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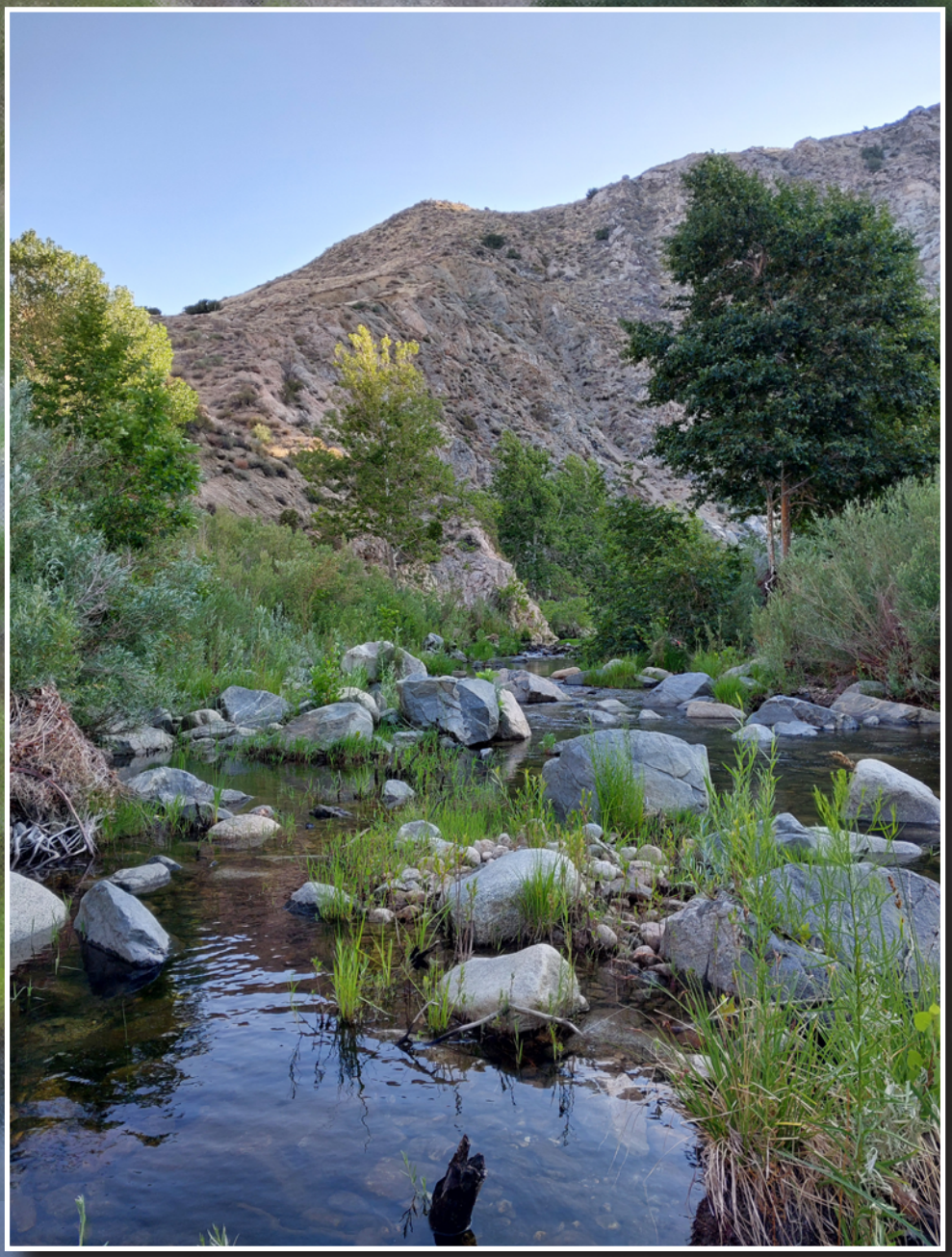
Distribution and Abundance of Least Bell's Vireos (*Vireo bellii pusillus*) and Southwestern Willow Flycatchers (*Empidonax traillii extimus*) at the Mojave River Dam, San Bernardino County, California—2025 Data Summary



Data Report 1218

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

Cover. Riparian habitat at the Mojave River Dam. Photograph by Scarlett L. Howell, U.S. Geological Survey, June 2025.

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

Datum

Horizontal coordinate information is referenced to the World Geodetic System of 1984 (WGS 84).

