USGS Western Ecological Research Center
Publication Brief

# Reclassifying Bell's Vireo (*Vireo bellii*) to Guide Conservation Efforts

Bell's Vireo (*Vireo bellii*) is a species of conservation concern throughout the United States, and inhabits some of North America's most threatened habitats, including streamsides and shrub-grasslands. The number of Bell's Vireo has decreased since the 1960s in response to habitat loss from urban development, agriculture, and other causes, and brood parasitism by the Brown-headed Cowbird (*Molothrus ater*).

Across the United States, Federal and State laws provide Bell's Vireo populations with varying degrees of protection using a system that classifies the birds based on their physical traits. However, the species has never been characterized genetically, and the existing classification used to guide management decisions may misrepresent the species' true evolutionary history. In a study published in *Conservation Genetics*, researchers from the U.S. Geological Survey and San Diego State University investigated patterns of genetic variation that helped them distinguish between species of Bell's Vireo, and compared their results to the four subspecies currently recognized.

Analyzing blood and tissue samples obtained from museum collections and live birds throughout the species' range, the researchers sequenced 86 individuals for ND2 (a gene commonly examined in genomics studies) and genotyped 48 individuals for genome-wide SNPs (single nucleotide polymorphisms) to identify distinct lineages within Bell's Vireo.

They found two distinct groups of birds that are separated in the Southwestern United States near the border of the Chihuahuan and Sonoran Deserts. These two groups diverged around the same time and location as other highly mobile species in the region, suggesting a physical barrier that has restricted gene flow over time. The genetic differences between the two groups were greater than those between many avian sister species, leading the authors to propose that Bell's Vireo is better classified as two species rather than one.

Further analyses identified two subspecies within each of the "new" species, distributed similarly to the current four subspecies. Importantly, the study supported the classification of the Least Bell's Vireo (*V. b. pusillus*), an endangered bird that breeds in stream- and riverside habitats in southern California and northern Baja California, as its own genetically distinct subspecies.

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The Least Bell's Vireo is an endangered subspecies of Bell's Vireo that lives near rivers and other bodies of water in southern California and northern Baja California. Photo credit: Alan Schmierer

## MANAGEMENT IMPLICATIONS

- Genetic evidence supports a new taxonomy for Bell's Vireo that better reflects the species' evolutionary history.
- The genetic distinctiveness of the endangered Least Bell's Vireo supports its current Federal and State listing status.
- A re-assessment of the conservation status of Bell's Vireo in the rest of the United States is warranted to ensure that the full breadth of taxonomic diversity is protected.

## RESEARCH CONTACT

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