
BIOLOGICAL ASSESSMENT SURVEYS OF SELECTED LOCATIONS IN SANTIAGO CREEK - 2025

PREPARED FOR FRIENDS OF HARBORS, BEACHES, AND PARKS

BY THE

SANTA ANA WATERSHED ASSOCIATION

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INTRODUCTION

ABOUT THE SANTA ANA WATERSHED ASSOCIATION

The Santa Ana Watershed Association (SAWA) is a 501(c)(3) non-profit organization committed to the protection and improvement of natural areas within the watershed with major focus on the removal of invasive species, native habitat enhancement, and the protection of endangered, threatened and other sensitive species. SAWA is dedicated to the restoration of the Santa Ana River Watershed with the interest of reestablishing natural riverine functions and enhancing riparian habitat in an effort to aid in the recovery of the federally endangered Least Bell's Vireo (*Vireo bellii pusillus*; hereafter "vireo") and Southwestern Willow Flycatcher (*Empidonax traillii extimus*). This vireo, a riparian obligate, is considered an umbrella species for several other sensitive species that nest in the riparian zone in southern California and is increasingly the focus of conservation efforts promoting protection of avian diversity (Kus et al., 2022). Restoration of riparian habitat is a viable strategy to this vireo's recovery (Kus, et al., 2022) and likely benefits other species, such as Yellow Warbler (*Setophaga petechia*) and Yellow-breasted Chat (*Icteria virens*), both CDFW Species of Special Concern and known hosts of Brown-headed Cowbird (*Molothrus ater*) parasitism (CNDDDB, 2025). SAWA has removed over 6,900 acres of the invasive *Arundo donax* since 1997 in an effort to restore riparian habitat, allowing for native plant recovery.

SAWA's recovery strategy is comprised of riparian habitat restoration in conjunction with cowbird trapping and vireo nest monitoring including removal of cowbird eggs; this strategy has proved beneficial to the species' recovery in the Santa Ana Watershed. Vireo monitoring and cowbird control in the Santa Ana Watershed began in 1986, when only 19 vireo territories were detected at the Orange County Water District's Prado Basin (Hays, 1987). As an expansion of the program, in 2000, SAWA began the same vireo monitoring and cowbird control program outside of Prado Basin. In 2005, SAWA further expanded vireo survey efforts to include smaller and/or fragmented riparian patches that were deemed suitable for vireo and reported a total of 391 territories in the watershed, excluding Prado Basin (Hoffman and Zembal, 2005). The watershed-wide population has since increased to a high of 1,586 territories in 2024 (Zembal et al., 2025), which is a testament to this successful strategy.

SAWA is often called upon by wildlife agencies, non-governmental organizations, consultants, and local governments for recommendations regarding the status of vireo and other sensitive species throughout the watershed. Government regulatory agencies have come to rely on our unbiased results for information about any sensitive species, especially vireo, in the Santa Ana River Watershed. SAWA biologists are listed on a Federal Fish and Wildlife Service Permit (TE-839480-5), California Department of Fish and Wildlife Memorandum of Understanding and Scientific Collecting Permit for Least Bell's Vireo nest monitoring, Coastal California Gnatcatcher (*Poliptila californica*; hereafter "gnatcatcher") protocol surveys/nest monitoring, Southwestern Willow Flycatcher (*Empidonax traillii extimus*) protocol surveys/nest monitoring, Coastal Cactus Wren (*Campylorhynchus brunneicapillus sandiegensis*) protocol surveys, and Brown-headed Cowbird trapping. SAWA conducts environmental management projects, working collaboratively with governmental agencies, conservation organizations, and private citizens. Collaborating agencies include the U.S. Army Corps of Engineers (USACE), U.S. Fish & Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), U.S. Forest Service (USFS), California Department of Water Resources (DWR), Santa Ana Watershed Project Authority (SAWPA), Riverside County Flood and Water Conservation District (RCFCD), Riverside County Parks and Open Space District, and the Regional Water Quality Control Board (RWQCB).

PURPOSE OF STUDY

The Santa Ana Watershed Association was contracted by the Friends of Harbors, Beaches and Parks (FHBP) on June 10, 2025 to conduct species surveys to determine the existence and viability of special status (including threatened and endangered) species as well as to understand the current status and key biological aspects present at selected locations along Santiago Creek in Orange County, California.

SITE DESCRIPTION

The entire length of Santiago Creek is within the boundaries of Orange County, California. From its headwaters near Santiago Peak in the Cleveland National Forest, it flows approximately 55 km west/northwest to its confluence with the Santa Ana River in Santa Ana (ESRI 2025). Aerial images and site surveys show the creek flowing through a diverse set of environmental surroundings ranging from relatively undisturbed wilderness to heavily developed urban areas. The area selected for this project is located in a densely populated region of Orange County that contains preserved open space in addition to urban areas.

SURVEY AREAS AND METHODS

SURVEY LOCATION

Seven locations along Santiago Creek were selected for biological assessment surveys. In upstream to downstream order these are: Section 1, Section 2, Section 3, Upstream Chapman, Chapman to 55, Cambridge to Hart Park, and I-5 to Flower (Figure 1). Section 1 includes parts of Irvine Regional Park, Santiago Oaks Regional Park, and additional parcels under various ownership. Section 2 includes parts of Santiago Oaks Regional Park and other parcels; part of this section is privately owned. Section 3 includes a small segment of Santiago Oaks Regional Park in addition to the Hurwitz property. These locations downstream of the Irvine Lake Dam were selected by SAWA and FHBP as separate locations that had riparian habitat potentially appropriate for sensitive species occupancy. The survey areas are separated into locations that have differing park names, land management or ownership (Figure 2).

