	30.6	29	25	0	49	36.8	449.7
E.	Average number of fledglings per pair (C/B)	1.9	1.2	1.4	1.0	1.0	1.5	1.5	1.6
F.	Projected number of fledglings per pair (D/B)	2.8	1.8	2.1	2.3	n/a	2.6	1.6	2.2
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %= $K/I \times 100$ (b)	26% (16/61)	71% (5/7)	55% (6/11)	20% (1/5)	50% (2/4)	25% (2/8)	n/a	33% (32/96)
H.	Rate of cowbird nest parasitism	7% (4/61)	0% (0/7)	0% (0/11)	0% (0/5)	0% (0/4)	0% (0/8)	0% (0/15)	4% (4/111)
I.	Numbers of cowbirds removed from study area	802	58	26	37	34	15	32	1,004
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	3,101	407	119	124	130	131	237	4,249
L.	Average number of cowbirds trapped per trap day (I/K)	0.26	0.14	0.22	0.3	0.3	0.1	0.14	0.24
M.	Number of field hours -LBVI	*See Upper Canyon Summary Sheet for all Santa Ana Canyon hours							
N.	Number of field hours -BHCO								

**Appendix C-1-K. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

SANTA ANA CANYON – FEATHERLY REGIONAL PARK

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	40	33	36	64	59	65	n/a
B.	Number of known pairs (breeding and non-breeding)	131	23	19	16	45	39	38	311
C.	Number of fledged young observed	175	22	23	12	55	35	37	359
D.	Projected total of recruitment of vireo young (a)	307.1	46	38	--	77	43	49.4	560.4
E.	Average number of fledglings per pair (C/B)	1.3	1.0	1.21	0.75	1.2	0.9	1.0	1.2
F.	Projected number of fledglings per pair (D/B)	2.3	2.0	2.0	0	1.7	1.1	1.3	1.8
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	48% (31/65)	71% (5/7)	20% (1/5)	100% (4/4)	50% (7/14)	64% (9/14)	n/a	52% (57/109)
H.	Rate of cowbird nest parasitism	8% (5/65)	0% (0/7)	0% (0/5)	0% (0/4)	0% (0/14)	0% (0/14)	0% (0/19)	4% (5/128)
I.	Numbers of cowbirds removed from study area	127	118	44	30	48	41	44	452
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	1,591	514	335	244	258	241	495	3,678
L.	Average number of cowbirds trapped per trap day (I/K)	0.08	0.23	0.13	0.12	0.12	0.2	0.09	0.12
M.	Number of field hours – LBVI	See Upper Canyon Summary Sheet for all Santa Ana Canyon hours							
N.	Number of field hours - BHCO								

\*Includes 2 traps at Yorba Linda Regional Park

**Appendix C-1-L. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

CHINO HILLS (Butterfields Ranch environs)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	11	8	8	13	10	24	n/a
B.	Number of known pairs (breeding and non-breeding)	45	7	3	2	5	2	6	70
C.	Number of fledged young observed	54	7	1	1	7	3	4	77
D.	Projected total of recruitment of vireo young (a)	52.9 (n=4 yrs)	11.9	n/a	--	20	n/a	1.8	86.6 (n=7 yrs)
E.	Average number of fledglings per pair (C/B)	1.2	1.0	0.33	0.5	1.4	n/a	0.7	1.1 (n=9 yrs)
F.	Projected number of fledglings per pair (D/B)	1.8* (n=4 yrs)	1.7	n/a	0	4.0	n/a	0.3	1.2 (n=8 yrs)
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	63% (12/19) (n= 4 yrs)	67% (2/3)	n/a	100% (1/1)	0	n/a	n/a	65% (15/23)
H.	Rate of cowbird nest parasitism	32% (6/19) (n=4 yrs)	0% (0/3)	n/a	0% (0/1)	0	n/a	20% (1/5)	25% (7/28) (n=8 yrs)
I.	Numbers of cowbirds removed from study area	11	16	16	6	12	4	76	141
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	214	129	115	124	132	119	219	1,052
L.	Average number of cowbirds trapped per trap day (I/K)	0.05	0.12	0.14	0.05	0.1	<0.1	0.35	0.13
M.	Number of field hours -LBVI	388	59	54	44	36	23.5	60	664.5
N.	Number of field hours - BHCO	179	129	115	124	83	75	95	800

**Appendix C-1-M. Least Bell's Vireo status and management and Brown-headed Cowbird management data, at survey sites in the Santa Ana River Watershed, California.**

IRVINE REGIONAL PARK

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of territorial males	n/a	24	26	29	n/a	27	24	n/a
B.	Number of known pairs (breeding and non-breeding)	n/a	14	9	5	n/a	9	1	38
C.	Number of fledged young observed	n/a	18	7	5	n/a	12	2	44
D.	Projected total of recruitment of vireo young (a)	n/a	50	18	n/a	n/a	14	n/a	82
E.	Average number of fledglings per pair (C/B)	n/a	1.3	0.77	1.0	n/a	1.3	2.0	1.2
F.	Projected number of fledglings per pair (D/B)	n/a	3.6	9	n/a	n/a	1.6	n/a	2.2
G.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=(K/I x100) (b)	n/a	25% (1/4)	n/a	n/a	n/a	80% (4/5)	n/a	56% (5/9)
H.	Rate of cowbird nest parasitism	n/a	0% (0/4)	n/a	n/a	n/a	0% (0/6)	n/a	0% (0/10)
I.	Numbers of cowbirds removed from study area	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
J.	This row intentionally omitted.								
K.	Number of trap days (1 operative trap in the field for one day = 1 trap day)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
L.	Average number of cowbirds trapped per trap day (I/K)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
M.	Number of field hours -LBVI	n/a	25	21	9.5	n/a	88.5	n/a	144
N.	Number of field hours - BHCO	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Table C-2-A. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SAN JACINTO

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Black Willow ( <i>Salix gooddingii</i> )	5							5
Narrowleaf Willow ( <i>Salix exigua</i> )	26	2	8	10	9			55
Dead Narrowleaf willow ( <i>S. exigua</i> )					1			1
Black Mustard ( <i>Brassica nigra</i> )	1							1
Tamarisk ( <i>Tamarix ramosissima</i> )	1	1						2
Coyote Brush ( <i>Baccharis pilularis</i> )						1		1
Mulefat ( <i>Baccharis salicifolia</i> )	26	4	1	3				34
Unknown					3	1		4
Totals:	59	7	9	13	13	2	0	103

**Table C-2-B. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SAN TIMOTEO CANYON

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Western Sycamore ( <i>Platanus racemosa</i> )			1					1
Golden Currant ( <i>Ribes aureum</i> )	1				2	1		4
Wild Grape ( <i>Vitis girdiana</i> )	10	5	10	1	2	18	10	56
Fremont Cottonwood ( <i>Populus fremontii</i> )	16	1	4		3	5	8	37
Dead Cottonwood ( <i>P. fremontii</i> )				1				1
Black Willow ( <i>Salix gooddingii</i> )	52	4	1	1	4	2	5	69
Narrowleaf Willow ( <i>Salix exigua</i> )	13		1		2	4	2	22
Red Willow ( <i>Salix laevigata</i> )	64	8	13	6	17	6	20	134
Arroyo Willow ( <i>Salix lasiolepis</i> )	76	4	17	17	16	20	24	174
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )	3		2		2	1	1	9
Willow sp. ( <i>Salix</i> sp.)							1	1
Dead Salix ( <i>Salix</i> sp.)				1				1
Toyon ( <i>Heteromeles arbutifolia</i> )	8			1	1	4	3	17
White Mulberry ( <i>Morus alba</i> )						1		1
Scrub Oak ( <i>Quercus berberidifolia</i> )							1	1
Oak sp. ( <i>Quercus</i> sp.)							1	1
Black Walnut ( <i>Juglans californica</i> )		1						1
Basketbush ( <i>Rhus aromatica</i> )			1					1
Boxelder ( <i>Acer negundo</i> )							1	1
Tree of Heaven ( <i>Ailanthus altissima</i> )						1		1
Black Mustard ( <i>Brassica nigra</i> )	1							1
Mustard ( <i>Brassica</i> sp.)	3				1			4
Pepperweed ( <i>Lepidium latifolium</i> )							1	1
Tamarisk ( <i>Tamarix</i> sp.)				1			1	2
Fourwing Saltbush ( <i>Atriplex canescens</i> )	1							1
Mugwort ( <i>Artemisia douglasiana</i> )	14		1	1	1	1	1	19
Emory Baccharis ( <i>Baccharis salicina</i> )	1							1
Mulefat ( <i>Baccharis salicifolia</i> )	101	15	25	12	26	26	34	239
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	12	2	3	5	3	4	9	38
Wild Grape/Arroyo Willow ( <i>V. girdiana</i> / <i>S. lasiolepis</i> )	1							1
Arroyo Willow/Fennel ( <i>S. lasiolepis</i> / <i>F. vulgare</i> )	1							1
Deadfall			1				1	2
Unknown/No Data							2	2
Totals	378	40	80	47	80	94	126	845

**Table C-2-C. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

MERIDIAN CONSERVATION AREA (former March SKR Preserve)

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Black Willow ( <i>Salix gooddingii</i> )	9	1						10
Red Willow ( <i>Salix laevigata</i> )	3	3				1		7
Arroyo Willow ( <i>Salix lasiolepis</i> )	5	1				2		8
Mulefat ( <i>Baccharis salicifolia</i> )		1						1
Totals	17	6	0	0	0	3	0	26

**Table C-2-D. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SYCAMORE CANYON

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Fremont Cottonwood ( <i>Populus fremontii</i> )						1		1
Black Willow ( <i>Salix gooddingii</i> )	9							9
Arroyo Willow ( <i>Salix lasiolepis</i> )						1		1
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	1					2		3
Totals	10	n/a	n/a	n/a	n/a	4	0	14



**Table C-2-E. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

MOCKINGBIRD CANYON

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Western Sycamore ( <i>Platanus racemosa</i> )	1							1
Wild Grape ( <i>Vitis girdiana</i> )	6		1					7
Fremont Cottonwood ( <i>Populus fremontii</i> )			1	1				2
Black Willow ( <i>Salix gooddingii</i> )	26		3	1	1			31
Narrowleaf Willow ( <i>Salix exigua</i> )							1	1
Red Willow ( <i>Salix laevigata</i> )	30	2	13	7	2		2	56
Arroyo Willow ( <i>Salix lasiolepis</i> )	2		6	3	4			15
Willow species ( <i>Salix</i> sp.)	1							1
Dead Salix sp. ( <i>Salix</i> sp.)	1							1
Holly-leaved Cherry ( <i>Prunus ilicifolia</i> )			1					1
Black Walnut ( <i>Juglans californica</i> )	1							1
Peruvian Pepper Tree ( <i>Schinus molle</i> )	2		1	1				4
Perennial Pepperweed ( <i>Lepidium latifolium</i> )	3			1				4
Dead Perennial Pepperweed ( <i>L. latifolium</i> )	1							1
Fourwing Saltbush ( <i>Atriplex canescens</i> )					1			1
Emory's Baccharis ( <i>Baccharis salicina</i> )	2							2
Mulefat ( <i>Baccharis salicifolia</i> )	5	1	2	3	4			15
Arrowweed ( <i>Pluchea sericea</i> )					1			1
Wild Celery ( <i>Apium graveolens</i> )	1							1
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	13		3	2	6	1	2	27
Wild Grape/Black Willow ( <i>V. girdiana/S. gooddingii</i> )	1							1
Black Willow/Perennial Pepperweed ( <i>S. gooddingii/L. latifolium</i> )	1							1
Willow sp./Perennial Pepperweed ( <i>Salix</i> sp./ <i>L. latifolium</i> )	1							1
Coyote Brush/Mulefat ( <i>B. pilularis/B. salicifolia</i> )					1			1
Unknown						2		2
Totals	98	3	31	19	20	3	5	179