Abbreviations

USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

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—2025 Data Summary

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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 2025. Four vireo surveys were completed between April 23 and June 26, 2025, and three flycatcher surveys were completed between May 16 and June 26, 2025.

We detected two territorial male vireos, both of which were paired, and one transient vireo. No juvenile vireos were observed during surveys. Vireos were reported in two habitat types: riparian scrub dominated by narrowleaf willow (*Salix exigua*) or mule fat (*Baccharis salicifolia*) and willow-cottonwood dominated by red or arroyo willow (*Salix laevigata* or *lasiolepis*). One transient willow flycatcher of unknown subspecies was observed in willow-cottonwood habitat dominated by Fremont cottonwood (*Populus fremontii*).

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 (Kus and others, 2022). 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, 2022). By 1986, the vireo population in California numbered just 300 territorial males (U.S. Fish and Wildlife Service, 1986).

In response to the considerable 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 (U.S. Fish and Wildlife Service, 1986; California Natural Diversity Database, 2026). 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, southwestern Colorado, and possibly western Texas (Hubbard, 1987; Unitt, 1987; Browning, 1993). Restricted to riparian habitat for breeding, the flycatcher has declined over the past five 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; Remsen, 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 1991 and by the USFWS in 1995 (U.S. Fish and Wildlife Service, 1995; California Natural Diversity Database, 2026). After listing, population estimates for flycatchers in California increased to 256 territories, with the increase largely attributed to expanded survey efforts rather than population growth at known sites (U.S. Fish and Wildlife Service, 2002). In the 2014 5-year status review, estimates of California flycatcher territories decreased to 172, with declines occurring statewide (Durst and others, 2008; U.S. Fish and Wildlife Service, 2014).

Flycatchers in southern California co-occur with vireos. However, flycatcher numbers have remained low, unlike vireo numbers, which have increased tenfold since the mid-1980s in response to management practices alleviating threats (U.S. Fish and Wildlife Service, 2006). As of 2023, most of the flycatchers in California are concentrated at two known sites: (1) the Owens River valley in Inyo County (approximately 56 territories; M. Whitfield, Southern Sierra Research Station, written commun., 2023) and (2) the upper San Luis Rey River at Lake Henshaw in San Diego County (approximately 51 territories; Howell and Kus, 2024). Outside of these sites, flycatchers occur as small, isolated populations of one to six pairs (U.S. Fish and Wildlife Service, 2002).

Male vireos arrive on breeding grounds in southern California in mid-March. Males 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 often are 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 (Kus and others, 2022).

Male flycatchers begin arriving in southern California in early to mid-May, 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 (U.S. Fish and Wildlife Service, 2002).

The Mojave River Dam is within USFWS designated critical habitat for the flycatcher, and although this area is not designated critical habitat for the vireo, breeding birds have been documented at Mojave River Dam since 2020 (Howell and Kus, 2022, 2025; Singer, 2026). 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 perform surveys and assess activities that might have adverse effects on these federally endangered bird species (U.S. Army Corps of Engineers, 2023). The purpose of this report is to summarize the results of vireo and flycatcher surveys completed by the U.S. Geological Survey (USGS) at the Mojave River Dam in 2025. These data will inform natural resource managers about the status of these endangered species at the Mojave River Dam and help to guide land use and management practices as appropriate to support the species' survival.

Methods

Study Area

The study area is upstream and downstream from the Mojave River Dam located in San Bernardino County, California, 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 outside the city of Hesperia, off Arrowhead Lake Road and north of State Route 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 kilometer (km) of the West Fork Mojave River flowing east toward the dam, 2.0 km of Deep Creek flowing west toward the dam, and 2.0 km of the Mojave River flowing north away from the dam. The riparian habitat south of the dam is dominated by willow (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*; S. Howell, U.S. Geological Survey, pers. obs., 2025). The area north of the dam is highly disturbed by illegal off-road vehicle use, and the riparian habitat is patchy and degraded. Water flowed swiftly throughout the rocky Deep Creek section of the survey area, whereas the Mojave and West Fork Mojave River sections were sandier and included areas of dry riverbed, slow-moving water, and standing pools.