SURVEY METHODS

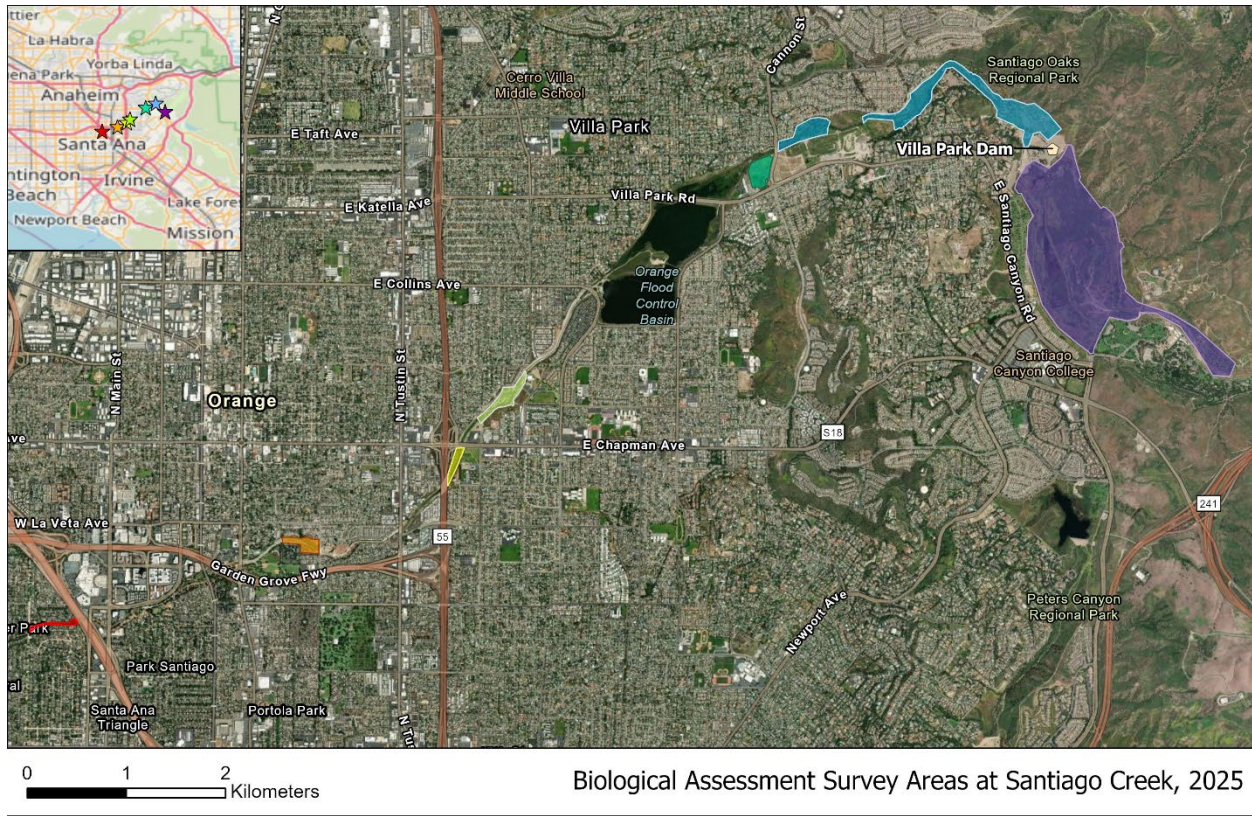
Sites were visited by a permitted vireo biologist one to three times during the nesting bird breeding season, though no vireo nest monitoring was conducted. At all sites, the objectives were to record presence of special status (including threatened and endangered) species, document vireo occupancy, and quantify a minimum number of territorial male vireos. Incidental observations of female and fledgling vireos were collected and all wildlife species detected during surveys were recorded (Appendix A). In addition, site conditions including native and non-native vegetation species and coverage were quantified using rapid inventory sampling with a modified Daubenmire cover class scale (<1%, 1-5%, >5-15%, >15-25%, >25-50%, >50-75%, or >75%). Spatial data was collected for large patches of invasive species, but not for all non-native species detected. Locations of special status species and invasive plant stands were collected with an Apple iPhone 11 in ESRI's ArcGIS Field Maps and Survey123 apps. Data were subsequently reviewed and processed using ArcGIS Pro.

Historical data (Appendix B) for each survey location were collected from SAWA's internal digital files and subsequently combined and analyzed in ArcGIS Pro.

Spatial data for 2025 survey results and historical occurrences of endangered/threatened species territory locations will be supplied to FHBP separately. All special status species occurrences documented by SAWA are submitted annually to the CDFW California Natural Diversity Database (CNDDDB).

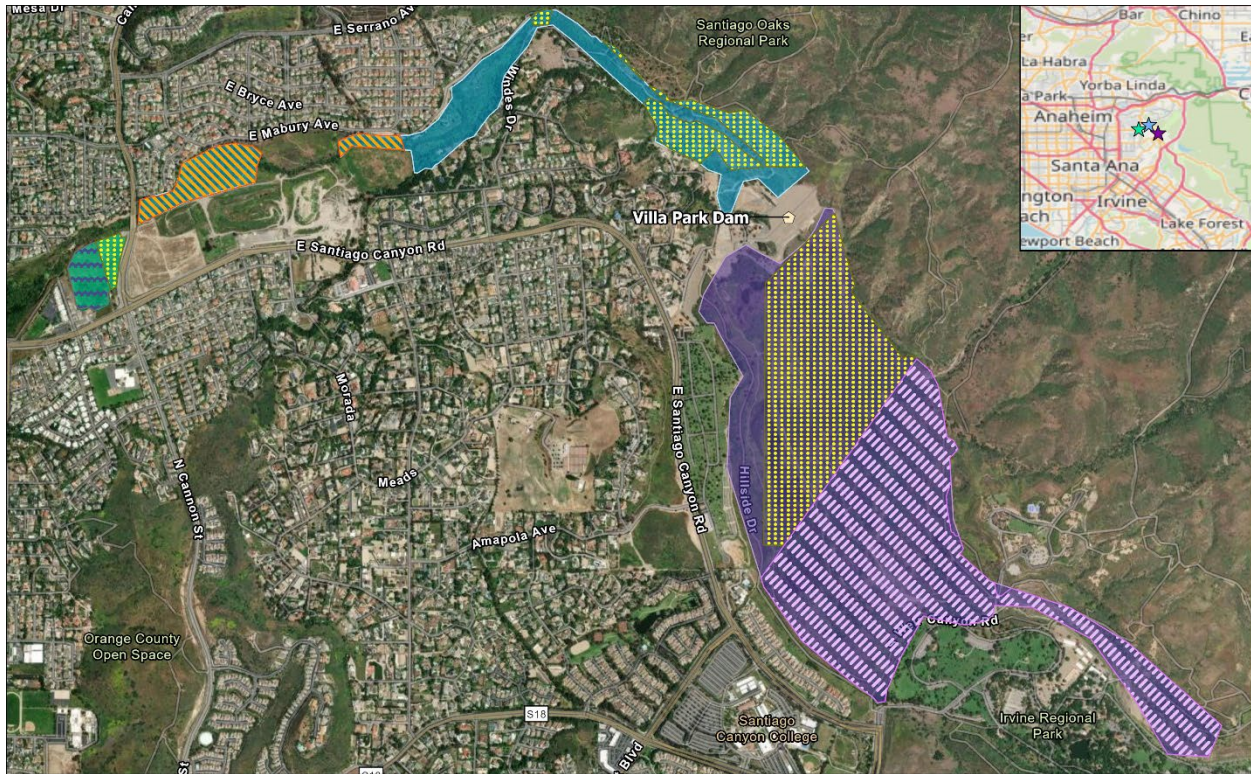
HISTORICAL DATA METHODS

SAWA has historical data for some of the sites in this project area from prior surveys. These data were retrieved from SAWA's electronic archives, spatial data records, and our CNDDDB submissions to the state. Territory numbers of endangered or threatened species as well as documented presence/absence data for other special status species observed in watershed-wide assessments conducted from 2015-2024 were imported into ArcGIS Pro and combined. Data prior to 2015 were not collected electronically and would take much longer to retrieve than this project budget allows.