**Table C-2-F. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SANTA ANA RIVER – RIVERSIDE (Riverside Ave to Van Buren Blvd)

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Wild Grape ( <i>Vitis girdiana</i> )		1	2			1	2	6
Fremont Cottonwood ( <i>Populus fremontii</i> )	7		1					8
Narrowleaf Willow ( <i>Salix exigua</i> )	2		1			2		5
Black Willow ( <i>Salix gooddingii</i> )	10			1				11
Dead Black Willow ( <i>S. gooddingii</i> )	1							1
Red Willow ( <i>Salix laevigata</i> )	6	1	1					8
Arroyo Willow ( <i>Salix lasiolepis</i> )	28	4	5					37
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )	1							1
Willow sp. ( <i>Salix</i> sp.)	1							1
Wild Rose ( <i>Rosa californica</i> )	1							1
Hoary Nettle ( <i>Urtica dioica</i> )	1							1
Scrub Oak ( <i>Quercus berberidifolia</i> )	2							2
Tamarisk ( <i>Tamarix ramosissima</i> )	1							1
Tree Tobacco ( <i>Nicotiana glauca</i> )			1					1
Mulefat ( <i>Baccharis salicifolia</i> )	26	7	1	1		2		37
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	3		1					4
Dead Black Willow/Hoary Nettle ( <i>S. gooddingii</i> / <i>U. dioica</i> )	1							1
Totals	91	13	13	2	0	5	2	126

**Table C-2-G. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

HIDDEN VALLEY (south side of river)

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Wild Grape ( <i>Vitis girdiana</i> )	6		2	2		1		11
Narrowleaf Willow ( <i>Salix exigua</i> )	1			1	1			3
Black Willow ( <i>Salix gooddingii</i> )	15	1			2			18
Red Willow ( <i>Salix laevigata</i> )	4	1	2		2	1		10
Arroyo Willow ( <i>Salix lasiolepis</i> )	43	6	2	1	2	2		56
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )	1							1
Willow species ( <i>Salix</i> spp.)	2							2
Poison Oak ( <i>Toxicodendron diversilobum</i> )	1							1
Coyote Brush ( <i>Baccharis pilularis</i> )	1							1
Mulefat ( <i>Baccharis salicifolia</i> )	29	9	3	2	3			46
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	3							3
Wild Grape/Wild Rose ( <i>V. girdiana</i> / <i>R. californica</i> )	1							1
Red Willow/Fresh water reed ( <i>S. lasiolepis</i> /fresh water reed)	1							1
Willow sp./Blackberry ( <i>Salix</i> sp./ <i>Rubus ursinus</i> )	1							1
Mulefat/Poison Hemlock ( <i>B. salicifolia</i> / <i>C. maculatum</i> )				1				1
Unknown			2					2
Totals	109	17	11	7	10	4	0	158

**Table C-2-H. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

HIDDEN VALLEY (north side of river)

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Wild Grape ( <i>Vitis girdiana</i> )		2	1					3
Narrowleaf Willow ( <i>Salix exigua</i> )						1		1
Red Willow ( <i>Salix laevigata</i> )		2						2
Arroyo Willow ( <i>Salix lasiolepis</i> )			1					1
Mulefat ( <i>Baccharis salicifolia</i> )		4				2		6
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )		2				1		3
Totals	0	10	2	0	0	4	0	16

**Table C-2-I. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SANTA ANA RIVER – GOOSE CREEK, NORCO TO I-15

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015*	Totals
Wild Grape ( <i>Vitis girdiana</i> )	9			1	5		4	19
Fremont Cottonwood ( <i>Populus fremontii</i> )	11	1		1	1			14
Dead Fremont cottonwood ( <i>Populus fremontii</i> )					1			1
Narrowleaf Willow ( <i>Salix exigua</i> )	8	1	1			1	1	12
Black Willow ( <i>Salix gooddingii</i> )	39	1	5	2			4	51
Red Willow ( <i>Salix laevigata</i> )				2	2		3	7
Arroyo Willow ( <i>Salix lasiolepis</i> )	70	5	5	9	11	1		101
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )							1	1
Willow sp. ( <i>Salix</i> sp.)							1	1
Dead Arroyo Willow ( <i>Salix lasiolepis</i> )		1						1
Dead Willow sp. ( <i>Salix</i> sp.)						1		1
Black walnut ( <i>Juglans californica</i> )					1			1
Ash sp. ( <i>Fraxinus</i> sp.)	1							1
Mulefat ( <i>Baccharis salicifolia</i> )	63	13	10	4	10	10	4	114
Dead Mulefat ( <i>B. salicifolia</i> )	2							2
Poison Hemlock ( <i>Conium maculatum</i> )	4							4
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	2		1					3
Black Willow /Poison Hemlock ( <i>S. gooddingii</i> / <i>C. maculatum</i> )	1							1
Unknown			3					3
Totals	210	22	25	19	31	13	18	338

\*Starting in 2015 Goose Creek Golf Course to I-15 only. Formerly monitored as Goose Creek Golf Club to River Rd.

**Table C-2-J. Least Bell’s Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SANTA ANA RIVER – Prado Basin Norco Bluffs

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015*	Totals
Black Willow ( <i>Salix gooddingii</i> )							3	3
Arroyo Willow ( <i>Salix lasiolepis</i> )							5	5
Mulefat ( <i>Baccharis salicifolia</i> )							5	5
Wild Grape and Mulefat ( <i>Vitis girdiana/B. salicifolia</i> )							1	1
Totals							14	14

\*Formerly monitored as part of Goose Creek Golf Club to River Rd.

**Table C-2-K. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

TEMESCAL CANYON

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Western Sycamore ( <i>Platanus racemosa</i> )	1							1
Fremont Cottonwood ( <i>Populus fremontii</i> )	2		2					4
Narrowleaf Willow ( <i>Salix exigua</i> )			1					1
Black Willow ( <i>Salix gooddingii</i> )	18	2	7	2	1			30
Red Willow ( <i>Salix laevigata</i> )		1	10	3				14
Arroyo Willow ( <i>Salix lasiolepis</i> )	61	7	2	1	1			72
Yellow Willow ( <i>Salix lucida</i> ssp. <i>lasiandra</i> )	3	1						4
Dead Willow ( <i>Salix</i> sp.)	1							1
Toyon ( <i>Heteromeles arbutifolia</i> )	1							1
Sugarbush ( <i>Rhus ovata</i> )		1	1					2
California Blackberry ( <i>Rubus ursinus</i> )				1				1
Poison Oak ( <i>Toxicodendron diversilobum</i> )	1							1
Mustard ( <i>Brassica</i> sp.)				1				1
Perennial Pepperweed ( <i>Lepidium latifolium</i> )	1							1
Tamarisk ( <i>Tamarix ramosissima</i> )	1		1	2				4
Mugwort ( <i>Artemisia douglasiana</i> )	1							1
Coyote Brush ( <i>Baccharis pilularis</i> )	1		1					2
Mulefat ( <i>Baccharis salicifolia</i> )	65	6	7	2	1			81
Dead Mulefat ( <i>B. salicifolia</i> )	3							3
Brittlebush ( <i>Encelia farinosa</i> )				1				1
Common Sunflower ( <i>Helianthus annuus</i> )	1							1
Arrowweed ( <i>Pluchea sericea</i> )	1			1				2
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	1	3	3	1				8
Arroyo Willow/Dead Hoary Nettle ( <i>S. lasiolepis/U. dioica</i> )	1							1
Deadfall	2	1						3
Totals	166	22	35	15	3	0	0	241

**Table C-2-L. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SANTA ANA CANYON – UPPER CANYON BELOW PRADO DAM

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Wild Grape ( <i>Vitis girdiana</i> )	4							4
Fremont Cottonwood ( <i>Populus fremontii</i> )	5	1			1	1		8
Narrowleaf Willow ( <i>Salix exigua</i> )	1							1
Black Willow ( <i>Salix gooddingii</i> )	10		1					11
Red Willow ( <i>Salix laevigata</i> )	3							3
Arroyo Willow ( <i>Salix lasiolepis</i> )	2				1			3
Willow sp. ( <i>Salix</i> spp.)	1							1
Castor Bean ( <i>Ricinus communis</i> )	1							1
Toyon ( <i>Heteromeles arbutifolia</i> )	1							1
Wild Rose ( <i>Rosa californica</i> )	3							3
Coast Live Oak ( <i>Quercus agrifolia</i> )	1							1
Scrub Oak ( <i>Quercus berberidifolia</i> )	2							2
Poison Oak ( <i>Toxicodendron diversilobum</i> )	5							5
Peruvian Pepper Tree ( <i>Schinus molle</i> )	1						1	2
Mustard ( <i>Brassica</i> spp.)	2							2
Coyote Brush ( <i>Baccharis pilularis</i> )	1							1
Mulefat ( <i>Baccharis salicifolia</i> )	33				3	7		43
Broom Baccharis ( <i>Baccharis sarothroides</i> )	1							1
Milk Thistle ( <i>Silybum marianum</i> )	1							1
Cocklebur ( <i>Xanthium strumarium</i> )	1							1
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	14	1	1	1	1			18
Poison Hemlock ( <i>Conium maculatum</i> )	2							2
Black Willow/Poison Hemlock ( <i>S. gooddingii</i> / <i>C. maculatum</i> )	1							1
Wild Grape/Mulefat ( <i>V. girdiana</i> / <i>B. salicifolia</i> )				1				1
Totals	96	2	2	2	6	8	1	117

**Table C-2-M. Least Bell’s Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SANTA ANA CANYON – GREEN RIVER GOLF CLUB

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Giant Reed ( <i>Arundo donax</i> )	1							1
Wild Grape ( <i>Vitis girdiana</i> )	1		1				1	3
Fremont Cottonwood ( <i>Populus fremontii</i> )	4					1	2	7
Narrowleaf Willow ( <i>Salix exigua</i> )	1				1			2
Black Willow ( <i>Salix gooddingii</i> )	5	2	1	3			2	13
Red Willow ( <i>Salix laevigata</i> )	4						1	5
Arroyo Willow ( <i>Salix lasiolepis</i> )	2					2		4
Toyon ( <i>Hetermeles arbutifolia</i> )	1		1					2
Black Walnut ( <i>Juglans californica</i> )		1						1
Laurel Sumac ( <i>Malosma laurina</i> )	3							3
Poison Oak ( <i>Toxicodendron diversilobum</i> )	1					1	1	3
Peruvian Pepper Tree ( <i>Schinus molle</i> )	2	3					1	6
Brazilian Pepper Tree ( <i>Schinus terebinthifolius</i> )				1				1
Blue Plumbago ( <i>Plumbago auriculata</i> )				1	1			2
Waxleaf Privet ( <i>Ligustrum</i> sp.)	1							1
Lollypop Tree ( <i>Myoporum laetum</i> )	1							1
California Sagebrush ( <i>Artemisia californica</i> )	1							1
Mugwort ( <i>Artemisia douglasiana</i> )						1		1
Coyote Brush ( <i>Baccharis pilularis</i> )	2		1					3
Mulefat ( <i>Baccharis salicifolia</i> )	35	1	5	2	1	2	4	50
Poison Hemlock ( <i>Conium maculatum</i> )	2							2
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	4		2		2	2	3	13
Yerba Santa sp. ( <i>Eriodictyon</i> sp.)						1		1
Wild Grape/Peruvian Pepper Tree ( <i>V. girdiana/S. molle</i> )			1					1
Wild Grape/Blue Elderberry ( <i>V. girdiana/S. n. caerulea</i> )	1							1
Black Willow/Blue Elderberry ( <i>S. gooddingii/S. n. caerulea</i> )			1					1
Unknown/No data							1	1
Totals	72	7	13	7	5	10	16	130



