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First Record of Interspecific Breeding of Least Bell's Vireo and White-eyed Vireo

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ABSTRACT.—We provide the first known documentation of a male Least Bell's Vireo (*Vireo bellii pusillus*) breeding with a female White-eyed Vireo (*V. griseus*) and the first report of a White-eyed Vireo breeding in California at the San Luis Rey River, Oceanside, San Diego County. We discovered the pair building a nest on 12 May 2010. The female laid four eggs, and the pair successfully raised and fledged four nestlings. We collected DNA samples from each nestling and the female during the nestling stage and banded them with a numbered federal leg band for future identification. We obtained detailed nest measurements after fledging and monitored the territory for further nesting attempts. No additional nesting attempts were detected. *Received 29 November 2010. Accepted 29 March 2011.*

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The Least Bell's Vireo (*Vireo bellii pusillus*) is a federally endangered migratory songbird that breeds from southern California, USA to northern Baja California, Mexico between late March and mid-August (Kus et al. 2010) with the majority of the population breeding in San Diego County along the San Luis Rey and Santa Margarita rivers. The White-eyed Vireo (*V. griseus*) is a migratory songbird that primarily breeds in eastern North America (from southern Florida to southeast Massachusetts and west through Illinois) and into central North America (from

FIG. 1. A male Least Bell's Vireo (left) building a nest with a female White-eyed Vireo (right) at the San Luis Rey River, Oceanside, San Diego County, California (2010). Photograph by Lisa D. Allen.

eastern Iowa to west-central Texas and northeastern Mexico) between early April and early August (Hopp et al. 1995). White-eyed Vireos are rare vagrants in California, with 67 confirmed sightings statewide between 1969 and 2009, only eight of which occurred in San Diego County (California Bird Records Committee 2007, 2010). Five of the San Diego County sightings were during the breeding season, while three were fall migrants (11 Sep–30 Oct). We report the first known documentation of a Least Bell's Vireo, one of four subspecies of Bell's Vireo (*V. bellii*), breeding with a White-eyed Vireo. This is the first documented case of a White-eyed Vireo breeding in California and appears to be the first successful nesting of a mixed pair of any two vireo species observed in the field.

OBSERVATIONS

We observed a male Least Bell's Vireo breeding with a female White-eyed Vireo at the San Luis Rey River, Oceanside, San Diego County, California (33° 13.86′ N, 117° 20.68′ W). One observer (MAB) observed a male Least Bell's Vireo building a nest with a female White-eyed Vireo on 12 May 2010 (Fig. 1). The pair likely had just started building the nest, as it was ~10% complete and consisted of a woven hammock attached to the branch of an arroyo willow (*Salix lasiolepis*). The following day (13 May), the nest was 60–70% complete with a strong cup formation. The Least Bell's Vireo was identified as male as he sang on the nest. Two additional observers corroborated identification of the female as a White-eyed Vireo on the same day. Six days later (19 May) and 12 days later (25 May), two and four eggs, respectively, were observed in the nest. The presence of eggs corroborated the White-eyed Vireo was female. The male was incubating the eggs during these two visits. The nest was still active on 1 June with four eggs and the female was incubating the clutch. Four days later (5 Jun), four nestlings ranging from 1 to 2 days of age were present, placing 3 June as the approximate hatch date.

We banded the four nestlings (5–6.5 days of age) on 9 June with single anodized aluminum dark blue numbered federal bands. We used a mist net during the same visit to catch the female White-eyed Vireo as she approached the nest. We

TABLE 1. Nest dimensions of Least Bell's Vireo, White-eyed Vireo, and a mixed species pair.

		Least Bell's Vireo[a]			White-eyed Vireo[b]		
	Mixed pair	Average	*n*	Range	Average	*n*	Range
Nest height, m[c]	0.86	1.00 ± 0.40	271	0.30–3.5	0.94	29	0.29–2.1
Inside diameter, mm[d]	46	49.9 ± 5.1	270	35–70	50.5	12	44–64
Nest depth, mm[e]	52	46.7 ± 5.4	269	30–70	53.7	12	38–73
Cup height, mm[f]	85	62.1 ± 9.5[g]	49		97.2	12	69–146

[a] Unpublished data from this study for the San Luis Rey River, California.
[b] Hopp et al. 1995.
[c] Distance from ground to top rim of nest.
[d] At widest point measured from inside the rim.
[e] Distance of lowest rim to bottom of inside the nest.
[f] Highest rim of the nest to outside bottom of the nest.
[g] Arizona subspecies (*V. b. arizonae*); Kus et al. (2010). Harrison (1979) provides an average range of 71–98 mm.

did not attempt to catch the male Least Bell's Vireo to minimize disturbance. We banded the White-eyed Vireo with a single aluminum numbered federal band. We annually conduct intensive band observations for Least Bell's Vireos throughout southern California and should be able to detect these individuals if they return in future years. We also collected DNA samples from each individual. We collected a pin feather sample from each nestling and a blood sample from the female via a toenail clip. This genetic material is currently being analyzed for further evidence of this interspecific breeding occurrence.