- Legend**
- I-5 to Flower
 - Cambridge to Hart Park
 - Chapman to 55
 - Upstream Chapman
 - Santiago Creek - Section 3
 - Santiago Creek - Section 2
 - Santiago Creek - Section 1

FIGURE 1: BIOLOGICAL ASSESSMENT SURVEY AREAS AT SANTIAGO CREEK, 2025



Biological Assessment Survey Areas and Select Property Boundaries at Santiago Creek, 2025

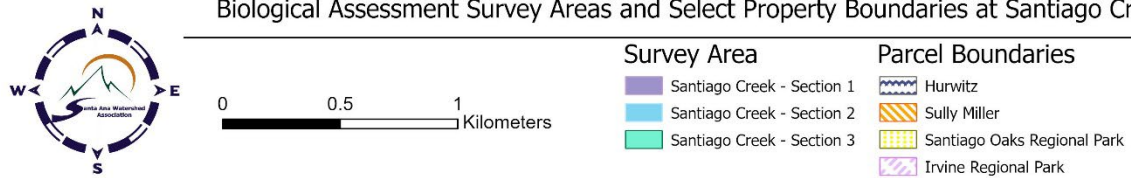


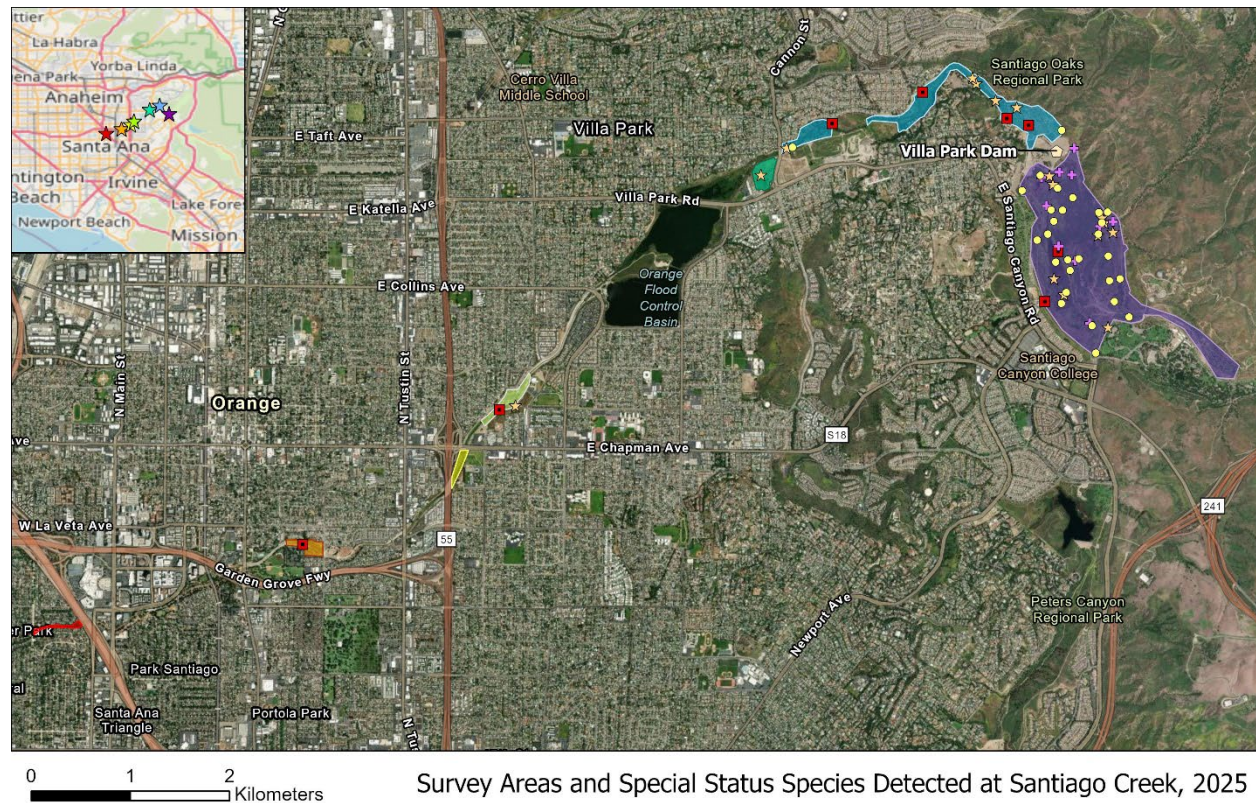
FIGURE 2: BIOLOGICAL ASSESSMENT SURVEY AREAS AND SELECT PROPERTY BOUNDARIES AT SANTIAGO CREEK, 2025

RESULTS

2025 SURVEY RESULTS

Twenty-eight vireo territories were detected across all sites in 2025. Sixteen Yellow Warbler and ten Yellow-breasted Chat territories were also found.

Results and recommendations for individual sites are reported below in upstream to downstream order. Overall survey areas and special status species detections are shown below (Figure 3).



- Survey Area**
- I-5 to Flower
 - Cambridge to Hart Park
 - Chapman to 55

- Survey Area**
- Upstream Chapman
 - Santiago Creek - Section 3
 - Santiago Creek - Section 2
 - Santiago Creek - Section 1

Legend

- Special Status Avian Species**
- ★ Yellow-breasted Chat (10)
 - ★ Yellow Warbler (16)
 - Least Bell's Vireo (28)

- Invasive Plant Location**
- See site map for details.

FIGURE 3: SURVEY AREAS AND SPECIAL STATUS SPECIES DETECTED AT SANTIAGO CREEK, 2025

HISTORICAL DATA RESULTS

Nine special status avian and one special status reptile species were detected across all sites between 2015 and 2024 (Appendix B). The majority of these were documented in Section 1, which is a substantially larger area than the other project sites and has been surveyed more intensely by SAWA due to the size of its vireo population.

Vireo were historically detected at Section 1, Section 2, Section 3, Upstream Chapman, and Cambridge to Hart Park. Gnatcatcher were found at Sections 1 and Section 3. Yellow Warblers were present at Section 1, Section 2, Upstream Chapman, and Chapman to 55. Yellow-breasted Chats were present at Sections 1 and 2.

One Willow Flycatcher (*Empidonax traillii*) was detected at Section 1 in 2019, though this was likely a migratory bird. SAWA classifies all Willow Flycatchers as migrants (*E. traillii* rather than the federally endangered Southwest Willow Flycatcher, *E. traillii extimus*) unless they remain through the breeding season. All subspecies of willow flycatcher are now classified as state endangered if they are found to be nesting (CNDDDB, 2025).

The remaining special status species detected between 2015 and 2024 all occurred in Section 1. Avian species include Coastal Cactus Wren (CDFW Species of Special Concern, USFS Sensitive Species, and USFWS Bird of Conservation Concern), White-tailed Kite (*Elanus leucurus*, a CDFW fully protected and BLM Sensitive Species), and American Peregrine Falcon (*Falco peregrinus anatum*, a CA Dept of Forestry & Fire Protection Sensitive Species). The only special status reptile species detection was Belding's Orange-throated Whiptail (*Aspidoscelis hyperthra beldingi*, CDFW Watchlist and USFS Sensitive Species; CNDDDB, 2025).