**Table C-2-N. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

SANTA ANA RIVER – FEATHERLY REGIONAL PARK

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Western Sycamore ( <i>Platanus racemosa</i> )						3		3
Wild Grape ( <i>Vitis girdiana</i> )	1							1
Fremont Cottonwood ( <i>Populus fremontii</i> )	4	3	4	4	2	1	5	23
Black Cottonwood ( <i>Populus trichocarpa</i> )					1		1	2
Dead Black Willow covered w/ living Black Willow ( <i>S. gooddingii</i> )	1							1
Narrowleaf Willow ( <i>Salix exigua</i> )	4						1	5
Black Willow ( <i>Salix gooddingii</i> )	13	1	2		3		1	20
Red Willow ( <i>Salix laevigata</i> )	2	2						4
Arroyo Willow ( <i>Salix lasiolepis</i> )	3		1				1	5
Black Walnut ( <i>Juglans californica</i> )	4				3		1	8
Willow sp. ( <i>Salix</i> sp.)	1							1
Toyon ( <i>Heteromeles arbutifolia</i> )	1							1
White Alder ( <i>Alnus rhombifolia</i> )	1							1
Laurel Sumac ( <i>Malosma laurina</i> )	3				3	2	1	9
Poison Oak ( <i>Toxicodendron diversilobum</i> )	1				4	1	2	8
Orange Tree ( <i>Citrus sinensis</i> )	1		1	1				3
Black Mustard ( <i>Brassica nigra</i> )	1	1					1	3
Black Sage ( <i>Salvia mellifera</i> )						1		1
Mulefat ( <i>Baccharis salicifolia</i> )	23	1	2		3	4	1	34
Yellowspine Thistle ( <i>Cirsium ochrocentrum</i> )	2							2
Cocklebur ( <i>Xanthum strumaritum</i> )	1							1
Poison Hemlock ( <i>Conium maculatum</i> )	2						1	3
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	11	3	2	2	2	5	4	29
Fiddleneck ( <i>Amsinckia</i> sp.)					1			1
Thick-leaved Yerba Santa ( <i>Eriodictyon crassifolium</i> )					1		2	3
Wild Grape/Mulefat ( <i>V. girdiana</i> / <i>B. salicifolia</i> )	2							2
Arroyo Willow/Black Mustard ( <i>S. lasiolepis</i> / <i>B. nigra</i> )	1							1
Castorbean/Mulefat ( <i>Ricinus communis</i> / <i>B. salicifolia</i> )				1				1
Unknown						1		1
Totals	83	11	12	8	23	18	22	177

**Table C-2-O. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

CHINO HILLS (Butterfield Ranch environs)

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Wild Grape ( <i>Vitis girdiana</i> )	1							1
Black Willow ( <i>Salix gooddingii</i> )	9						5	14
Red Willow ( <i>Salix laevigata</i> )	3	2		1				6
Arroyo Willow ( <i>Salix lasiolepis</i> )	1							1
Toyon ( <i>Heteromeles arbutifolia</i> )	1							1
Coast Live Oak ( <i>Quercus agrifolia</i> )					1			1
Scrub Oak ( <i>Quercus berberidifolia</i> )							1	1
Mugwort ( <i>Artemisia douglasiana</i> )	3							3
Mulefat ( <i>Baccharis salicifolia</i> )	4	1					1	6
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )	2							2
Totals	24	3	0	1	1	0	7	36

**Table C-2-P. Least Bell's Vireo nest placement preferences, at survey sites in the Santa Ana River Watershed, California. Plant species listed in taxonomic order.**

IRVINE REGIONAL PARK

Host Plant Species	2000-2009	2010	2011	2012	2013	2014	2015	Totals
Wild Grape ( <i>Vitis girdiana</i> )						1		1
Black Willow ( <i>Salix gooddingii</i> )						1		1
False Indigo ( <i>Amorpha fruticosa</i> )		1						1
Mulefat ( <i>Baccharis salicifolia</i> )		3				4		7
Blue Elderberry ( <i>Sambucus nigra caerulea</i> )		1	1					2
Totals		5	1	0	0	6	0	12

**Table C-3-A. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**  
 SAN JACINTO

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	43	18	25	36	29	19	7	n/a
B.	Number of known breeding (nesting) pairs	39	15	20	22	28	15	7	146
C.	Number of breeding pairs that were well-monitored throughout the breeding season	29	0	1	9	6	0	0	45
D.	Number of 'known fledged young' OBSERVED	104	28	18	49	39	12	8	258
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	93	n/a	0	26	8	n/a	n/a	127
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.7	1.9	0.9	2.2	1.4	0.8	1.1	1.8
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	3.2	n/a	n/a	2.9	1.3	n/a	n/a	2.8
H.	Number of nests that were discovered	59	7	14	13	17	2	n/a	112
I.	Number of nests that were regularly monitored or 'tracked'	54	3	10	13	13	1	n/a	94
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	59% (32/54)	100% (3/3)	10% (1/10)	69% (9/13)	38% (5/13)	0% (0/1)	n/a	53% (50/94)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) % = K/I x 100)	33% (18/54)	0% (0/3)	80% (8/10)	31% (4/13)	69% (9/13)	0% (0/1)	n/a	41% (39/94)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	11% (6/54)	0% (0/3)	10% (1/10)	8% (1/13)	0% (0/13)	100% (1/1)	n/a	10% (9/94)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	5% (3/54)	0% (0/3)	0% (0/10)	0% (0/13)	8% (1/13)	0% (0/1)	n/a	4% (4/94)
	B. Number of 'tracked' nests that failed as a result of parasitism	5-7% (3 or 4/54)	0% (0/3)	10% (1/10)	0% (0/13)	0% (0/13)	100% (1/1)	n/a	5-6% (5 or 6/94)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	28% (15/54)	0% (0/3)	80% (8/10)	31% (4/13)	54% (7/13)	0% (0/1)	n/a	36% (34/94)
N.	Average clutch size	n/a	3.3	3.7	3.3	3.5	3.0	n/a	n/a
O.	Number of cowbird eggs found in or near vireo nests	9	0	1	1	0	1	n/a	12

**Table C-3-A. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SAN JACINTO

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	0	0	0	0	0	0	n/a	0
Q.	Number of cowbird young fledged by vireo	2	0	1	0	2	2	n/a	7
R.	Number of 'manipulated' parasitized nests	4	0	0	1	0	0	n/a	5
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	40% (2/5)	n/a	n/a	100% (1/1)	n/a	n/a	n/a	50% (3/6)
T.	Number of vireo fledged from 'manipulated' parasitized nests	4	n/a	n/a	3	n/a	n/a	n/a	7
U.	Number of repaired nests	2	0	0	1	0	0	n/a	3
V.	% successful repaired nests	100% (2/2)	n/a	n/a	100% (1/1)	n/a	n/a	n/a	100% (3/3)
W.	Number of vireo fledged from repaired nests	6	n/a	n/a	4	n/a	n/a	n/a	10

**Table C-3-B. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**  
 SAN TIMOTEO CANYON

Parameter	2000-2009	2010	2011	2012	2013	2014	2015	Totals
A. Number of known pairs	n/a	95	101	102	80	135	141	n/a
B. Number of known breeding (nesting) pairs	287	76	78	73	67	114	126	821
C. Number of breeding pairs that were well-monitored throughout the breeding season	183	24	31	32	35	48	56	409
D. Number of 'known fledged young' OBSERVED	635	137	196	153	179	206	287	1,793
E. Number of 'known fledged young' produced by pairs monitored throughout the breeding season	497	67	104	90	127	121	181	1,187
F. Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.2	1.8	2.5	2.1	2.7	1.8	2.3	2.2
G. Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.7	2.8	3.4	2.8	3.6	2.5	3.2	2.9
H. Number of nests that were discovered	388	55	80	47	80	94	126	870
I. Number of nests that were regularly monitored or 'tracked'	338	37	73	45	76	88	114	771
J. Number of 'tracked' nests that were successful (% = J/I x 100)	57% (192*/338)	62% (23/37)	60% (44/73)	64% (29/45)	57% (43/76)	48% (42/88)	58% (66/114)	57% (439/771)
K. Rate of missing eggs/chicks from nests (successful and unsuccessful nests) % = K/I x 100 (b)	44% (150*/338)	65% (24/37)	30% (22/73)	42% (19/45)	41% (31/76)	52% (46/88)	n/a	44% (292/657)
L. Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	30% (103/338)	8% (3/37)	0% (0/73)	2% (1/45)	3% (2/76)	6% (5/88)	0% (0/114)	15% (114/771)
M. A. Number of 'tracked' nests that failed as a result of reproductive failure	2% (7/338)	11% (4/37)	8% (6/73)	0% (0/45)	5% (4/76)	6% (5/88)	10% (11/114)	5% (37/771)
B. Number of 'tracked' nests that failed as a result of parasitism	7% (25/338)	0% (0/37)	0% (0/73)	2% (1/45)	0% (0/76)	2% (2/88)	0% (0/114)	4% (28/771)
C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	34% (114/338)	27% (10/37)	30% (22/73)	33% (15/45)	36% (27/76)	44% (39/88)	32% (37/114)	34% (264/771)
D. Number of 'tracked' nests that failed for unknown reasons	n/a	n/a	1% (1/73)	0% (0/45)	3% (2/76)	0% (0/88)	0% (0/114)	1% (3/396)

**Table C-3-B. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SAN TIMOTEO CANYON

Parameter		2000- 2009	2010	2011	2012	2013	2014	2015	Totals
N.	Average clutch size	n/a	3.4	3.5	3.3	3.4	3.2	3.3	n/a
O.	Number of cowbird eggs found in or near vireo nests	118	3	0	1	2	4	0	128
P.	Number of cowbird nestlings removed from 'tracked' nests	6	0	0	0	0	1	0	7
Q.	Number of cowbird young	2	0	0	0	0	0	0	2
R.	Number of 'manipulated'	84	3	0	0	2	4	0	93
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	49% (41/84)	100% (3/3)	n/a	n/a	50% (1/2)	50% (2/4)	n/a	51% (47/93)
T.	Number of vireo fledged from 'manipulated' parasitized nests	88	8	n/a	n/a	1	5	n/a	102
U.	Number of repaired nests	3	1	2	1	1	0	0	8
V.	% successful repaired nests	66.7% (2/3)	0% (0/1)	100% (2/2)	100% (1/1)	100% (1/1)	n/a	n/a	75% (6/8)
W.	Number of vireo fledged from repaired nests	5	0	7	2	4	n/a	n/a	18