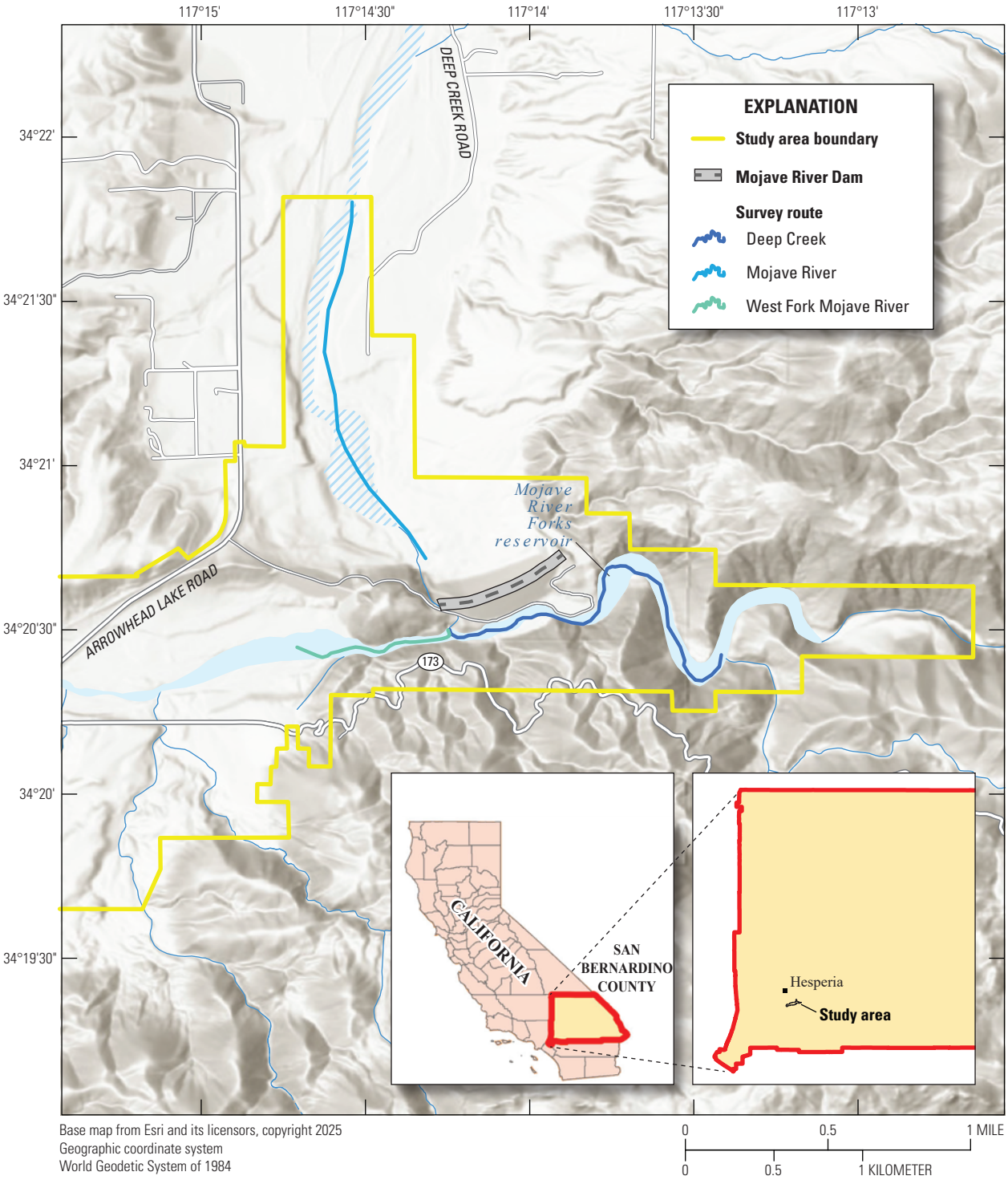

Figure 1. Location of Least Bell's Vireo (*Vireo bellii pusillus*) and Southwestern Willow Flycatcher (*Empidonax traillii extimus*) study area at the Mojave River Dam, San Bernardino County, California, 2025.

Surveys

Surveys were done 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 completed throughout the study area between April 23 and June 26, 2025, and three surveys for flycatchers were completed between May 16 and June 26, 2025. Observers walked slowly through or adjacent to suitable riparian habitat, listening and searching for vireos and flycatchers, systematically playing a recording of a vireo or flycatcher song to elicit a territorial response if no vireos or flycatchers were heard spontaneously singing. Surveys typically began at sunrise and were completed by late morning, avoiding conditions of high winds and extreme heat that can reduce bird activity and detectability. Vireo and flycatcher surveys were completed by USGS biologist Scarlett Howell under Federal 10(a)1(A) Recovery Permit ESPER0004080_0.3 and a protocol approved by the USGS Western Ecological Research Center (WERC) Institutional Animal Care and Use Committee for conformance with the Animal Welfare Act.