SANTIAGO CREEK – SECTION 1

RESULTS

The biological assessment took place on July 3, 2025. Two additional vireo assessment visits were conducted under a different funding source on April 22 and May 28, 2025. A large diversity of native vegetation and avian species are present. Twenty-six vireo territories were documented. Other special status species territories detected on site were ten Yellow-breasted Chat and nine Yellow Warbler, both of which are CDFW Species of Special Concern (CNDDDB, 2025). Vegetation coverage estimations for Santiago Creek – Section 1 are shown in Table 1.

SITE CONDITIONS

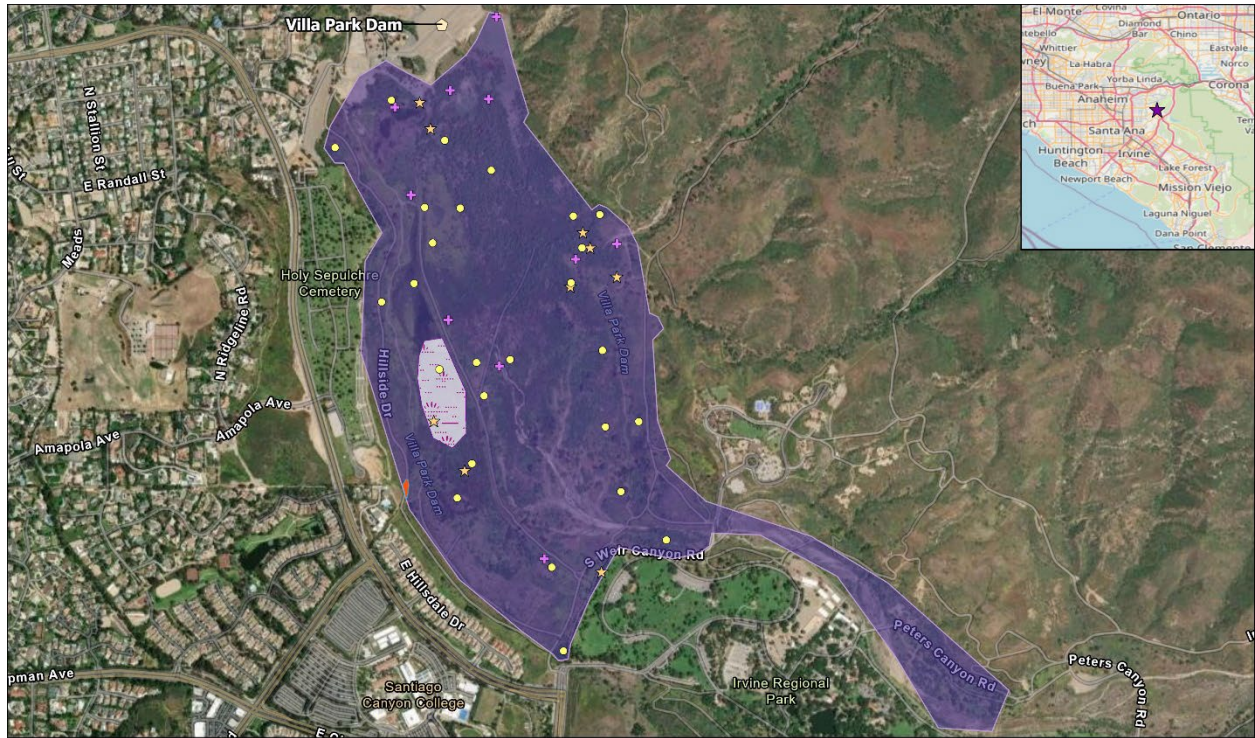
Table 1: Vegetation Coverage		
Canopy height class:	>35-50 meters	
Overall vegetative coverage:	>50-75%	
Overall native vegetative coverage:	>50-75%	
Common Name	Scientific Name	Coverage Class
Goodding’s black willow	<i>Salix gooddingii</i>	>25-50%
Blue elderberry	<i>Sambucus mexicana</i>	>15-25%
Coast live oak	<i>Quercus agrifolia</i>	>15-25%
Overall non-native coverage:	>15-25%	
Common Name	Scientific Name	Coverage Class
Mustard species	Brassicaceae spp.	>5-15%
Tamarisk	<i>Tamarix ramosissima</i>	>5-15%
Brome grasses	<i>Bromus</i> spp.	1-5%
Eucalyptus	<i>Eucalyptus</i> sp.	1-5%
Milk thistle	<i>Silybum marianum</i>	trace
Stinknet	<i>Oncosiphon pilulifer</i>	trace

RESTORATION RECOMMENDATIONS

This site is a passive park, but the riparian area is mostly avoided by the public. Threats to biological resources include risk of inundation from the Villa Park Dam water retention and potential wildfire risk.

The entire west portion of the site would benefit from tamarisk (*Tamarix ramosissima*) removal; patches of milk thistle (*Silybum marianum*) near the dam and in dried ponding areas should be targeted as well. There was a trace amount of stinknet (*Oncosiphon pilulifer*) found on one of the trails that should be addressed as soon as possible. Due to the presence of so many endangered birds at this location, restoration activities should be conducted outside of nesting bird season unless a permitted vireo biologist is present.

MAP



0 250 500
 Meters

Survey Area and Special Status Species Detected at Santiago Creek - Section 1, 2025



Survey Area
 Santiago Creek - Section 1

Special Status Avian Species
 Yellow-breasted Chat (10)
 Yellow Warbler (9)
 Least Bell's Vireo (26)

Invasive Plant Species
 Oncosiphon pilulifer
 Tamarix ramosissima

SANTIAGO CREEK – SECTION 2

RESULTS

The biological assessment took place on June 20, 2025. Weather during the bioassessment was overcast and cool, which could reduce the amount of avian and reptile species detected. Two additional vireo assessment visits were conducted under a different funding source on May 13 and July 15, 2025. A large diversity of native vegetation and avian species are present on site. Two vireo territories were documented. The other special-status species detected on site was Yellow Warbler. Although no Yellow-breasted Chats were observed at this site in 2025, SAWA biologists observed three territories in 2024 and 10 territories at Santiago Creek – Section 1, immediately upstream from this site, in 2025. Vegetation coverage estimations for Santiago Creek - Section 2 are shown in Table 2.

SITE CONDITIONS

Table 2: Vegetation Coverage		
Canopy height class:	>20-35 meters	
Overall vegetative coverage:	>75%	
Overall native vegetative coverage:	>75%	
Common Name	Scientific Name	Coverage Class
Western sycamore	<i>Platanus racemosa</i>	>25-50%
Goodding’s black willow	<i>Salix gooddingii</i>	>15-25%
Desert wild grape	<i>Vitis girdiana</i>	>50-75%
Coast live oak	<i>Quercus agrifolia</i>	>5-15 (riparian edge)
Overall non-native coverage:	>5-15%	
Common Name	Scientific Name	Coverage Class
Eucalyptus	<i>Eucalyptus</i> spp.	>5-15%
Mustard species	Brassicaceae spp.	>5-15%
Brome grasses	<i>Bromus</i> spp.	>5-15%
Tamarisk	<i>Tamarix ramosissima</i>	<1%
Downstream section only:		
Giant reed	<i>Arundo donax</i>	>5-15%
Mexican fan palm	<i>Washingtonia robusta</i>	>5-15%

RESTORATION RECOMMENDATIONS

This site is a passive park, but the riparian area is mostly protected. Threats to biological resources include risk of flood damage from Villa Park Dam water releases and potential for wildfire.