**Table C-3-C. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

MERIDIAN CONSERVATION AREA (former March SKR Preserve)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	12	9	7	12	16	3	n/a
B.	Number of known breeding (nesting) pairs	30	8	5	6	9	16	3	77
C.	Number of breeding pairs that were well-monitored throughout the breeding season	9 (n=4 yrs)	3	0	0	0	1	0	13
D.	Number of 'known fledged young' OBSERVED	75	25	7	8	16	23	3	157
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	38 (n=4 yrs)	19	0	n/a	n/a	3	n/a	60*
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.5	3.1	1.4	1.3	1.8	1.4	1.0	2.0
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	4.2	6.3	n/a	n/a	n/a	3.0	n/a	4.6*
H.	Number of nests that were discovered	17	6	n/a	n/a	n/a	3	n/a	26
I.	Number of nests that were regularly monitored or 'tracked'	16	6	n/a	n/a	n/a	3	n/a	25
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	69% (11/16)	100% (6/6)	n/a	n/a	n/a	33% (1/3)	n/a	72% (18/25)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100 (b)	38% (6/16)	0% (0/6)	n/a	n/a	n/a	67% (2/3)	n/a	32% (8/25) (n = 6yrs)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	0% (0/16)	0% (0/6)	n/a	n/a	n/a	0% (0/3)	n/a	0% (0/25)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	0% (0/16)	0% (0/6)	n/a	n/a	n/a	0% (0/3)	n/a	0% (0/25)
	B. Number of 'tracked' nests that failed as a result of parasitism	0.0% (0/16)	0% (0/6)	n/a	n/a	n/a	0% (0/3)	n/a	0% (0/25)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	31% (5/16)	0% (0/6)	n/a	n/a	n/a	67% (2/3)	n/a	28% (7/25)
N.	Average clutch size	n/a	3.5	n/a	n/a	n/a	3.3	n/a	n/a
O.	Number of cowbird eggs found in or near vireo nests	0	1	n/a	n/a	n/a	0	n/a	1

**Table C-3-C. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

MERIDIAN CONSERVATION AREA (former March SKR Preserve)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	0	0	n/a	n/a	n/a	0	n/a	0
Q.	Number of cowbird young fledged by vireo	0	0	0	n/a	n/a	0	n/a	0
R.	Number of 'manipulated' parasitized nests	0	0	n/a	n/a	n/a	0	n/a	0
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T.	Number of vireo fledged from 'manipulated' parasitized nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
U.	Number of repaired nests	0	0	n/a	n/a	n/a	0	n/a	0
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

\*Excludes 2011-2013 data



**Table C-3-D. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**  
 SYCAMORE CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	8	5	7	n/a	5	1	n/a
B.	Number of known breeding (nesting) pairs	19	6	3	4	n/a	3	1	36
C.	Number of breeding pairs that were well-monitored throughout the breeding season	6	0	0	0	n/a	0	0	6
D.	Number of 'known fledged young' OBSERVED	40	11	4	5	n/a	2	1	63
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	12	n/a	0	n/a	n/a	n/a	n/a	12
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.1	1.8	1.3	1.3	n/a	0.7	1.0	1.8
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.0	n/a	n/a	n/a	n/a	n/a	n/a	2.0
H.	Number of nests that were discovered	10	0	0	n/a	n/a	4	n/a	14
I.	Number of nests that were regularly monitored or 'tracked'	9	n/a	n/a	n/a	n/a	4	n/a	13
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	67% (6/9)	n/a	n/a	n/a	n/a	25% (1/4)	n/a	54% (7/13)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	33% (3/9)	n/a	n/a	n/a	n/a	100% (4/4)	n/a	54% (7/13)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	22% (2/9)	n/a	n/a	n/a	n/a	50% (2/4)	n/a	31% (4/13)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	0% (0/9)	n/a	n/a	n/a	n/a	0% (0/4)	n/a	0% (0/13)
	B. Number of 'tracked' nests that failed as a result of parasitism	11% (1/9)	n/a	n/a	n/a	n/a	50% (2/4)	n/a	23% (3/13)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	22% (2/9)	n/a	n/a	n/a	n/a	25% (1/4)	n/a	23% (3/13)
N.	Average clutch size	n/a	n/a	n/a	n/a	n/a	3.3	n/a	n/a
O.	Number of cowbird eggs found in or near vireo nests	2	n/a	n/a	n/a	n/a	3	n/a	5

**Table C-3-D. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SYCAMORE CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	0	n/a	n/a	n/a	n/a	0	n/a	0
Q.	Number of cowbird young fledged by vireo	0	n/a	0	n/a	n/a	0	n/a	0
R.	Number of 'manipulated' parasitized nests	1	n/a	n/a	n/a	n/a	1	n/a	2
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	100% (1/1)	n/a	n/a	n/a	n/a	0% (0/1)	n/a	50% (1/2)
T.	Number of vireo fledged from 'manipulated' parasitized nests	1	n/a	n/a	n/a	n/a	0	n/a	1
U.	Number of repaired nests	0	n/a	n/a	n/a	n/a	0	n/a	0
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Table C-3-E. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

MOCKINGBIRD CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	34	32	26	24	7	23	n/a
B.	Number of known breeding (nesting) pairs	110	26	31	21	22	4	16	230
C.	Number of breeding pairs that were well-monitored throughout the breeding season	37	0	16	5	6	0	0	64
D.	Number of 'known fledged young' OBSERVED	218	25	67	39	40	7	19	415
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	113	n/a	46	15	20	n/a	n/a	194
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.0	1.0	2.2	1.9	1.8	1.8	1.2	1.8
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	3.0	n/a	2.9	3.0	3.3	n/a	n/a	3.0
H.	Number of nests that were discovered	99	3	31	19	20	3	5	180
I.	Number of nests that were regularly monitored or 'tracked'	82	0	30	17	17	2	5	153
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	55% (45/82)	n/a	50% (15/30)	47% (8/17)	59% (10/17)	50% (1/2)	40% (2/5)	53% (81/153)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) % = K/I x 100 (b)	38% (31/82)	n/a	60% (18/30)	53% (9/17)	47% (8/17)	50% (1/2)	n/a	45% (67/148)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	15% (12/82)	n/a	0% (0/30)	6% (1/17)	18% (3/17)	0% (0/2)	0% (0/5)	10% (16/153)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	9% (7/82)	n/a	3% (1/30)	6% (1/17)	6% (1/17)	0% (0/2)	20% (1/5)	7% (11/153)
	B. Number of 'tracked' nests that failed as a result of parasitism	7% (6/82)	n/a	0% (0/30)	0% (0/17)	0% (0/17)	0% (0/2)	0% (0/5)	4% (6/153)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	29% (24/82)	n/a	43% (13/30)	47% (8/17)	35% (6/17)	0% (0/2)	40% (2/5)	35% (53/153)
	D. Number of 'tracked' nests that failed for unknown reasons	n/a		3% (1/30)	0	0	50% (1/2)	0% (0/5)	5% (2/37)
N.	Average clutch size	n/a	3.0	3.6	3.5	2.9	3.0	3.4	n/a

**Table C-3-E. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

MOCKINGBIRD CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
O.	Number of cowbird eggs found in or near vireo nests	22	1	0	1	3	0	0	27
P.	Number of cowbird nestlings removed from 'tracked' nests	2	n/a	0	0	0	0	0	2
Q.	Number of cowbird young fledged by vireo	1	n/a	0	0	0	0	0	1
R.	Number of 'manipulated' parasitized nests	10	n/a	0	1	2	0	0	13
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	1% (1/10)	n/a	n/a	100% (1/1)	100% (2/2)	n/a	n/a	31% (4/13)
T.	Number of vireo fledged from 'manipulated' parasitized nests	2	n/a	n/a	1	5	n/a	n/a	8
U.	Number of repaired nests	1	n/a	2	0	0	0	0	3
V.	% successful repaired nests	100% (1/1)	n/a	100% (2/2)	n/a	n/a	n/a	n/a	100% (3/3)
W.	Number of vireo fledged from repaired nests	1	n/a	6	n/a	n/a	n/a	n/a	7

**Table C-3-F. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA RIVER - RIVERSIDE (Riverside Ave to Van Buren Blvd)

Parameter	2000-2009	2010	2011	2012	2013	2014	2015	Totals
A. Number of known pairs	n/a	50	23	11	n/a	19	37	n/a
B. Number of known breeding (nesting) pairs	149	39	19	7	n/a	10	27	251
C. Number of breeding pairs that were well-monitored throughout the breeding season	51 (n=5 yrs)	9	7	0	0	5	0	72
D. Number of 'known fledged young' OBSERVED	283	58	30	7	7	15	33	433
E. Number of 'known fledged young' produced by pairs monitored throughout the breeding season	133 (n=5 yrs)	18	22	n/a	n/a	6	n/a	179
F. Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.9	1.5	1.6	n/a	n/a	1.5	1.2	1.7
G. Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.6 (n=5 yrs)	2.0	3.1	n/a	n/a	1.2	n/a	2.5
H. Number of nests that were discovered	94	13	14	2	0	6	11	140
I. Number of nests that were regularly monitored or 'tracked'	75	11	10	0	0	3	3	102
J. Number of 'tracked' nests that were successful (% = J/I x 100)	68% (51/75)	55% (6/11)	60% (6/10)	n/a	n/a	67% (2/3)	33% (1/3)	65% (66/102)
K. Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100 (b)	32% (24/75)	36% (4/11)	30% (3/10)	n/a	n/a	67% (2/3)	n/a	33% (33/99)
L. Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	16% (12/75)	0% (0/11)	10% (1/10)	n/a/	n/a	0% (0/3)	100% (3/3)	16% (16/102)
M. A. Number of 'tracked' nests that failed as a result of reproductive failure	3% (2/75)	9% (1/11)	0% (0/10)	n/a	n/a	0% (0/3)	0% (0/3)	3% (3/102)
B. Number of 'tracked' nests that failed as a result of parasitism	8% (6/75)	0% (0/11)	10% (1/10)	n/a	n/a	0% (0/3)	0% (0/3)	7% (7/102)
C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	21% (16/75)	36% (4/11)	30% (3/10)	n/a	n/a	33% (1/3)	67% (2/3)	25% (26/102)
N. Average clutch size	n/a	3.2	3.5	3.0	n/a	3.5	3.7	n/a
O. Number of cowbird eggs found in or near vireo nests	15	0	2	1	n/a	0	3	21

**Table C-3-F. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA RIVER - RIVERSIDE (Riverside Ave to Van Buren Blvd)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	0	0	0	n/a	n/a	0	0	0
Q.	Number of cowbird young fledged by vireo	1	1	0	n/a	n/a	0	1	3
R.	Number of 'manipulated' parasitized nests	10	0	1	0	n/a	0	3	14
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	20% (2/10)	n/a	Unknown	n/a	n/a	n/a	33% (1/3)	23% (3/13)
T.	Number of vireo fledged from 'manipulated' parasitized nests	5	n/a	Unknown	n/a	n/a	n/a	2	7
U.	Number of repaired nests	1	0	0	0	n/a	0	0	1
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Table C-3-G. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