The nest was empty on 14 June and two fledglings were heard calling nearby. Three more visits were made to the territory to search for a second nesting attempt, but none was detected, nor was the female White-eyed Vireo observed. One individual (MAB) observed one of the banded fledglings with the male Least Bell's Vireo on 27 June. The fledgling resembled a Least Bell's Vireo fledgling in appearance with a white underbelly, gray crown, back and primaries, and black eyes.

The pair's pensile nest was suspended in an arroyo willow from the crook of a Y-shaped horizontal branch. We obtained nest dimensions (Table 1) for comparison with average measurements for nests of Least Bell's Vireo and White-eyed Vireo. The nest was left undisturbed in the territory.

DISCUSSION

Interspecific breeding among vireos is rare. A Blue-headed Vireo (*V. solitarius*) and Yellow-throated Vireo (*V. flavifrons*) hybrid has been recorded (James 1998). Additionally, Hauser (1959) provides documentation of a female Blue-headed Vireo and male Yellow-throated Vireo constructing a nest together, although the nest was not used. Additional hybrids have been implicated through genetic analysis or physical characteristics (McCarthy 2006, Chartier 2008), but documentation in the field of successful nesting of any two vireo species is lacking prior to our observations.

A comparison of cytochrome b sequences using gel electrophoresis showed Bell's Vireo and White-eyed Vireo to be sister taxa and more closely related to each other than to any other vireo species analyzed (Murray et al. 1994). Least Bell's Vireos and White-eyed Vireos share similar breeding behaviors that may have facilitated this pairing and successful production of young. Least Bell's Vireos typically breed in dense, low, early successional vegetation (Kus et al. 2010), and White-eyed Vireos are common in low trees and shrubs, dense secondary deciduous scrub, wood margins, and overgrown pastures (Hopp et al. 1995). Both male and female Least Bell's Vireos and White-eyed Vireos participate in nest-building, incubation, and parental care.

Least Bell's Vireos typically lay three to four eggs per clutch, incubate for ~14 days, and fledge young ~10–12 days later (Kus et al. 2010). White-eyed Vireos typically lay four eggs per clutch, incubate for ~14 days, and fledge young 9–11 days later (Hopp et al. 1995). Harrison (1979) notes that Bell's Vireo nests are indistinguishable from White-eyed Vireo nests, while Kus et al. (2010) suggest Bell's Vireo nests may be smaller, more finely constructed, and have a shorter outside height than White-eyed Vireo nests. The height of the mixed pair's nest was within the average range for those recorded for Least Bell's Vireo and White-eyed Vireos

(Table 1). Inside nest diameter was close to average for Least Bell's Vireos and at the low end of the range for White-eyed Vireos. Nest depth and cup height were greater than average for Least Bell's Vireos but near average for White-eyed Vireos. This may indicate that females affect these nest parameters during nest building. Alternatively, since White-eyed Vireos are on average larger (female: 11.7 g, range = 10.5–13 g, $n = 6$; Hopp et al. 1995) than Least Bell's Vireos (combined sex: 8.5 g, range = 7.4–9.8 g, $n = 33$; Kus et al. 2010), the nest depth and cup height may be a reflection of the female's size rather than any sex-specific influence on nest dimensions.

Hopp et al. (1995) reported that upon fledging, young White-eyed Vireos appear similar in plumage coloration to adults, but are less yellow. They also note the iris is brownish in White-eyed Vireos up until ~November of the hatching year. Pyle (1997) notes that hatch-year and second-year birds display a brownish-gray to grayish iris through February and after-hatch-year birds usually display a white or white with slight grayish wash iris (Aug–Jul). It will be interesting to see what combination of Least Bell's Vireo and White-eyed Vireo morphological characteristics are expressed in the adult plumage should the hybrid young return to the study area in future years. It will also be interesting to see if they attempt to breed and are successful.

Least Bell's Vireos and White-eyed Vireos differ greatly in plumage and song. Least Bell's Vireos appear nearly entirely gray with two wing bars and white on the chest, sides, belly, and flanks, and have a black iris (Kus et al. 2010). White-eyed Vireos have a more distinct facial pattern (yellow lores, white iris), yellow sides and flanks, two bold wing bars, white throat and belly, and greenish-gray to olive green upperparts (Hopp et al. 1995). Both are sexually monomorphic. The Least Bell's Vireo primary song consists of a rapid sequence of short, distinctive notes that progressively increase in amplitude. Each song has a raspy or jumbled quality and songs are delivered as alternating pairs (Kus et al. 2010). The White-eyed Vireo song begins and ends with a short chip note, and consists of a series of rapid and complex whistle notes, tick notes, and buzzes (Bradley 1980). Differences in plumage and song were not barriers to courtship and pairing in this interspecific mating, despite their importance as cues in species recognition and mate selection in songbirds (e.g., Marler 1960, Lack 1968). The female White-eyed Vireo was in a situation in which there were no potential conspecific mates which may have changed her threshold(s) of responsiveness to cues in the environment.

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