Active restoration is occurring in the park, but the downstream section of the site has additional restoration needs. Removal of Mexican fan palms (*Washingtonia robusta*) and large patches of giant reed (*Arundo donax*; hereafter “arundo”) is recommended. Due to the presence of an endangered bird at this site, restoration activities should be conducted outside of nesting bird season unless a permitted vireo biologist is present.

MAP



Survey Area and Special Status Species Detected at Santiago Creek - Section 2, 2025



Survey Area
■ Santiago Creek - Section 2

Legend

Special Status Avian Species
★ Yellow Warbler (5)
● Least Bell's Vireo (2)

Invasive Plant Species
■ Arundo donax

0 250 500
 Meters

SANTIAGO CREEK – SECTION 3

RESULTS

The biological assessment took place on June 12, 2025. The site contains both riparian and CSS habitat. No vireo territories were documented; however, one territory was present in 2024, and the site contains suitable vireo habitat. No California Gnatcatcher, a federally threatened and CDFW Species of Special Concern (CNDDDB, 2025), were found on site in 2025, but one territory was detected in the adjacent Smith Basin in 2024, so the species could be present. One Yellow Warbler was detected. Vegetation coverage estimations for Section 3 are shown in Table 3.

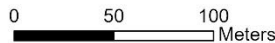
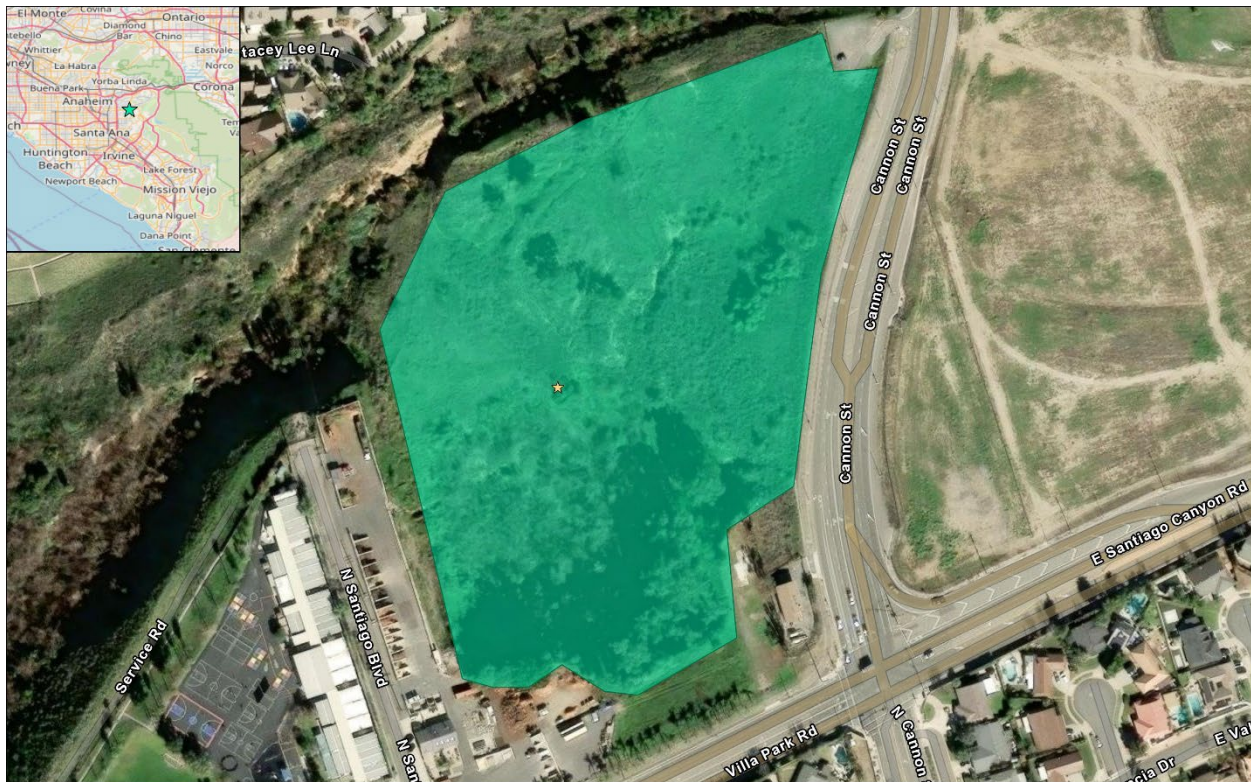
SITE CONDITIONS

Table 3: Vegetation Coverage (Riparian / CSS)		
Canopy height class:	>10-15 meters (riparian) / >35-50m (CSS; <i>Eucalyptus</i> sp. only)	
Overall vegetative coverage:	>75% (riparian) / >25-50% (CSS)	
Overall native vegetative coverage:	>50-75% (riparian) / >5-15% (CSS)	
Riparian Habitat		
Common Name	Scientific Name	Coverage Class
Goodding’s black willow	<i>Salix gooddingii</i>	>50-75%
Red willow	<i>Salix laevigata</i>	trace
Coast live oak	<i>Quercus agrifolia</i>	>15-25%
California wild grape	<i>Vitis californica</i>	>1-5%
Mulefat	<i>Baccharis salicifolia</i>	trace
Blue elderberry	<i>Sambucus mexicana</i>	trace
CSS Habitat		
California sagebrush	<i>Artemisia californica</i>	>25-50%
California brittlebush	<i>Encelia californica</i>	>5-15%
California buckwheat	<i>Eriogonum fasciculatum</i>	trace
Overall non-native coverage:	>25-50% (riparian) / >15-25% (CSS)	
Riparian Habitat		
Common Name	Scientific Name	Coverage Class
Poison hemlock	<i>Conium maculatum</i>	>25-50%
Eucalyptus	<i>Eucalyptus</i> sp.	>5-15%
Castor bean	<i>Ricinus communis</i>	>1-5%
Peruvian pepper tree	<i>Schinus molle</i>	trace
Tamarisk	<i>Tamarix ramosissima</i>	trace
CSS Habitat		
Eucalyptus	<i>Eucalyptus</i> sp.	trace
Mustard species	Brassicaceae spp.	>25-50%
Castor bean	<i>Ricinus communis</i>	>5-15%

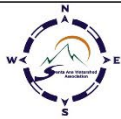
RESTORATION RECOMMENDATIONS

Restoration opportunities in the riparian habitat include removal of invasive plant species including hemlock (*Conium maculatum*), tamarisk, and castor bean (*Ricinus communis*). The addition of mulefat pole-cuttings, which may not need to be irrigated at this site, is also recommended. The coastal sage scrub portion of the site would benefit from removal of invasive plant species (mustard species, *Brassica* spp., and castor bean) and planting of additional CSS species such as black or white sage (*Salvia mellifera* or *S. apiana*, respectively). The site contains decent Coastal California Gnatcatcher habitat that could be improved with restoration.