HIDDEN VALLEY (south side of river)

Parameter	2000-2009	2010	2011	2012	2013	2014	2015	Totals
A. Number of known pairs	n/a	43	36	37	42	32	27	n/a
B. Number of known breeding (nesting) pairs	212	36	33	31	37	25	18	392
C. Number of breeding pairs that were well-monitored throughout the breeding season	56	9	5	4	8	0	0	82
D. Number of 'known fledged young' OBSERVED	407	53	41	45	66	28	22	662
E. Number of 'known fledged young' produced by pairs monitored throughout the breeding season	142	19	17	11	21	n/a	n/a	210
F. Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.9	1.5	1.2	1.5	1.8	1.1	1.2	1.7
G. Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.5	2.1	3.4	2.8	2.6	n/a	n/a	2.6
H. Number of nests that were discovered	114	18	11	8	10	4	0	165
I. Number of nests that were regularly monitored or 'tracked'	85	17	10	8	8	3	n/a	131
J. Number of 'tracked' nests that were successful (% = J/I x 100)	68% (58/85)	41% (7/17)	60% (6/10)	63% (5/8)	88% (7/8)	67% (2/3)	n/a	65% (85/131)
K. Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	36% (31/85)	65% (11/17)	30% (3/10)	0% (0/8)	25% (2/8)	67% (2/3)	n/a	37% (49/131)
L. Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	7% (6/85)	6% (1/17)	20% (2/10)	0% (0/8)	0% (0/8)	0% (0/3)	n/a	7% (9/131)
M. A. Number of 'tracked' nests that failed as a result of reproductive failure	4% (3/85)	0% (0/17)	0% (0/10)	0% (0/8)	0% (0/8)	0% (0/3)	n/a	2% (3/131)
B. Number of 'tracked' nests that failed as a result of parasitism	5% (4/85)	6% (1/17)	10% (1/10)	0% (0/8)	0% (0/8)	0% (0/3)	n/a	5% (6/131)
C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	24% (20/85)	53% (9/17)	30% (3/10)	38% (3/8)	13% (1/13)	33% (1/3)	n/a	28% (37/131)
N. Average clutch size	n/a	3.4	3.1	3.2	3.3	3.0	n/a	n/a
O. Number of cowbird eggs found in or near vireo nests	4	2	2	0	0	0	n/a	8

**Table C-3-G. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

HIDDEN VALLEY (south side of river)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	2	0	0	0	0	0	n/a	2
Q.	Number of cowbird young fledged by vireo	0	0	0	0	0	0	n/a	0
R.	Number of 'manipulated' parasitized nests	2	0	1	0	0	0	n/a	3
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	100% (2/2)	n/a	100% (1/1)	n/a	n/a	n/a	n/a	100% (3/3)
T.	Number of vireo fledged from 'manipulated' parasitized nests	6	n/a	2	n/a	n/a	n/a	n/a	8
U.	Number of repaired nests	0	0	0	0	0	0	n/a	0
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a



**Table C-3-H. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

HIDDEN VALLEY (north side of river)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	12	2	3	2	14	23	n/a
B.	Number of known breeding (nesting) pairs	n/a	9	2	2	2	10	11	36
C.	Number of breeding pairs that were well-monitored throughout the breeding season	n/a	6	0	0	0	4	0	10
D.	Number of 'known fledged young' OBSERVED	n/a	18	2	1	3	19	15	58
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	n/a	14	0	n/a	n/a	8	n/a	22
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	n/a	2.0	1.0	n/a	1.5	1.9	1.4	1.6
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	n/a	2.3	0	n/a	n/a	2.0	n/a	2.2
H.	Number of nests that were discovered	n/a	10	2	0	n/a	4	0	16
I.	Number of nests that were regularly monitored or 'tracked'	n/a	9	0	0	n/a	3	n/a	12
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	n/a	56% (5/9)	n/a	n/a	n/a	67% (2/3)	n/a	58% (7/12)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	n/a	11% (1/9)	n/a	n/a	n/a	33% (1/3)	n/a	17% (2/12)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	n/a	33% (3/9)	n/a	n/a	n/a	0% (0/3)	n/a	25% (3/12)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	n/a	0% (0/9)	n/a	n/a	n/a	0% (0/3)	n/a	0% (0/12)
	B. Number of 'tracked' nests that failed as a result of parasitism	n/a	33% (3/9)	n/a	n/a	n/a	0% (0/3)	n/a	25% (3/12)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	n/a	11% (1/9)	n/a	n/a	n/a	33% (1/3)	n/a	17% (2/12)
N.	Average clutch size	n/a		n/a	n/a	n/a	4.0	n/a	n/a
O.	Number of cowbird eggs found in or near vireo nests	n/a	4	n/a	n/a	n/a	0	n/a	4

**Table C-3-H. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

HIDDEN VALLEY (north side of river)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	n/a	0	n/a	n/a	n/a	0	n/a	0
Q.	Number of cowbird young fledged by vireo	n/a	0	0	n/a	n/a	0	n/a	0
R.	Number of 'manipulated' parasitized nests	n/a	2	n/a	0	n/a	0	n/a	2
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	n/a	0% (0/2)	n/a	n/a	n/a	n/a	n/a	0%
T.	Number of vireo fledged from 'manipulated' parasitized nests	n/a	0% (0/2)	n/a	n/a	n/a	n/a	n/a	0%
U.	Number of repaired nests	n/a	0	n/a	0	n/a	0	n/a	0
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

**Table C-3-I. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA RIVER – GOOSE CREEK, NORCO TO I-15

Parameter	2000-2009	2010	2011	2012	2013	2014	2015*	Totals
A. Number of known pairs	n/a	64	59	51	52	32	36	n/a
B. Number of known breeding (nesting) pairs	224	60	56	48	50	28	29	495
C. Number of breeding pairs that were well-monitored throughout the breeding season	105	12	12	8	20	0	13	170
D. Number of 'known fledged young' OBSERVED	489	113	91	86	109	36	63	987
E. Number of 'known fledged young' produced by pairs monitored throughout the breeding season	315	39	36	29	68	n/a	33	520
F. Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.23	1.9	1.6	1.8	2.2	1.3	2.2	2.0
G. Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	3.0	3.3	3.0	3.6	3.4	n/a	2.5	3.1
H. Number of nests that were	212	22	25	19	31	13	18	340
I. Number of nests that were regularly monitored or 'tracked'	177	18	22	17	29	9	13	285
J. Number of 'tracked' nests that were successful (% = J/I x 100)	65% (115/177)	89% (16/18)	45% (10/22)	71% (12/17)	83% (24/29)	44% (4/9)	77% (10/13)	67% (191/285)
K. Rate of missing eggs/chicks from nests (successful and unsuccessful nests) % = K/I x 100 (b)	41% (73/177)	28% (5/18)	45% (10/22)	0% (0/17)	26% (8/29)	56% (5/9)	n/a	37% (101/272)
L. Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	8.5% (15/177)	0% (0/18)	0% (0/22)	0% (0/17)	7% (2/29)	0% (0/9)	0% (0/13)	6% (17/285)
M. A. Number of 'tracked' nests that failed as a result of reproductive failure	3% (6/177)	0% (0/18)	14% (3/22)	12% (2/17)	0% (0/29)	0% (0/9)	8% (1/13)	4% (12/285)
B. Number of 'tracked' nests that failed as a result of parasitism	2% (4/177)	0% (0/18)	0% (0/22)	0% (0/17)	0% (0/29)	0% (0/9)	0% (0/13)	1% (4/285)
C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	29% (51/177)	11% (2/18)	41% (9/22)	18% (3/17)	14% (4/29)	56% (5/9)	15% (2/13)	27% (76/285)
D. Number of "tracked" nests that failed for Other/Unknown Reasons	1% (1/177)	0% (0/18)	0% (0/22)	0% (0/17)	3% (1/29)	0% (0/9)	0% (0/13)	1% (2/285)

**Table C-3-I. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA RIVER – GOOSE CREEK, NORCO TO I-15

Parameter		2000-2009	2010	2011	2012	2013	2014	2015*	Totals
N.	Average clutch size	n/a	3.7	3.8	3.6	3.7	3.3	3.5	n/a
O.	Number of cowbird eggs found in or near vireo nests	20	0	0	0	2	0	0	22
P.	Number of cowbird nestlings removed from 'tracked' nests	1	0	0	0	0	0	0	1
Q.	Number of cowbird young fledged by vireo	0	0	0	0	0	0	0	0
R.	Number of 'manipulated' parasitized nests	14	0	0	0	2	0	n/a	16
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	64% (9/14)	n/a	n/a	n/a	100% (2/2)	n/a	n/a	69% (11/16)
T.	Number of vireo fledged from 'manipulated' parasitized nests	13	n/a	n/a	n/a	5	n/a	n/a	18
U.	Number of repaired nests	2	0	0	0	0	0	0	2
V.	% successful repaired nests	50%	n/a	n/a	n/a	n/a	n/a	n/a	50%
W.	Number of vireo fledged from repaired nests	4	n/a	n/a	n/a	n/a	n/a	n/a	4

\*Starting in 2015 Goose Creek Golf Club to I-15 only. Formerly monitored as Goose Creek Golf Course to River Rd.

**Table C-3-J. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

PRADO BASIN – NORCO BLUFFS

Parameter		2000-2009	2010	2011	2012	2013	2014	2015*	Totals
A.	Number of known pairs							17	n/a
B.	Number of known breeding (nesting) pairs							17	17
C.	Number of breeding pairs that were well-monitored throughout the breeding season							3	3
D.	Number of 'known fledged young' OBSERVED							43	43
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season							11	11
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')							2.5	2.5
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)							3.7	3.7
H.	Number of nests that were							14	14
I.	Number of nests that were regularly monitored or 'tracked'							13	13
J.	Number of 'tracked' nests that were successful (% = J/I x 100)							69% (9/13)	69% (9/13)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)							n/a	n/a
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)							0% (0/13)	0% (0/13)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure							15% (2/13)	15% (2/13)
	B. Number of 'tracked' nests that failed as a result of parasitism							0% (0/13)	0% (0/13)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group							15% (2/13)	15% (2/13)
	D. Number of "tracked" nests that failed for Other/Unknown Reasons							0% (0/13)	0% (0/13)

**Table C-3-J. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

PRADO BASIN – NORCO BLUFFS

Parameter		2000-2009	2010	2011	2012	2013	2014	2015*	Totals
N.	Average clutch size							3.4	3.4
O.	Number of cowbird eggs found in or near vireo nests							0	0
P.	Number of cowbird nestlings removed from 'tracked' nests							0	0
Q.	Number of cowbird young fledged by vireo							n/a	n/a
R.	Number of 'manipulated' parasitized nests							0	0
S.	Number of 'successful, manipulated' nests (% = S/R x 100)							n/a	n/a
T.	Number of vireo fledged from 'manipulated' parasitized nests							n/a	n/a
U.	Number of repaired nests							0	0
V.	% successful repaired nests							n/a	n/a
W.	Number of vireo fledged from repaired nests							n/a	n/a

\*Formerly monitored as part of Goose Creek Golf Course to River Rd.

