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Distribution and Abundance of Least Bell's Vireos (*Vireo bellii pusillus*) and Southwestern Willow Flycatchers (*Empidonax traillii extimus*) at the Mojave River Dam, San Bernardino County, California—2021 Data Summary

Data Report 1149

U.S. Department of the Interior
U.S. Geological Survey

Cover. Photograph showing riparian habitat at the Mojave River Dam. Photograph by S.L. Howell, U.S. Geological Survey, July 2021.

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U.S. Geological Survey, Reston, Virginia: 2022

Suggested citation:
Howell, S.L., and Kus, B.E., 2022, Distribution and abundance of Least Bell's Vireos (*Vireo bellii pusillus*) and Southwestern Willow Flycatchers (*Empidonax traillii extimus*) at the Mojave River Dam, San Bernardino County, California—2021 Data Summary: U.S. Geological Survey Data Report 1149, 7 p., https://doi.org/10.3133/dr1149.

ISSN (online) [pending]

Acknowledgments

The authors would like to thank the U.S. Army Corps of Engineers for funding this research.

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Conversion Factors

International System of Units to U.S. customary units

Multiply	By	To obtain
	Length	
meter (m)	3.281	foot (ft)
kilometer (km)	0.6214	mile (mi)

Temperature in degrees Fahrenheit (°F) may be converted to degrees Celsius (°C) as follows:

$$°C = (°F - 32) / 1.8.$$

Datum

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Abbreviations

ESRI	Environmental Systems Research Institute
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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Executive Summary

We surveyed for Least Bell's Vireos (*Vireo bellii pusillus*; vireo) and Southwestern Willow Flycatchers (*Empidonax traillii extimus*; flycatcher) at the Mojave River Dam study area near Hesperia, California, in 2021. Four vireo surveys were conducted between April 16 and July 16, 2021, and three flycatcher surveys were conducted between May 27 and July 16, 2021.

We detected four territorial male vireos, including two that were paired and two with undetermined breeding status. No juveniles were observed during surveys. Vireo territories were found in three habitat types: (1) riparian scrub, (2) willow-cottonwood, and (3) willow-sycamore, with willow-cottonwood being the most commonly recorded habitat type. Red or arroyo willow (*Salix laevigata* or *lasiolepis*) was the dominant plant species in most vireo territories.

No territorial or transient flycatchers were observed.

Introduction

The Least Bell's Vireo (*Vireo bellii pusillus*; vireo) is a small, migratory songbird that breeds in southern California and northwestern Baja California, Mexico, from April through July. Historically abundant within lowland riparian ecosystems, vireo populations began declining in the late 1900s as a result of multiple anthropogenic factors, including habitat loss and alteration associated with urbanization and agricultural conversion of land adjacent to rivers, the expansion in range of the brood-parasitic Brown-headed Cowbird (*Molothrus ater*; cowbird), and the introduction of invasive exotic plant species, such as giant reed (*Arundo donax*) into riparian systems (U.S. Fish and Wildlife Service 1986, 1998; Franzreb, 1989; Kus, 1998, 1999; Riparian Habitat Joint Venture, 2004; Kus and others, 2020). By 1986, the vireo population in California numbered just 300 territorial males (U.S. Fish and Wildlife Service, 1986).

In response to the dramatic numeric decline of vireos in California, the California Fish and Game Commission listed the species as endangered in 1980, and the U.S. Fish and Wildlife Service (USFWS) followed suit in 1986. Since listing, the vireo population in southern California has rebounded, largely in response to cowbird control and habitat restoration and preservation (Kus and Whitfield, 2005). As of 2006, the statewide vireo population was estimated to be approximately 2,500–3,000 territories (U.S. Fish and Wildlife Service, 2006).

The Southwestern Willow Flycatcher (*Empidonax traillii extimus;* flycatcher) is one of four subspecies of Willow Flycatcher in the United States, with a breeding range including southern California, Arizona, New Mexico, extreme southern parts of Nevada and Utah, and western Texas (Hubbard, 1987; Unitt, 1987). Restricted to riparian habitat for breeding, the flycatcher has declined in recent decades in response to widespread habitat loss throughout its range and, possibly, brood-parasitism by cowbirds (Wheelock, 1912; Willett, 1912, 1933; Grinnell and Miller, 1944; Remson, 1978; Garrett and Dunn, 1981; Unitt, 1984, 1987; Gaines, 1988; Schlorff, 1990; Whitfield and Sogge, 1999). By 1993, the species was believed to number approximately 70 pairs in California (U.S. Fish and Wildlife Service, 1993) in small, disjunct populations. The flycatcher was listed as endangered by the State of California in 1992 and by the USFWS in 1995.