MAP



Survey Area and Special Status Species Detected at Santiago Creek - Section 3, 2025



Legend

- | | |
|--|---|
| Survey Area | Special Status Avian Species |
| Santiago Creek - Section 3 | Yellow Warbler |

UPSTREAM CHAPMAN

RESULTS

The biological assessment took place on May 20, 2025. A large diversity of native vegetation and avian species are present. Vireo were detected on site in 2024 but were not detected in 2025. Other special status species detected on site were Yellow Warbler, and Red-shouldered Hawk (*Buteo lineatus*), a covered species under the County of Orange Central and Coastal Subregion NCCP/HCP. Vegetation coverage estimations for Upstream Chapman are shown in Table 4.

SITE CONDITIONS

Table 4: Vegetation Coverage		
Canopy height class:	>15-20 meters	
Overall vegetative coverage:	>25-50%	
Overall native vegetative coverage:	>25-50%	
Common Name	Scientific Name	Coverage Class
California sagebrush	<i>Artemisia californica</i>	1-5%
Mulefat	<i>Baccharis salicifolia</i>	1-5%
Goodding’s black willow	<i>Salix gooddingii</i>	1-5%
Western sycamore	<i>Platanus racemosa</i>	1-5%
Thick-leaved yerba santa	<i>Eriodictyon crassifolium</i>	1-5%
Blue elderberry	<i>Sambucus mexicana</i>	<1%
Laurel sumac	<i>Malosma laurina</i>	>5-15%
Overall non-native coverage:	>5-15%	
Common Name	Scientific Name	Coverage Class
Mustard species	Brassicaceae spp.	<1%
Peruvian peppertree	<i>Schinus molle</i>	>5-15%
Eucalyptus	<i>Eucalyptus</i> sp.	1-5%
Castor bean	<i>Ricinus communis</i>	<1%
Various ornamental trees/shrubs	<i>Cupaniopsis, Callistemon, Koelreuteria, etc.</i>	1-5%

RESTORATION RECOMMENDATIONS

Restoration opportunities include removal of ornamentals, eucalyptus (*Eucalyptus* sp.), Peruvian pepper trees (*Schinus molle*), and castor bean. The riparian habitat would benefit from installation of willow and mulefat pole cuttings, while the drier edges of the site could support additional coastal sage scrub species. Trash is present throughout the habitat, and the site is used recreationally by mountain bikers. There is high potential for establishment of homeless encampments at this location. Installation of fencing to discourage anthropogenic disturbances is recommended if restoration is attempted.

MAP



Survey Area and Special Status Species Detected at Upstream Chapman, 2025



Legend		
Survey Area	Special Status Avian Species	Invasive Plant Species
 Upstream Chapman	★ Yellow Warbler (1)	 Ricinus communis

CHAPMAN TO 55

RESULTS

The biological assessment took place on June 17, 2025. No special status species were detected; however, birds are difficult to hear at this location due to the site’s proximity to SR 55 and related traffic noise. Vegetation coverage estimations for Chapman to 55 are shown in Table 5.

SITE CONDITIONS

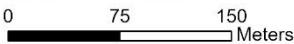
Table 5: Vegetation Coverage		
Canopy height class:	>20-35 meters	
Overall vegetative coverage:	>15-25%	
Overall native vegetative coverage:	>5-15%	
Common Name	Scientific Name	Coverage Class
Goodding’s black willow	<i>Salix gooddingii</i>	<1%
Mulefat	<i>Baccharis salicifolia</i>	>5-15%
Overall non-native coverage:	>50-75%	
Common Name	Scientific Name	Coverage Class
Eucalyptus	<i>Eucalyptus</i> sp.	>5-15%
Mustard species	Brassicaceae spp.	>5-15%
Various ornamentals	n/a	>5-15%
Castor bean	<i>Ricinus communis</i>	>1-5%
Giant reed	<i>Arundo donax</i>	>1-5%
Peruvian pepper tree	<i>Schinus molle</i>	>1%

RESTORATION RECOMMENDATIONS

The site has the potential to be an excellent restoration opportunity and would benefit from the removal of invasive plant species and the addition of willow and mulefat cuttings along with watered hydroseed on the banks.

Though no special status species were found on-site during the biological assessment, a Yellow Warbler was detected on adjacent land and special status species would likely move in a few years after restoration of the riparian habitat.

MAP



Survey Area and Special Status Species Detected at Chapman to 55, 2025



Legend

- Survey Area
- Chapman to 55

No special status wildlife species were detected.

CAMBRIDGE TO HART PARK

RESULTS

The biological assessment took place on June 23, 2025. No special status species were detected. The potential for occurrence of special status species at this location is low unless non-native invasive plant species are removed from the upstream and downstream portions of the creek. Vegetation coverage estimations for Cambridge to Hart Park are shown in Table 6.

SITE CONDITIONS

Table 6: Vegetation Coverage		
Canopy height class:	>5-10 meters	
Overall vegetative coverage:	>50-75%	
Overall native vegetative coverage:	>5-15%	
Common Name	Scientific Name	Coverage Class
Mulefat	<i>Baccharis salicifolia</i>	>1-5%
Mixed willow species (black, arroyo, and narrowleaf)	<i>Salix gooddingii</i> , <i>S. lasiolepis</i> , <i>S. exigua</i>	<1%
Blue elderberry	<i>Sambucus mexicana</i>	<1%
Overall non-native coverage:	>50-75%	
Common Name	Scientific Name	Coverage Class
Common fennel	<i>Foeniculum vulgare</i>	>25-50% (~80% in downstream half)
Mustard species	Brassicaceae spp.	>5-15%
Brome grasses	<i>Bromus</i> spp.	>15-25%

RESTORATION RECOMMENDATIONS

The site presents an excellent restoration opportunity if invasive plant species are removed. This location would benefit from the addition of mulefat and willow pole cuttings as well as hydroseed of coastal sage scrub (CSS) species on the banks, though irrigation would likely be required.

MAP



Survey Area and Special Status Species Detected at Cambridge to Hart Park, 2025



Survey Area
 Cambridge to Hart Park

Legend

Invasive Plant Species
 Foeniculum vulgare

No special status wildlife species were detected.

I-5 TO FLOWER

SITE OVERVIEW

The site was inaccessible due to tall fencing surrounding this portion of the creek, which appears to include primarily non-native, ornamental trees. No special status species were detected from the outside borders, though pervasive traffic noise in the area significantly reduces the audible range at which biologists can detect bird songs.