**Table C-3-K. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

TEMESCAL CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	49	65	63	50	24	21	n/a
B.	Number of known breeding (nesting) pairs	146	38	57	48	42	n/a	20	351
C.	Number of breeding pairs that were well-monitored throughout the breeding season	81	11	18	8	0	n/a	0	118
D.	Number of 'known fledged young' OBSERVED	339	73	113	71	48	17	22	683
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	217	34	52	24	0	n/a	n/a	327
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.3	1.9	2.0	1.5	1.1	n/a	1.1	1.9
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.7	3.1	2.9	3.0	0	n/a	n/a	2.8
H.	Number of nests that were discovered	166	22	35	16	3	3	0	245
I.	Number of nests that were regularly monitored or 'tracked'	133	15	32	12	0	0	n/a	192
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	62% (82/133)	87% (13/15)	69% (22/32)	58% (7/12)	n/a	n/a	n/a	65% (124/192)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100 (b)	39% (52/133)	20% (3/15)	34% (11/32)	0% (0/12)	n/a	n/a	n/a	34% (66/192)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	20% (27/133)	0% (0/15)	3% (1/32)	25% (3/12)	n/a	n/a	n/a	16% (31/192)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	4% (5/133)	0% (0/15)	0% (0/32)	0% (0/12)	n/a	n/a	n/a	3% (5/192)
	B. Number of 'tracked' nests that failed as a result of parasitism	3% (4/133)	0% (0/15)	0% (0/32)	17% (2/12)	n/a	n/a	n/a	3% (6/192)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	32% (42/133)	13% (2/15)	31% (10/32)	25% (3/12)	n/a	n/a	n/a	30% (57/192)
N.	Average clutch size	n/a	3.7	3.5	3.5	3.7	n/a	n/a	n/a
O.	Number of cowbird eggs found in or near vireo nests	33	0	1	5	0	n/a	n/a	39

**Table C-3-K. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

TEMESCAL CANYON

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	2	0	0	0	0	n/a	n/a	2
Q.	Number of cowbird young fledged by vireo	2	0	0	0	0	n/a	n/a	2
R.	Number of 'manipulated' parasitized nests	29	0	1	2	0	n/a	n/a	32
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	41% (12/29)	0	100% (1/1)	100% (2/2)	n/a	n/a	n/a	47% (15/32)
T.	Number of vireo fledged from 'manipulated' parasitized nests	26	n/a	2	6	n/a	n/a	n/a	34
U.	Number of repaired nests	0	0	3	0	0	n/a	n/a	3
V.	% successful repaired nests	n/a	n/a	67% (2/3)	n/a	n/a	n/a	n/a	67% (2/3)
W.	Number of vireo fledged from repaired nests	n/a	n/a	3	n/a	n/a	n/a	n/a	3



**Table C-3-L. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA CANYON – UPPER CANYON BELOW PRADO DAM

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	4	5	4	14	18	9	n/a
B.	Number of known breeding (nesting) pairs	110	3	5	4	12	16	6	156
C.	Number of breeding pairs that were well-monitored throughout the breeding season	46	0	0	1	4	4	1	56
D.	Number of 'known fledged young' OBSERVED	208	6	5	6	23	28	10	286
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	118	n/a	n/a	3	12	12	2	147
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.9	2.0	1.0	1.5	1.9	1.8	1.7	1.8
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.6	n/a	n/a	3.0	3.0	3.0	2.0	2.6
H.	Number of nests that were discovered	97	2	2	2	6	8	1	118
I.	Number of nests that were regularly monitored or 'tracked'	64	1	0	1	5	6	1	78
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	64% (41/64)	100% (1/1)	n/a	100% (1/1)	80% (4/5)	83% (5/6)	100% (1/1)	68% (53/78)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	41% (26/64)	0% (0/1)	n/a	0% (0/1)	40% (2/5)	33% (2/6)	n/a	39% (30/77)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	6% (4/64)	0% (0/1)	n/a	0% (0/1)	0% (0/5)	0% (0/6)	0% (0/1)	5% (4/78)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	5% (3/64)	0% (0/1)	n/a	0% (0/1)	0% (0/5)	0% (0/6)	0% (0/1)	4% (3/78)
	B. Number of 'tracked' nests that failed as a result of parasitism	3% (2/64)	0% (0/1)	n/a	0% (0/1)	0% (0/5)	0% (0/6)	0% (0/1)	3% (2/78)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	28% (18/64)	0% (0/1)	n/a	0% (0/1)	20% (1/5)	17% (1/6)	0% (0/1)	26% (20/78)
N.	Average clutch size	n/a	4.0	4.0	3.0	3.5	3.2	4.0	n/a
O.	Number of cowbird eggs found in or near vireo nests	3	0	0	0	0	0	0	3

**Table C-3-L. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA CANYON – UPPER CANYON BELOW PRADO DAM

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	1	0	n/a	0	0	0	0	1
Q.	Number of cowbird young fledged by vireo	0	0	0	0	0	0	0	0
R.	Number of 'manipulated' parasitized nests	1	0	0	0	0	0	0	1
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	100% (1/1)	n/a	n/a	n/a	n/a	n/a	n/a	100% (1/1)
T.	Number of vireo fledged from 'manipulated' parasitized nests	1	n/a	n/a	n/a	n/a	n/a	n/a	1
U.	Number of repaired nests	2	0	0	0	0	0	0	2
V.	% successful repaired nests	0% (0/2)	n/a	n/a	n/a	n/a	n/a	n/a	0% (0/2)
W.	Number of vireo fledged from repaired nests	0	n/a	n/a	n/a	n/a	n/a	n/a	0

**Table C-3-M. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA CANYON – GREEN RIVER GOLF CLUB

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	17	14	11	19	19	23	n/a
B.	Number of known breeding (nesting) pairs	92	14	12	8	15	18	19	178
C.	Number of breeding pairs that were well-monitored throughout the breeding season	44	4	7	4	2	4	8	73
D.	Number of 'known fledged young' OBSERVED	192	19	19	11	19	29	35	324
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	118	7	15	9	0	9	13	171
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	2.1	1.4	1.6	1.4	1.3	1.6	1.8	1.8
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.7	1.8	2.1	2.3	0.0	2.3	1.6	2.3
H.	Number of nests that were discovered	73	7	13	7	5	10	16	131
I.	Number of nests that were regularly monitored or 'tracked'	61	7	11	5	4	8	15	111
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	72% (44/61)	43% (3/7)	45% (5/11)	60% (3/5)	25% (1/4)	63% (5/8)	47% (7/15)	61% (68/111)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	26% (16/61)	71% (5/7)	55% (6/11)	20% (1/5)	50% (2/4)	25% (2/8)	n/a	33% (32/96)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	7% (4/61)	0% (0/7)	0% (0/11)	0% (0/5)	0% (0/4)	0% (0/8)	0% (0/15)	4% (4/111)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	7% (4/61)	0% (0/7)	0% (0/11)	20% (1/5)	0% (0/4)	13% (1/8)	5% (1/15)	6% (7/111)
	B. Number of 'tracked' nests that failed as a result of parasitism	2% (1/61)	0% (0/7)	0% (0/11)	0% (0/5)	0% (0/4)	0% (0/8)	0% (0/15)	1% (1/111)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	20% (12/61)	57% (4/7)	55% (6/11)	20% (1/5)	75% (3/4)	25% (2/8)	47% (7/15)	32% (35/111)
N.	Average clutch size	n/a	4.0	3.4	3.2	3.0	3.0	2.8	n/a
O.	Number of cowbird eggs found in or near vireo nests	4	0	0	0	0	0	n/a	4

**Table C-3-M. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA CANYON – GREEN RIVER GOLF CLUB

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	0	0	0	0	0	0	0	0
Q.	Number of cowbird young fledged by vireo	0	0	0	0	0	0	0	0
R.	Number of 'manipulated' parasitized nests	2	0	0	0	0	0	0	0
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	100% (2/2)	n/a	n/a	n/a	n/a	n/a	n/a	100% (2/2)
T.	Number of vireo fledged from 'manipulated' parasitized nests	6	n/a	n/a	n/a	n/a	n/a	n/a	6
U.	Number of repaired nests	4	0	0	0	0	1	0	5
V.	% successful repaired nests	75% (3/4)	n/a	n/a	n/a	n/a	100% (1/1)	n/a	80% (4/5)
W.	Number of vireo fledged from repaired nests	7	n/a	n/a	n/a	n/a	3	n/a	10

**Table C-3-N. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA RIVER – FEATHERLY REGIONAL PARK

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	23	19	16	45	39	38	n/a
B.	Number of known breeding (nesting) pairs	109	18	18	11	37	34	30	257
C.	Number of breeding pairs that were well-monitored throughout the breeding season	36	3	7	2	10	10	9	77
D.	Number of 'known fledged young' OBSERVED	175	22	23	12	55	35	37	359
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	73	6	14	0	17	11	12	133
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.6	1.2	1.3	1.1	1.5	1.0	1.2	1.4
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	2.0	2.0	2.0	0	1.7	1.1	1.3	1.7
H.	Number of nests that were discovered	83	11	12	8	23	18	22	177
I.	Number of nests that were regularly monitored or 'tracked'	65	7	5	4	14	14	19	128
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	49% (32/65)	29% (2/7)	100% (5/5)	0% (0/4)	50% (7/14)	29% (4/14)	32% (6/19)	44% (56/128)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	48% (31/65)	71% (5/7)	20% (1/5)	100% (4/4)	50% (7/14)	64% (9/14)	n/a	52% (57/109)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	8% (5/65)	0% (0/7)	0% (0/5)	0% (0/4)	0% (0/14)	0% (0/14)	0% (0/19)	4% (5/128)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	5% (3/65)	0% (0/7)	0% (0/5)	0% (0/4)	7% (1/14)	7% (1/14)	5% (1/19)	5% (6/128)
	B. Number of 'tracked' nests that failed as a result of parasitism	3% (2/65)	0% (0/7)	0% (0/5)	0% (0/4)	0% (0/14)	0% (0/14)	0% (0/19)	2% (2/128)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	43% (28/65)	71% (5/7)	0% (0/5)	100% (4/4)	43% (6/14)	64% (9/14)	63% (12/19)	50% (64/128)
N.	Average clutch size	n/a	4.0	3.6	4.0	3.4	3.1	3.2	n/a
O.	Number of cowbird eggs found in or near vireo nests	4	0	0	0	0	0	0	4

**Table C-3-N. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

SANTA ANA RIVER – FEATHERLY REGIONAL PARK

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	1	0	0	0	0	0	0	1
Q.	Number of cowbird young fledged by vireo	0	0	0	0	0	0	0	0
R.	Number of 'manipulated' parasitized nests	3	0	0	0	0	0	0	3
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	33% (1/3)	n/a	n/a	n/a	n/a	n/a	n/a	33% (1/3)
T.	Number of vireo fledged from 'manipulated' parasitized nests	2	n/a	n/a	n/a	n/a	n/a	n/a	2
U.	Number of repaired nests	4	1	0	0	0	2	0	7
V.	% successful repaired nests	100% (4/4)	100% (1/1)	n/a	n/a	n/a	50% (1/2)	n/a	86% (6/7)
W.	Number of vireo fledged from repaired nests	14	2	n/a	n/a	n/a	2	n/a	18