Flycatchers in southern California co-occur with vireos. However, unlike the vireo, which has increased tenfold since the mid-1980s in response to management practices alleviating threats (U.S. Fish and Wildlife Service, 2006), the number of flycatchers has remained low. Currently, most flycatchers in California are concentrated at one site, the upper San Luis Rey River near Lake Henshaw in San Diego County (Howell and Kus, 2021). Outside of this site, flycatchers occur as small, isolated populations of one to six pairs. Data on the distribution and demography of the flycatcher, as well as identification of factors limiting the species, are critical information needs during the current stage of recovery planning (Kus and others, 2003; Kus and Whitfield, 2005).

Male vireos arrive on breeding grounds in southern California in mid-March. Male vireos are vocally conspicuous and frequently sing their diagnostic primary song from exposed perches throughout the breeding season. Females arrive approximately 1–2 weeks after males and are more secretive but are often seen early in the season traveling through habitat with the males. The female, with the male's help, builds an open cup nest in dense vegetation approximately 1 meter (m) above the ground. Nesting occurs from early April through July, but adults and juvenile birds remain on the breeding grounds into late September and early October before migrating to their wintering grounds in southern Baja California, Mexico.

Male flycatchers begin arriving in southern California at the end of April, whereas females arrive approximately 1 week later. While on the breeding grounds, males sing repeatedly from exposed perches. Once the pair bond is established, the female builds an open cup nest that is usually placed in a branch fork of a willow (*Salix* spp.) or plant with a similar branching structure approximately 1–3 m above the ground. Adults usually depart from their breeding territory in mid-August and early September to their wintering grounds in central America and northern South America.

The Mojave River Dam is located within USFWS designated critical habitat for the flycatcher, and although this area is not designated critical habitat for the vireo, territorial birds have been observed at Mojave River Dam in recent years (M. Madden, U.S. Geological Survey, unpub. data, 2019). Managed by the U.S. Army Corps of Engineers for flood control, the Mojave River Dam requires regular operational maintenance, including debris, sediment, and vegetation removal and management. As mandated by the USFWS, the U.S. Army Corps of Engineers is required to conduct surveys and assess activities that might have adverse effects on these federally endangered bird species. The purpose of this report is to summarize the results of vireo and flycatcher surveys conducted by the U.S. Geological Survey (USGS) at the Mojave River Dam in 2021. These data will inform natural resource managers about the status of these endangered species at the Mojave River Dam and guide modification of land use and management practices as appropriate to ensure the species' continued existence.

Methods

Study Area

The study area is upstream from the Mojave River Dam, where Deep Creek and the West Fork Mojave River come together and flow through the Mojave River Dam forming the Mojave River north of the dam (fig. 1). The Mojave River Dam is located outside the city of Hesperia, off Arrowhead Lake Road and north of SR 173, in San Bernardino County, California. The dam was completed in 1974 for the purpose of flood control. The reservoir behind the dam is typically dry but can fill temporarily after heavy rains. The area that was surveyed includes 0.8 kilometers (km) of the West Fork Mojave River flowing east toward the dam, 2.8 km of Deep Creek flowing west toward the dam, and 0.7 km of the Mojave River flowing north away from the dam. The riparian habitat within the survey area is dominated by willow (*Salix* spp.) and cottonwood (*Populus fremontii*). The area north of the dam is highly disturbed by illegal off-road vehicle use, and the riparian habitat is patchy and degraded. Water flows throughout the rocky Deep Creek part of the survey area, whereas the sandy Mojave River part includes areas of dry riverbed, slow-moving water, and standing pools. Most of the floodplain in the Mojave River and the West Fork Mojave River was dry by the end of the surveys.

Surveys

Surveys were conducted during the breeding season (April–July) and followed standard survey techniques for vireos (U.S. Fish and Wildlife Service, 2001) and flycatchers (Sogge and others, 2010). Four surveys for vireos were conducted throughout the study area between April 16 and July 16, 2021, and three surveys for flycatchers were conducted between May 27 and July 16, 2021. Observers walked slowly through or adjacent to suitable riparian habitat, listening and searching for vireos and flycatchers, occasionally playing a recording of a vireo or flycatcher song to elicit a territorial response. Surveys typically began at sunrise and were completed by early afternoon, avoiding conditions of high winds and extreme heat that can reduce bird activity and detectability. Vireo and flycatcher surveys were conducted by USGS biologist Scarlett Howell under USFWS permit ESPER0004080_0.