For each vireo or flycatcher encountered, observers recorded age (adult or juvenile), sex, breeding status (paired, undetermined, or transient), and if the bird was banded. A male was considered paired if a female also was detected visually, if vocalizations unique to mated birds were heard, or if breeding behavior was observed (for example, food carry, a nest, or dependent juveniles in the territory). A vireo or flycatcher was considered transient if detected only once. Vireo and flycatcher locations were mapped using Esri Field Maps (Esri, 2025) on mobile phones with built-in Global Positioning System to determine geographic coordinates (World Geodetic System of 1984). 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.

Dominant native and exotic plants were recorded at each vireo or flycatcher location, and the percentage cover of native vegetation was estimated using 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 (*S. gooddingii*), arroyo willow (*S. lasiolepis*), and red willow (*S. laevigata*), 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 narrowleaf willow (*S. exigua*) or mule fat, with few other woody species.

Upland scrub: Desert scrub adjacent to riparian habitat.

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

Results

A total of two territorial male vireos were detected at the Mojave River Dam in 2025, both of which were confirmed as paired (tables 1, 2; fig. 2). One vireo pair was south of the dam, and one was north of the dam (fig. 2). One transient vireo (MO02) was detected on May 16, 2025, but was not present on subsequent surveys. Two nests were observed incidentally at one territory (MO01), but the nests were inactive on subsequent visits. No juvenile vireos were detected in 2025 (table 1). No banded vireos were observed in 2025 (table 2). No territorial flycatchers were observed. One transient flycatcher of unknown subspecies was detected in May but was not seen on subsequent surveys, indicating that the bird did not establish a territory (table 1).

Vireos and flycatchers used two habitat types within the study area: riparian scrub and willow-cottonwood (table 3). Several willow species were dominant in vireo territories, including arroyo or red willow and narrowleaf willow (table 3). Exotic vegetation was sparse in vireo and flycatcher locations (table 3).

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, 2025.

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

Survey Date	Number of					
	Least Bell's Vireo			Willow Flycatcher		
	M	F	J	M	F	J
April 23, 2025	1	0	0	—	—	—
May 16, 2025	2	1	0	1	0	0
June 4, 2025	2	2	0	0	0	0
June 26, 2025	2	1	0	0	0	0
Total number of territorial birds	**2**	**2**	**—**	**0**	**0**	**—**

Table 2. Locations, breeding status, and band status of Least Bell's Vireos (*Vireo bellii pusillus*) and Willow Flycatchers (*Empidonax traillii*) detected at the Mojave River Dam, San Bernardino County, California, 2025.

[ID, identification; —, no data]

Species	Territory ID	Latitude	Longitude	Breeding status	Male banded	Female banded
Least Bell's Vireo	MO01	34.34155	−117.23482	Pair	No	No
Least Bell's Vireo	MO02	34.34116	−117.23703	Transient	No	—
Least Bell's Vireo	MO03	34.35126	−117.24141	Pair	No	No
Willow Flycatcher	MO01F	34.35126	−117.24141	Transient	No	—

Table 3. Habitat characteristics of Least Bell's Vireo (*Vireo bellii pusillus*) and Willow Flycatcher (*Empidonax traillii*) locations at the Mojave River Dam, San Bernardino County, California, 2025.

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

Species	Territory ID	Habitat type	Dominant plant species	Percent native cover
Least Bell's Vireo	MO01	Riparian scrub	Narrowleaf willow	>95 percent
Least Bell's Vireo	MO02	Riparian scrub	Mule fat	>95 percent
Least Bell's Vireo	MO03	Willow-cottonwood	Red or arroyo willow	>95 percent
Willow Flycatcher	MO01F	Willow-cottonwood	Fremont cottonwood	>95 percent