**Table C-3-O. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

CHINO HILLS (Butterfield Ranch environs)

Parameter		2000- 2009	2010	2011	2012	2013	2014	2015	Totals
A.	Number of known pairs	n/a	7	3	2	5	2	6	n/a
B.	Number of known breeding (nesting) pairs	37	4	1	2	4	n/a	3	51
C.	Number of breeding pairs that were well-monitored throughout the breeding season	15 (n=4 yrs)	3	0	1	1	n/a	3	23 (n=8 yrs)
D.	Number of 'known fledged young' OBSERVED	54	7	1	1	7	3	4	77
E.	Number of 'known fledged young' produced by pairs monitored throughout the breeding season	19 (n=4 yrs)	5	n/a	0	4	n/a	4	32 (n=8 yrs)
F.	Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	1.5	1.8	n/a	0.5	1.8	n/a	1.3	1.5
G.	Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	1.3 (n=4 yrs)	1.7	n/a	0	4.0	n/a	1.3	1.4
H.	Number of nests that were discovered	24	3	0	1	1	n/a	7	36
I.	Number of nests that were regularly monitored or 'tracked'	19	3	n/a	1	1	n/a	5	29
J.	Number of 'tracked' nests that were successful (% = J/I x 100)	32% (6/19)	67% (2/3)	n/a	0% (0/1)	100% (1/1)	n/a	20% (1/5)	34% (10/29)
K.	Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100) (b)	63% (12/19)	33% (1/3)	n/a	100% (1/1)	0% (0/1)	n/a	n/a	58% (14/24)
L.	Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	32% (6/19)	0% (0/3)	n/a	0% (0/1)	0% (0/1)	n/a	20% (1/5)	24% (7/29)
M.	A. Number of 'tracked' nests that failed as a result of reproductive failure	5% (1/19)	0% (0/3)	n/a	0% (0/1)	0% (0/1)	n/a	20% (1/5)	7% (2/29)
	B. Number of 'tracked' nests that failed as a result of parasitism	11% (2/19)	0% (0/3)	n/a	0% (0/1)	0% (0/1)	n/a	0% (0/5)	7% (2/29)
	C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	53% (10/19)	33% (1/3)	n/a	100% (1/1)	0% (0/1)	n/a	60% (3/5)	52% (15/29)
N.	Average clutch size	n/a	3.7	n/a	3.0	4.0	n/a	3.4	n/a
O.	Number of cowbird eggs found in or near vireo nests	9	0	n/a	0	0	n/a	1	10

**Table C-3-0. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

CHINO HILLS (Butterfield Ranch environs)

Parameter		2000-2009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	0	0	n/a	0	0	n/a	0	0
Q.	Number of cowbird young fledged by vireo	0	0	n/a	0	0	n/a	0	0
R.	Number of 'manipulated' parasitized nests	6	0	n/a	0	0	n/a	1	7
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	0% (0/6)	n/a	n/a	n/a	n/a	n/a	0% (0/1)	0% (0/7)
T.	Number of vireo fledged from 'manipulated' parasitized nests	0	n/a	n/a	n/a	n/a	n/a	0	0
U.	Number of repaired nests	0	0	n/a	0	0	n/a	0	0
V.	% successful repaired nests	n/d	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/d	n/a	n/a	n/a	n/a	n/a	n/a	n/a



**Table C-3-P. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

IRVINE REGIONAL PARK

Parameter	2000- 2009	2010	2011	2012	2013	2014	2015	Totals
A. Number of known pairs	n/a	14	9	5	n/a	9	24	n/a
B. Number of known breeding (nesting) pairs	n/a	9	5	5	n/a	8	1	28
C. Number of breeding pairs that were well-monitored throughout the breeding season	n/a	3	1	0	n/a	5	0	9
D. Number of 'known fledged young' OBSERVED	n/a	18	7	5	n/a	12	2	44
E. Number of 'known fledged young' produced by pairs monitored throughout the breeding season	n/a	11	2	n/a	n/a	8	n/a	21
F. Average number of fledglings produced per breeding pair (minimum; D/B = 'productivity or breeding success')	n/a	2.0	1.4	n/a	n/a	1.5	2.0	1.6
G. Average number of fledglings produced by pairs monitored throughout the breeding season (E/C)	n/a	3.6	2.0	n/a	n/a	1.6	n/a	2.3
H. Number of nests that were discovered	n/a	5	1	n/a	n/a	6	n/a	12
I. Number of nests that were regularly monitored or 'tracked'	n/a	4	1	n/a	n/a	5	n/a	10
J. Number of 'tracked' nests that were successful (% = J/I x 100)	n/a	75% (3/4)	100% (1/1)	n/a	n/a	60% (3/5)	n/a	70% (7/10)
K. Rate of missing eggs/chicks from nests (successful and unsuccessful nests) %=K/I x100 (b)	n/a	25% (1/4)	n/a	n/a	n/a	80% (4/5)	n/a	56% (5/9)
L. Number of 'tracked' nests that were parasitized by cowbirds (% = L/I x 100)	n/a	0% (0/4)	0% (0/1)	n/a	n/a	0% (0/5)	n/a	0% (0/10)
M. A. Number of 'tracked' nests that failed as a result of reproductive failure	n/a	0% (0/4)	0% (0/1)	n/a	n/a	0% (0/5)	n/a	0% (0/10)
B. Number of 'tracked' nests that failed as a result of parasitism	n/a	0% (0/4)	0% (0/1)	n/a	n/a	0% (0/5)	n/a	0% (0/10)
C. Number of 'tracked' nests that failed as a result of predation – Predation Rate according to Vireo Working Group	n/a	25% (1/4)	0% (0/1)	n/a	n/a	40% (2/5)	n/a	30% (3/10)
N. Average clutch size	n/a	3.5	2.0	n/a	n/a	3.2	n/a	n/a
O. Number of cowbird eggs found in or near vireo nests	n/a	4	0	n/a	n/a	0	n/a	4

**Table C-3-P. Least Bell's Vireo reproductive success and breeding biology data, at survey sites in the Santa Ana River watershed, California**

IRVINE REGIONAL PARK

Parameter		2000- 1009	2010	2011	2012	2013	2014	2015	Totals
P.	Number of cowbird nestlings removed from 'tracked' nests	n/a	0	0	n/a	n/a	0	n/a	0
Q.	Number of cowbird young fledged by vireo	n/a	0	0	n/a	n/a	0	n/a	0
R.	Number of 'manipulated' parasitized nests	n/a	n/a	n/a	n/a	n/a	0	n/a	0
S.	Number of 'successful, manipulated' nests (% = S/R x 100)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
T.	Number of vireo fledged from 'manipulated' parasitized nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
U.	Number of repaired nests	n/a	0	0	n/	n/a	0	n/a	0
V.	% successful repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
W.	Number of vireo fledged from repaired nests	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

## **APPENDIX D: SUMMARY TABLES BY MANAGED SITE, FROM 2000-2009**

*Available by request under separate header.*

**APPENDIX E: LEAST BELL'S VIREO ABUNDANCE AND DISTRIBUTION IN  
THE SANTA ANA WATERSHED, 2010-2014**

Table 1B: Least Bell's Vireo abundance and distribution in the Santa Ana Watershed, 2010-2014. Numbers of territories, pairs and fledglings detected. By Sub-watershed					
	2010	2011	2012	2013	2014
<b>Santa Ana River and Tributaries</b>					
Cajon Wash	0/0/0	0/0/0	Not surveyed	0/0/0	Not surveyed
Plunge Creek, Highland	1/1/0	1/0/0	1/1/1	Not surveyed	3/1/0
City Creek, Highland	2/1/0	0/0/0	0/0/0	Not surveyed	4/0/0
Little Sand Basin, Highland	2/0/0	3/2/1	3/2/0	Not surveyed	0/0/0
Arlington Falls	Not surveyed	0/0/0	0/0/0	0/0/0	0/0/0
Oak Glen Preserve	0/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
San Timoteo Canyon	126/95/137	116/101/196	118/102/153	131/80/179	151/135/206
Box Springs	5/2/1	2/1/0	1/1/1	Not Surveyed	3/2/1
Poorman Reservoir	6/1/0	4/1/1	1/1/2	2/0/0	6/3/2
Quail Run	0/0/0	0/0/0	0/0/0	Not Surveyed	0/0/0
Sycamore Canyon	12/8/11	9/5/4	7/7/5	12/--/--	17/5/2
Meridian C.A. (former March SKR Preserve)	14/12/25	16/9/7	13/11/8	14/12/16	21/16/23
Golden Star	0/0/0	0/0/0	0/0/0	0/0/0	2/1/0
Woodcrest	0/0/0	0/0/0	0/0/0	0/0/0	1/0/0
Mead Valley (Cajalco/Aqueduct)	8/0/0	5/4/5	4/1/2	4/4/2	5/2/0
Gavilan Hills	0/0/0	0/0/0	Not surveyed	0/0/0	0/0/0
Menifee - Paloma High School	0/0/0	Not surveyed	Not surveyed	Not surveyed	Not surveyed
Menifee - Haun Rd.	0/0/0	Not surveyed	Not surveyed	Not surveyed	Not surveyed
Steele Valley	0/0/0	Not surveyed	Not surveyed	Not surveyed	Not surveyed
Santa Rosa Mine Rd.	Not surveyed	Not surveyed	Not surveyed	Not surveyed	Not surveyed
Van Buren Blvd – Plummer Rd So.	4/3/2	3/2/3	2/1/1	Not surveyed	See Meridian C.A.
Van Buren Blvd. (Bountiful)	0/0/0	0/0/0	0/0/0	Not	1/0/0

Table 1B: Least Bell's Vireo abundance and distribution in the Santa Ana Watershed, 2010-2014.  
 Numbers of territories, pairs and fledglings detected. By Sub-watershed

	2010	2011	2012	2013	2014
				surveyed	
Van Buren Blvd (Porter Ave)	0/0/0	0/0/0	Not surveyed	Not surveyed	0/0/0
Canyon Crest	0/0/0	0/0/0	Not surveyed	0/0/0	1/1/0
Mockingbird Canyon	43/34/25	37/32/67	28/26/39	31/24/40*	23/7/7
Alessandro Arroyo/Prenda Arroyo	6/2/0	7/5/0	6/4/4	7/3/2	Not available
Alessandro Arroyo	Not available	Not available	Not available	Not available	19/4/5
Prenda Arroyo	Not available	Not available	Not available	Not available	4/0/0
Conrock Basin FHQ	Not surveyed	1/0/0	0/0/0	0/0/0	0/0/0
Castleview Park	0/0/0	0/0/0	0/0/0	Not surveyed	Not surveyed
Tequesquite Arroyo	0/0/0	0/0/0	Not surveyed	0/0/0	0/0/0
Pyrite Channel	3/0/0	3/1/0	0/0/0	0/0/0	0/0/0
Riverwalk Park					0/0/0
SAR– Riverside (Riverside Ave to Van Buren Blvd)	68/50/58	49/23/32	41/11/7	78/--/7	66/19/15
SAR - Hidden Valley (south side of river)	60/43/53	55/36/41	62/37/45	75/42/66	85/32/28
SAR – Hidden Valley (north side of river)	15/12/18	4/2/2	9/3/1	21/2/3	21/14/19
Hidden Valley Golf Club	3/0/0	4/0/0	6/0/0	6/3/1	8/1/0
Wyle Labs (at El Paso Rd. only)	1/1/2	1/0/0	1/1/1	1/0/0	1/0/0
Norco Hills Park - mitigation area	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Promenade Ave	2/2/4	2/1/1	2/1/1	1/1/0	2/1/1
Corona Ave @ Gilmore	0/0/0	0/0/0	Not surveyed	0/0/0	3/1/2
SAR– Norco (Goose Creek Golf Course to River Rd)	101/64/113	105/59/91	95/51/86	108/52/109	110/32/36
Temescal Canyon	83/49/73	102/65/113	109/63/71	131/50/48	126/24/17
Harrison Reservoir (aka Mcallister Creek)	1/0/0	Not surveyed	3/0/0	4/0/0	3/0/0