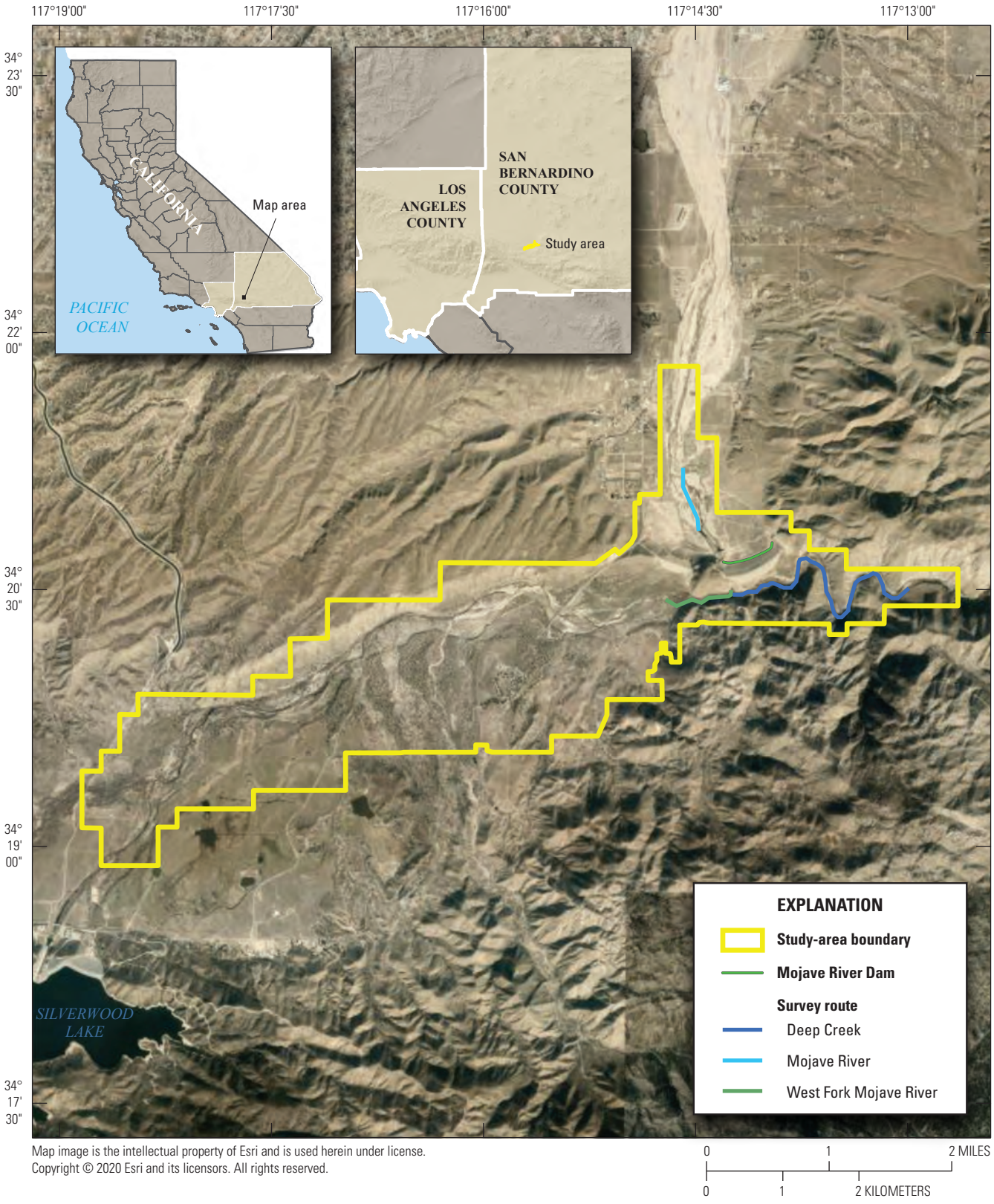

Figure 1. Location of Least Bell's Vireo (*Vireo bellii pusillus*) and Southwestern Willow Flycatcher (*Empidonax traillii extimus*) study area at the Mojave River Dam, San Bernardino County, California, 2021.

For each vireo or flycatcher encountered, observers recorded age (adult or juvenile), sex, breeding status (paired, undetermined, or transient), and whether the bird was banded. A male was considered paired if a female also was visually detected, by hearing vocalizations unique to mated birds, or by observing breeding behavior (for example, food carry, a nest, or dependent juveniles in the territory). A vireo or flycatcher was considered transient if detected only once or, if more than once, detections were less than 2 weeks apart. To determine geographic coordinates, the vireo and flycatcher locations were mapped using the ESRI Collector application (Environmental Systems Research Institute, 2020) on an Android phone with 1- to 15-m accuracy (World Geodetic System of 1984, WGS 84). Dominant native and exotic plants were recorded at each territory location, and percent cover of native vegetation was estimated using cover categories of less than 5 percent, 5–50 percent, 51–95 percent, and greater than 95 percent. Overall habitat type was specified according to the following categories:

Mixed willow riparian: Habitat dominated by one or more willow species, including Goodding's black willow (*Salix gooddingii*), arroyo willow, and red willow, with mule fat (*Baccharis salicifolia*) as a frequent co-dominant.