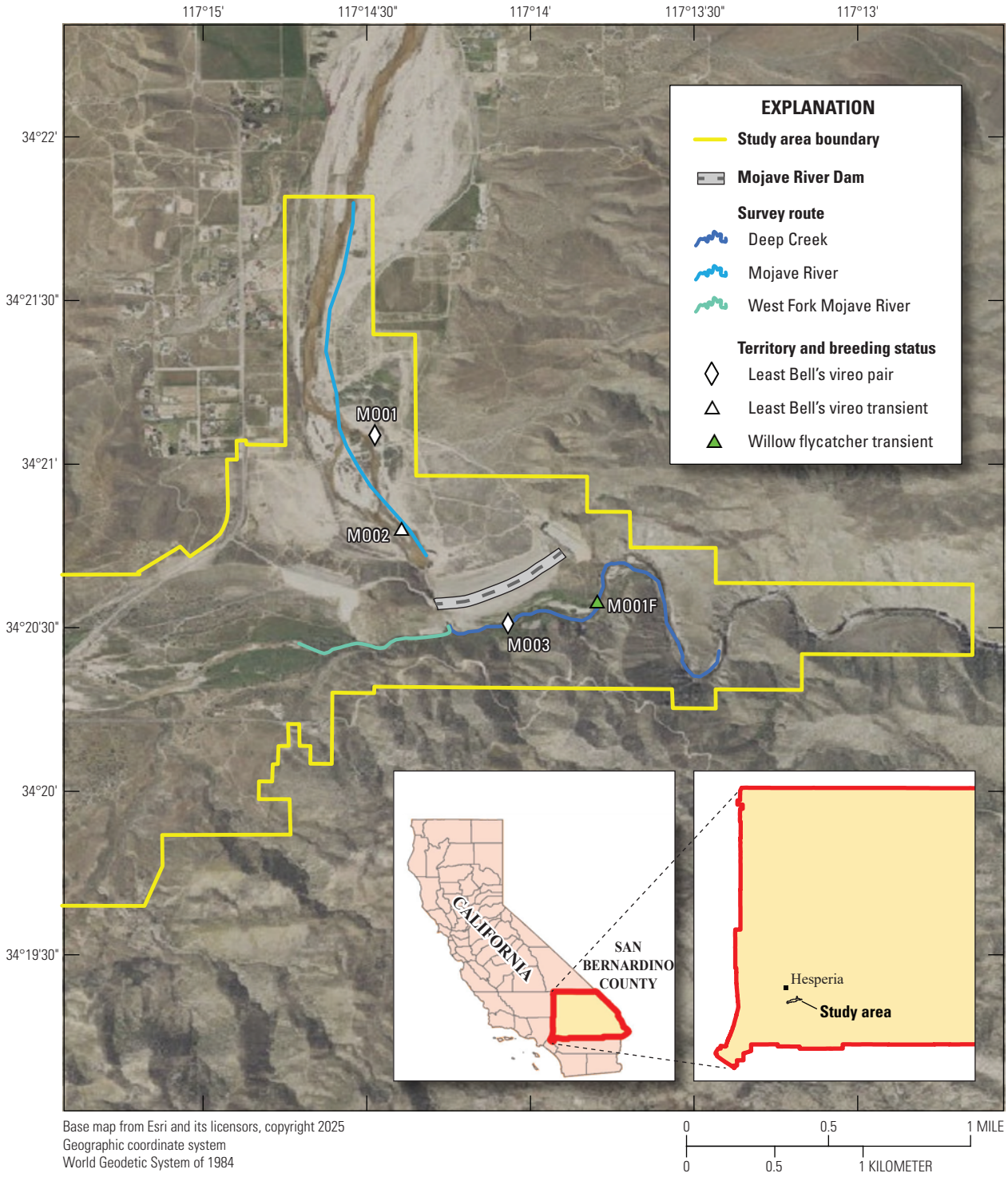

Figure 2. Least Bell's Vireo (*Vireo bellii pusillus*) and Willow Flycatcher (*Empidonax traillii*) detections and breeding status at the Mojave River Dam, San Bernardino County, California, 2025.

Summary

In 2025, we documented two vireo territories at the Mojave River Dam study area. The population of vireos at the Mojave River Dam has fluctuated between one and four territories since 2020 (Howell and Kus, 2022, 2025; Singer, 2026).

Although no territorial flycatchers were detected in 2025, the detection of one transient flycatcher may indicate that the habitat at the Mojave River Dam provides suitable habitat for migrating flycatchers, especially within the more hydric Deep Creek section of the study area.

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