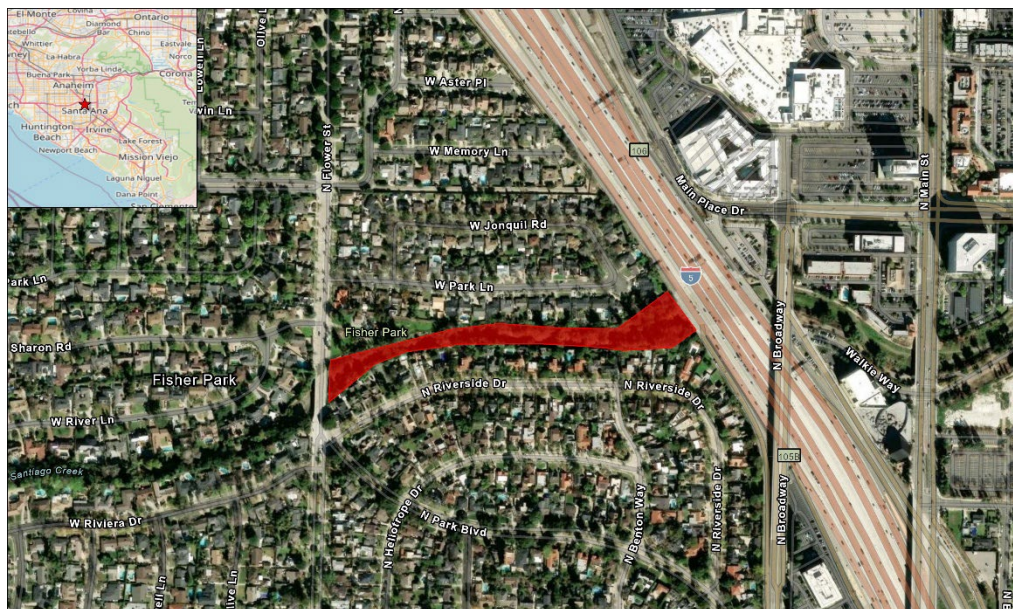
SITE CONDITIONS

No vegetation coverages were estimated for I-15 to Flower.

RESTORATION RECOMMENDATIONS

None at present.

MAP



Survey Area and Special Status Species Detected at I-5 to Flower, 2025



Legend

- Survey Area
- I-5 to Flower

The I-5 to Flower Site was visited but inaccessible due to fencing surrounding the habitat. No special status wildlife species were detected from the perimeter.

DISCUSSION

SAWA's vireo survey efforts in Santiago Creek have varied over the years due to staff availability and funding. This project began on June 10, and the first survey was conducted on June 12, which is nearing the end of nesting season when most birds may be more difficult to detect. SAWA did visit some of the project locations earlier in season for our watershed-wide effort and was able to include that data in this report. We recommend future surveys or monitoring be conducted April through July for more accurate results. Prior to this study, the areas outside of Section 1 and Section 2 have been surveyed less intensively, generally as incidental observations which coincided with SAWA restoration projects. For example, the first vireo detected by SAWA in Section 1 ($n=6$) occurred in 2003 while nest monitoring for an arundo removal project (Hoffman and Zembal, 2004). Nest monitoring at Section 1 continued in 2004, but sample sizes were low (Hoffman and Zembal, 2005). In 2005, biologists began watershed-wide assessments (three visits per site) to document vireo status and distribution at all riparian habitat areas known to SAWA at the time that were deemed suitable for vireo (Hoffman and Zembal, 2006). At that time, SAWA biologists began surveying Section 2 but did not detect vireo at this location until 2010 ($n=1$; Hoffman et al, 2011). No vireos were detected at Section 2 again until 2017 ($n=2$; Zembal et al, 2017). Surveys at the Upstream Chapman location began in 2007, but no vireo were detected until 2024 ($n=1$; Zembal et al, 2025). In 2005, SAWA began assessments at Section 1 which have continued annually, except for in 2013 due to staff availability. Vireo numbers at this location have ranged from six in 2004 to a high of 33 in 2024, which was also the highest population count year for the entire watershed. However, there was a decrease in vireo territories at this site during years 2016-2017 that does not coincide with the overall increase in the watershed during these years. Although the cause of this decrease is unknown, territory numbers continued to increase in subsequent years.

Overall, these data suggest that Section 1 has a relatively stable subpopulation of vireo; however, the locations downstream of Villa Park Dam do not show a similar pattern. The downstream areas are much smaller and narrower than Section 1, which could impact demographic stochasticity due to potential increases both in predation and parasitism resulting from habitat fragmentation, patch size, and edge effects. In addition, SAWA biologists have noted that fluctuation in water releases during nesting season may have inundated nesting habitat (Melody Aimar, *personal observation*). While this event(s) may have impacted nests at the time, it is unclear if such activities affect vireos' continued presence. Vireos, Yellow-breasted Chats, and Common Yellowthroats (*Geothlypis trichas*), all of which were detected along Santiago Creek, are riparian species more likely to suffer losses of nests, eggs, and nestlings as a result of dam releases, as these three species all establish nests near water and low in riparian vegetation (Kus et al, 2022, after Brown and Johnson, 1985).

Vireo monitoring to document local population trends of this endangered species should continue. Such data will be important to reflect the potential benefit of future restoration. Additionally, nest monitoring data would be beneficial to document productivity and avoid potential impacts during active restoration. Such data would also be a necessary step toward answering questions as to why apparently suitable habitat downstream of Villa Park Dam has far fewer vireo territories. Parasitism by Brown-headed Cowbirds (hereafter "cowbird"), which may be detected during a nest monitoring program, could also influence population size and fluctuation across the survey area, as it is one of the major causes of historical population decline for this subspecies (Kus, 2022; USFWS, 1989). Though SAWA's observations of cowbirds from 2015-2025 in this area are sparse, one adult male cowbird was detected adjacent to

Section 3 in 2023, and another was observed in Section 1 in 2018. Removing cowbird eggs from nests during nest monitoring can increase vireo productivity by up to 44%. However, such “manipulated” nests have been found to produce up to four times fewer young as unparasitized nests. Therefore, cowbird trapping to mitigate the effects of parasitism on vireo reproduction is recommended (Kus, 1999). A cowbird trapping program with 3-4 traps is estimated to cost about \$35,000.00. We also recommend a multiple-year nest monitoring program in Sections 1 and 2 to detect potential parasitism and compare vireo productivity between the sites. A nest monitoring program as described is estimated to cost about \$30,000.00. Additionally, it would be interesting to know the abundance and type of predators found at each site since predation is the leading cause of nest failure (Kus et al., 2022; Zembal et al, 2025). Such data could be collected via camera traps and herpetological surveys. Although this data would give insight into potential avian predators, predator control is not typically used as a recovery strategy for vireo. Therefore, we do not consider this to be a current priority.