Willow-cottonwood: Willow riparian habitat in which Fremont cottonwood is a co-dominant.

Willow-sycamore: Willow riparian habitat in which California sycamore (*Platanus racemosa*) is a co-dominant.

Sycamore-oak: Woodlands in which California sycamore and coast live oak (*Quercus agrifolia*) occur as co-dominants.

Riparian scrub: Dry or sandy habitat dominated by sandbar willow (*Salix exigua*) or mule fat, with few other woody species.

Upland scrub: Coastal sage scrub adjacent to riparian habitat.

Non-native: Areas vegetated primarily with non-native species, such as giant reed and tamarisk (*Tamarix ramosissima*).

Because multiple subspecies of flycatchers may be encountered during surveys, we refer to flycatchers in tables and figures as Willow Flycatchers (*Empidonax traillii*) to include all subspecies.

Results

A total of four territorial male vireos were detected at the Mojave River Dam in 2021 (table 1; fig. 2). Two males were confirmed as paired and two were of undetermined status (table 2). No juveniles were detected in 2021 (table 1). No banded vireos were confirmed; however, we were unable to resight one female, so her band status was undetermined (table 2).

No flycatchers were detected in 2021 (table 1).

Vireos used three different habitat types within the study area: (1) riparian scrub, (2) willow-cottonwood, and (3) willow-sycamore. Most of the vireo territories were in willow-cottonwood habitat (table 3). Several willow species were dominant in vireo territories, including arroyo or red willow and sandbar willow (table 3). Exotic vegetation was not prevalent in vireo territories.

Table 1. Survey dates and results of Least Bell's Vireo (*Vireo bellii pusillus*) and Willow Flycatcher (*Empidonax traillii*) surveys at the Mojave River Dam, San Bernardino County, California, 2021.

[M, male; F, female; J, juvenile; —, no data. The number of birds detected on individual survey dates does not sum to the total number of territorial birds]

Survey date	Number of					
	Least Bell's Vireo			Willow Flycatcher		
	M	F	J	M	F	J
April 16, 2021	1	0	0	—	—	—
April 17, 2021	0	0	0	—	—	—
May 27, 2021	3	1	0	0	0	0
May 28, 2021	1	1	0	0	0	0
June 9, 2021	2	0	0	0	0	0
June 10, 2021	2	1	0	0	0	0
July 15, 2021	1	0	0	0	0	0
July 16, 2021	0	0	0	0	0	0
Total number of territorial birds	4	2	—	0	0	—