Table 1B: Least Bell's Vireo abundance and distribution in the Santa Ana Watershed, 2010-2014.  
Numbers of territories, pairs and fledglings detected. By Sub-watershed

	2010	2011	2012	2013	2014
La Sierra Ave	3/0/0	3/2/3	2/1/1	4/2/3	5/1/1
Cajalco Creek	See Temescal	3/2/0	1/0/0	0/0/0	0/0/0
Chino Hills (Butterfield Ranch environs)	11/7/7	8/3/1	8/2/1	13/5/7	10/2/3
Chino Hills (Eucalyptus/Rancho Hills)	1/1/2	2/1/2	1/0/0	2/1/0	2/0/0
Chino Hills (Eucalyptus/Del Monte)	2/1/0	0/0/0	0/0/0	0/0/0	0/0/0
Chino Hills (End of Eucalyptus)	0/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
Carbon Canyon (Western Hills Golf Club)	0/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
Carbon Canyon (Chino Hills Pkwy)	0/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
Chino Hills Community Park (Eucalyptus/Peyton)	10/4/1	9/3/1	3/1/0	7/0/0	4/0/0
Chino Hills (Bayberry Dr)	0/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
Chino Hills (Soquel Canyon/Pipeline)	Not surveyed	2/0/0	2/1/1	3/2/0	4/2/3
Carbon Canyon Regional Park & Carbon Canyon Rd.	8/6/3	13/7/5	12/7/7	16/9/1	16/6/5
Clearwater Pkwy @ Glen Helen	Not available	Not available	Not available	0/0/0	1/0/0
Fontana Power Plant	Not available	Not available	Not available	1/1/0	0/0/0
Black Gold Golf Club, Yorba Linda	Not available	2/0/0 <sup>(5)</sup>	4/0/0 <sup>(5)</sup>	3/0/0 <sup>(5)</sup>	Not reported
South Coal Canyon (Santa Ana Canyon)	Not available	Not available	1/0/0 <sup>(5)</sup>	1/0/0 <sup>(5)</sup>	Not surveyed
Mud Canyon, Yorba Linda	Not available	Not available	1/0/0 <sup>(5)</sup>	0/0/0	Not surveyed
Sun Canyon Park	0/0/0	0/0/0	Not surveyed	1/0/0	Not surveyed
Wardlow Wash	0/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
Fresno Canyon	1/0/0	1/1/1	0/0/0	1/1/0	2/0/0
Santa Ana Canyon - Upper Canyon (below Prado Dam to Green River Golf Club)	11/4/6	14/5/5	10/4/6	28/14/23	27/18/28

Table 1B: Least Bell's Vireo abundance and distribution in the Santa Ana Watershed, 2010-2014.  
 Numbers of territories, pairs and fledglings detected. By Sub-watershed

	2010	2011	2012	2013	2014
Santa Ana Canyon - Green River Golf Club	24/17/19	26/14/19	19/11/11	22/19/19	26/19/29
Santa Ana Canyon - Featherly Regional Park	40/23/22	33/19/23	36/16/12	64/45/55	59/39/35
Yorba Linda (Starlight Dr)	2/0/0	1/1/0	2/0/0	4/0/0	4/1/1
Yorba Linda (San Antonio Rd)	Not available	Not available	Not available	Not available	2/1/1
Yorba Linda Lakebed Park	1/1/1	1/0/0	1/0/0	1/0/0	1/0/0
Talbert Park	Not surveyed	1/0/0	2/0/0	3/1/0	5/1/0
Chino Hills State Park	51/23/14	42/17/7	33/14/11	36/15/6	21/6/4
Pulte Wetlands, adjacent to Chino Hills State Park (CHSP)	Not available	2/0/0	Not surveyed <sup>(5)</sup>	Not surveyed	Not surveyed
Rim Crest Dr & Blue Gum Dr, adjacent to CHSP	Not available	0/0/0	Not surveyed <sup>(5)</sup>	Not surveyed	See Chino Hills State Park
<b>SAR - Miscellaneous Sightings/Reporting</b>					
Potrero	2/0/0 <sup>(2)</sup>	Not surveyed	Not surveyed	Not surveyed	0/0/0 <sup>(2)</sup>
SAR Mainstem at Woolly star Preserve	Not surveyed	Not surveyed	Not surveyed	Not surveyed	Not surveyed
Estelle Mountain Reserve	0/0/0 <sup>(2)</sup>	1/0/0 <sup>(2)</sup>	Not surveyed	Not surveyed	Not surveyed
Hwy 71, OCWD Property	Not available	Not available	Not available	1/0/0	Not surveyed
Shipley Nature Center	0/0/0 <sup>(6)</sup>	0/0/0 <sup>(6)</sup>	0/0/0 <sup>(6)</sup>	0/0/0 <sup>(6)</sup>	0/0/0 <sup>(6)</sup>
Etiwanda Wildlife Preserve	1/0/0	0/0/0	Not surveyed	Not surveyed	Not surveyed
Mt. Baldy (Shinn Rd.)	Not surveyed	0/0/0	Not surveyed	Not surveyed	Not surveyed
Chino Creek Park at Inland Empire Utilities Agency	2/1/1	2/1/1	1/0/0	2/1/1	1/0/0
Coyote Hills East Reserve (Fullerton)	(3/3/3) <sup>(4)</sup>	(4/0/0) <sup>(4)</sup>	(2/0/0) <sup>(4)</sup>	2/0/0 <sup>(4)</sup>	Not surveyed
Rancho La Sierra West, Riverside	1/1/0	1/1/1	1/1/1	2/2/1	1/0/0
(Chula Vista, CA)	(1/0/0) <sup>(4)</sup>	Not surveyed	Not surveyed	Not surveyed	Not surveyed
River View Golf Course, Santa Ana	Not surveyed	Not surveyed	Not surveyed	Not surveyed	Not surveyed



Table 1B: Least Bell's Vireo abundance and distribution in the Santa Ana Watershed, 2010-2014.  
 Numbers of territories, pairs and fledglings detected. By Sub-watershed

	2010	2011	2012	2013	2014
UCR	Not surveyed	1/0/0	0/0/0	Not surveyed	0/0/0
Alberhill - Temescal	0/0/0	0/0/0	1/0/0	Not surveyed	See Temescal
Santa Ana River – Riverside Ave to Mission Blvd	Not available	Not available	2/0/0	See SAR – Riverside Ave to Van Buren Blvd	See SAR – Riverside Ave to Van Buren Blvd
Colonies Crossroads Shopping Ctr Ponds, City	Not available	Not available	Not available	1/0/0	Not surveyed
Diemer Plant, Brea, CA	Not available	Not available	Not available	1/0/0 <sup>(5)</sup>	Not reported
Santa Ana River – AECOM Flood Control Mitigation Project within SAR Norco to River Road	Not available	Not available	Not available	32/21/48 <sup>(7)</sup>	38/19/16 <sup>(8)</sup>
<b>San Jacinto Sub Watershed</b>					
Kabian Park	3/3/0	3/1/0	1/0/0	3/3/0	7/4/3
San Jacinto	22/18/28	41/25/18	42/36/49	53/29/39	45/19/12
Lake Perris	6/4/4	10/6/3	8/4/4	14/5/1	20/7/8
Menifee (Salt Creek)				8/2/3	10/4/4
Cottonwood Canyon	2/0/0	3/0/0	3/0/0	2/0/0	2/1/1
<b>Santiago Creek Sub Watershed</b>					
Silverado Canyon	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Santiago Creek (above Irvine Lake)	6/0/0	5/0/0	4/1/2	10/5/6	13/6/7
Santiago Creek @ Santiago Canyon Road (unnamed tributary to Irvine Lake)	0/0/0	0/0/0	0/0/0	Not surveyed	Not surveyed
Limestone Canyon (including Old Haul Rd./Blue Diamond Rd.)	3/3/5	3/2/1	0/0/0	3/1/2	4/4/4
Peter's Canyon	14/5/1	16/3/2	12/2/0	16/2/2	15/11/7
Irvine Regional Park	24/14/18	26/9/7	29/5/5	29/8/10	27/9/12
Irvine Trust Mgmt Area Irvine Company Land (across from Peter's Canyon)	1/0/0	1/0/0	1/0/0	1/0/0	1/0/0
Santiago Oaks Regional Park	1/1/1	0/0/0	0/0/0	0/0/0	0/0/0

Table 1B: Least Bell's Vireo abundance and distribution in the Santa Ana Watershed, 2010-2014. Numbers of territories, pairs and fledglings detected. By Sub-watershed					
	2010	2011	2012	2013	2014
Santiago Basin (Santiago Pitts)	Not surveyed	2/1/1	1/0/0	1/0/0	1/0/0
Santiago Creek (Cannon, including Smith Basin)	1/0/0	3/0/0	0/0/0	2/2/0	2/0/0
Santiago Creek (Chapman Ave)	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
Santiago Creek (Cambridge Rd)	0/0/0	0/0/0	0/0/0	0/0/0	0/0/0
SUBTOTAL	821/517/655	810/473/665	756/430/539	1021/471/682	1062/481/548
Santa Ana River - San Bernardino County	42/26/24 <sup>(1)</sup>	42/23/30 <sup>(1)</sup>	30/22/25 <sup>(1)</sup>	Not reported	Not reported
<b>TOTAL FOR SANTA ANA WATERSHED EXCLUDING PRADO BASIN</b>	863/543/679	852/496/695	786/452/564	1021/471/682	1062/481/548
PRADO BASIN (Pike et al.)	569/286/479 <sup>(3)</sup>	517/200/286 <sup>(3)</sup>	451/158/229 <sup>(3)</sup>	561/195/286 <sup>(3)</sup>	520/172/194 <sup>(3)</sup>
<b>TOTAL FOR SANTA ANA WATERSHED</b>	1432/829/1158	1369/696/981	1237/610/793	1582/666/968	1582/653/742

- (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 biologists, San Bernardino County Flood Control
- (2) Reported by MSCHP biologists
- (3) Data from Pike et al. 2010-2014
- (4) Outside Santa Ana Watershed, not included in totals
- (5) Reported by California State Parks.
- (6) Reported by Dave Telford
- (7) AECOM. 2013b. 2013 Santa Ana River Flood Control Project Mitigation Plan Least Bell's Vireo 45-day Report, San Bernardino, California
- (8) AECOM personal communication

\*Number of fledglings misreported in 2013