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APPENDIX A: WILDLIFE SPECIES DETECTED IN 2025

Wildlife Species Detected at Santiago Creek, 2025								
Common Name	Scientific Name	Section 1	Section 2	Section 3	Upstream Chapman	Chapman to 55	Cambridge to Hart Park	I-5 to Flower
Avian Species								
Mallard	<i>Anas platyrhynchos</i>	x	x		x			
California Quail	<i>Callipepla californica</i>	x		x				
Mourning Dove	<i>Zenaida macroura</i>	x	x	x	x	x		
Anna's Hummingbird	<i>Calypte anna</i>	x						
Allen's Hummingbird	<i>Selasphorus sasin</i>	x						
Snowy Egret ^f	<i>Egretta thula</i>		x					
Great Egret ^f	<i>Ardea alba</i>	x						
Great Blue Heron ^f	<i>Ardea herodias</i>				x			
Turkey Vulture	<i>Cathartes aura</i>	x			x			
Cooper's Hawk ^f	<i>Accipiter cooperii</i>	x	x					
Red-shouldered Hawk ^f	<i>Buteo lineatus</i>				x			
Red-tailed Hawk	<i>Buteo jamaicensis</i>	x	x	x				
Acorn Woodpecker	<i>Melanerpes formicivorus</i>	x	x					
Nuttall's Woodpecker	<i>Dryobates nuttallii</i>	x	x	x	x			
Lilac-crowned Parrot ⁱ	<i>Amazona finschi</i>	x	x					
Ash-throated Flycatcher	<i>Myiarchus cinerascens</i>		x					
Western Kingbird	<i>Tyrannus verticalis</i>	x						
Western Flycatcher	<i>Empidonax difficilis</i>		x					
Black Phoebe	<i>Sayornis nigricans</i>		x					
Say's Phoebe	<i>Sayornis saya</i>	x						
Least Bell's Vireo ^f	<i>Vireo bellii pusillus</i>	26	2					
California Scrub-Jay	<i>Apelocoma californica</i>	x	x	x				
American Crow	<i>Corvus brachyrhynchos</i>	x	x	x	x	x	x	
Common Raven	<i>Corvus corax</i>				x			
Oak Titmouse	<i>Baeolophus inornatus</i>	x	x					
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>		x	x	x			
Barn Swallow	<i>Hirundo rustica</i>	x	x	x				
Bushtit	<i>Psaltriparus minimus</i>			x	x			
Wrentit	<i>Chamaea fasciata</i>	x	x					
Phainopepla	<i>Phainopepla nitens</i>	x	x					
Bewick's Wren	<i>Thryomanes bewickii</i>				x			
Northern Mockingbird	<i>Mimus polyglottos</i>			x		x		
Song Sparrow	<i>Melospiza melodia</i>	x	x				x	
Lesser Goldfinch	<i>Spinus psaltria</i>	x	x	x	x		x	
House Finch	<i>Haemorhous mexicanus</i>	x	x	x	x	x	x	
California Towhee	<i>Melospiza crissalis</i>	x	x	x	x			
Spotted Towhee	<i>Pipilo maculatus</i>	x	x	x				
Yellow-breasted Chat ^f	<i>Icteria virens</i>	x	x					
Hooded Oriole	<i>Icterus cucullatus</i>	x						
Great-tailed Grackle	<i>Quiscalus mexicanus</i>		x					
Orange-crowned Warbler	<i>Leiothlypis celata</i>		x					
Common Yellowthroat	<i>Geothlypis trichas</i>	x	x	x		x		
Yellow Warbler ^f	<i>Setophaga petechia</i>	x	x	x	x			
Wilson's Warbler	<i>Cardellina pusilla</i>				x			
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	x	x					

Wildlife Species Detected at Santiago Creek, 2025								
Common Name	Scientific Name	Section 1	Section 2	Section 3	Upstream Chapman	Chapman to 55	Cambridge to Hart Park	I-5 to Flower
Fish Species								
Largemouth Bass	<i>Micropterus salmoides</i>		x					
Reptilian Species								
Multiple snake tracks	n/a	x						
Western Fence Lizard	<i>Sceloporus occidentalis</i>					x		
Western Side-blotched Lizard	<i>Uta stansburiana elegans</i>					x		
Mammalian Species								
California Ground Squirrel	<i>Otospermophilus beecheyi</i>			x	x	x	x	
Coyote	<i>Canis latrans</i>	x						
Desert Cottontail	<i>Sylvilagus audubonii</i>		x		x			
No Species Detected								
None	n/a							x
Numbers of territories detected are included only for federal/state listed endangered species. Species presence or absence is denoted by "x".								
* = special status species (covered under ESA, CESA, CDFW:SSC, USFS:S, County of Orange Central and Coastal Subregion NCCP/HCP, etc.)								
ⁱ = introduced species								

APPENDIX B: HISTORICAL WILDLIFE OCCURRENCES

2015-2024 Historical Special Status Species Occurrences Detected Across All Areas Surveyed for FHPB in 2025												
Site	Species	Common Name	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Section 1	<i>Aspidoscelis hyperthra beldingi</i>	Belding's Orange-throated Whiptail										x
	<i>Campylorhynchus brunneicapillus sandiegensis</i>	Coastal Cactus Wren							x ^a			
	<i>Elanus leucurus</i>	White-tailed Kite					x	x			x	
	<i>Empidonax traillii</i>	Willow Flycatcher					1 ^b					
	<i>Falco peregrinus anatum</i>	American Peregrine Falcon						x				
	<i>Icteria virens</i>	Yellow-breasted Chat		x	x			x	x	x	x	x
	<i>Polioptila californica</i>	California Gnatcatcher	1		3	1	1	2	1		1	2
	<i>Setophaga petechia</i>	Yellow Warbler		x	x			x	x	x	x	x
	<i>Vireo bellii pusillus</i>	Least Bell's Vireo	24	17	14	18	20	28	29	30	29	33
Section 2	<i>Icteria virens</i>	Yellow-breasted Chat				x	x				x	x
	<i>Setophaga petechia</i>	Yellow Warbler				x	x			x	x	x
	<i>Vireo bellii pusillus</i>	Least Bell's Vireo			2	1	2		2	3	5	6 ^c
Section 3	<i>Polioptila californica</i>	California Gnatcatcher		2	1			1		1	1	
	<i>Vireo bellii pusillus</i>	Least Bell's Vireo		1	1		1			2 ^d	1	2 ^d
Upstream Chapman	<i>Setophaga petechia</i>	Yellow Warbler									x	x
	<i>Vireo bellii pusillus</i>	Least Bell's Vireo										1
Chapman to 55	<i>Setophaga petechia</i>	Yellow Warbler		x								
Cambridge to Hart Park	<i>Vireo bellii pusillus</i>	Least Bell's Vireo			1	1						
I-5 to Flower	None	n/a										

Numbers of territories detected are included only for federal/state endangered species. Species presence or absence is denoted by "x".

a) The single incidentally detected Coastal Cactus Wren was found 35m outside of the Section 1 survey area polygon in 2021.

b) The single non-territorial Willow Flycatcher observation was likely a migratory bird. SAWA classifies all Willow Flycatchers as migrants (*E. traillii* rather than *E. traillii extimus*, Southwest Willow Flycatcher, unless they remain through the breeding season.

c) At Section 2, one LBVI territory was detected 35m outside of the survey area polygon in 2024.

d) At Section 3, two LBVI territories were detected <50m outside of survey area polygon in 2022. One LBVI territory was detected <20m outside of survey area polygon in 2024.