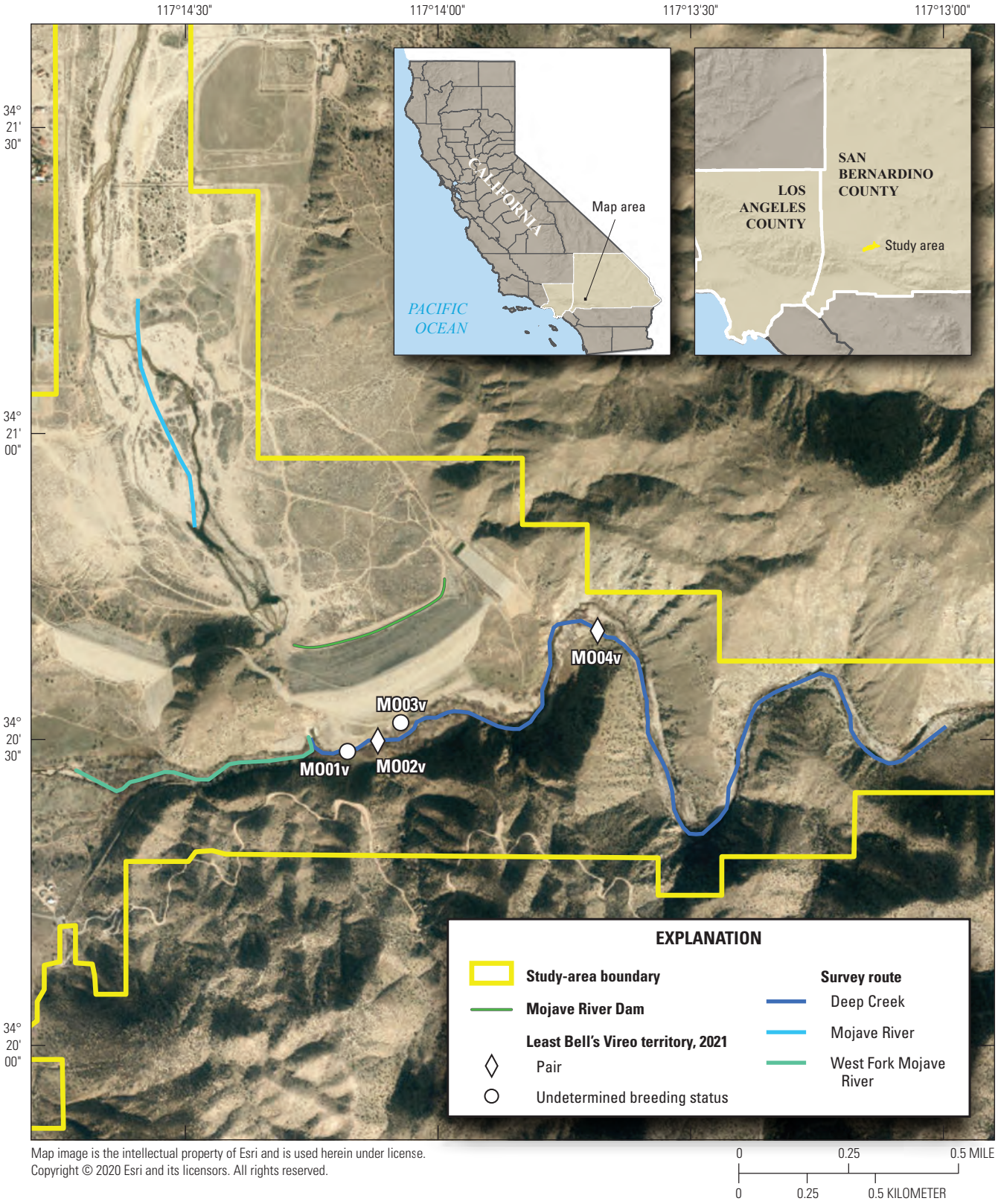

Figure 2. Least Bell's Vireo (*Vireo bellii pusillus*) detections and breeding status at the Mojave River Dam, San Bernardino County, California, 2021.

Table 2. Locations, breeding status, and band status of Least Bell's Vireos (*Vireo bellii pusillus*) detected at the Mojave River Dam, San Bernardino County, California, 2021.

[LBVI, Least Bell's Vireo; ID, identification; —, no data]

Species	Bird ID	Latitude	Longitude	Breeding status	Male banded	Female banded
LBVI	MO01v	34.34135	–117.23623	Undetermined	No	—
LBVI	MO02v	34.34164	–117.23520	Pair	No	Undetermined
LBVI	MO03v	34.34214	–117.23446	Undetermined	No	—
LBVI	MO04v	34.34466	–117.22798	Pair	No	No

Table 3. Habitat characteristics of Least Bell's Vireo (*Vireo bellii pusillus*) locations at the Mojave River Dam, San Bernardino County, California, 2021.

[*Willow-cottonwood*: Willow riparian habitat in which Fremont cottonwood is a co-dominant. *Riparian scrub*: Dry or sandy habitat dominated by sandbar willow or mule fat, with few other woody species. *Willow-sycamore*: Willow riparian habitat in which California sycamore is a co-dominant. **Abbreviations**: ID, identification; >, greater than]

Bird ID	Habitat type	Dominant plant species	Percent native cover
MO01v	Riparian scrub	Sandbar willow	>95 percent
MO02v	Willow-cottonwood	Red or arroyo willow	>95 percent
MO03v	Willow-cottonwood	Red or arroyo willow	>95 percent
MO04v	Willow-sycamore	California sycamore	>95 percent

Summary

In 2021, we documented four vireo territories at the Mojave River Dam. The population of vireos at the Mojave River Dam has increased 300 percent since 2019, when one territorial pair was documented (M. Madden, U.S. Geological Survey, unpub. data, 2019).

Although no flycatchers were detected in 2021, the vegetation at the Mojave River Dam contains suitable habitat for flycatchers, especially within the Deep Creek part of the study area that contained water for the entire survey period.

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Publishing support provided by the U.S. Geological Survey
Science Publishing Network, Sacramento Publishing Service Center

ISSN (online) [pending]
https://doi.org/10.3133/dr1149