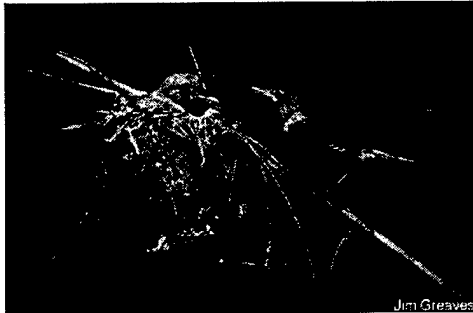




## Sensitive Western Riparian Songbirds Potentially Impacted by USACE Reservoir Operations



Southwestern Willow Flycatcher



Least Bell's Vireo



Western Yellow-billed Cuckoo

**PURPOSE:** This technical note is part of a series of technical notes concerning riparian species that are potentially impacted by U.S. Army Corps of Engineers reservoir operations and associated activities. These technical reports are prepared for the Corps Ecosystem Management and Restoration Research Program (EMRRP) work unit titled "Reservoir Operations – Impacts on Target Species," (see Dickerson, Martin, and Allen (1999); Kasul, Martin, and Allen (2000)). This report provides information on the status and management of three protected songbirds that are strongly dependent on riparian ecosystems in the Western United States. Habitat requirements for each songbird are discussed, and information is provided concerning the factors contributing to population declines and recovery efforts currently being implemented. Details on the status of each sensitive western songbird, its distribution, habitat, behavior, reproduction, food habits, impacts, and management are provided in separate sections below.

**BACKGROUND:** The southwestern willow flycatcher (*Empidonax traillii extimus*), the least Bell's vireo (*Vireo bellii pusillus*), and the western yellow-billed cuckoo (*Coccyzus americanus occidentalis*) are three sensitive songbirds found in the western United States that may be potentially impacted by U. S. Army Corps of Engineers (Corps) reservoir operations. For management purposes, these birds are considered riparian obligates because of their dependency upon riparian

habitats for successful nesting and maintenance of population viability. All of these subspecies have suffered significant declines during the past century. Both the southwestern willow flycatcher and the least Bell's vireo are federally listed as endangered (U.S. Fish and Wildlife Service (USFWS) 1986, USFWS 1995) under the Endangered Species Act (ESA) of 1973, and the western yellow-billed cuckoo was recently proposed for listing as endangered (USFWS 2000a). The protection status of these subspecies is shown in Table 1.

All three subspecies have been observed on Corps projects and reservoirs (U. S. Bureau of Reclamation (USBOR) 1997), and military installations (Schreiber and Reed 1999) in the western United States. Both the southwestern willow flycatcher and the western yellow-billed cuckoo have been observed along river systems in the Lower Colorado Basin. Rivers in this region include the Colorado and Bill Williams Rivers (USBOR 1997; Latta, Beardmore, and Corman 1999). These two subspecies also occur along other rivers in Arizona including the Upper Santa Cruz, San Pedro, Verde, and Gila Rivers. Small breeding populations of the southwestern willow flycatcher are found in riparian habitats along Roosevelt Lake and Lake Mead, AZ, the San Luis Rey, South Fork Kern, and Santa Ynez Rivers, CA, and the Gila River, NM (Sogge, Tibbitts, and Sferra 1993; USBOR 1997; Latta, Beardmore, and Corman 1999; Marshall 2000). The least Bell's vireo breeds only in Southern California, primarily in San Diego County, with the largest remaining populations found along the Santa Margarita River, in the vicinity around Prado Dam, and on Camp Pendleton, Marine Corps Base (Robinson et al. 1995; Mitchell and Martin 2000; Northern Prairie Wildlife Research Center (NPWRC) 2000).

**HABITAT REQUIREMENTS:** All three subspecies are associated with early-successional, densely vegetated riparian habitats in the southwestern United States. Such habitats tend to be created by periodic floods that scour mature vegetative communities along rivers and creeks (Robinson et al. 1995). The least Bell's vireo is found in riparian habitats in southern California, and the southwestern willow flycatcher and the western yellow-billed cuckoo are found in scattered remnant patches of riparian habitat throughout the southwestern United States. Vegetated riparian habitats of native willow (*Salix* spp.) and Fremont cottonwood (*Populus fremontii*) communities are preferred by all three subspecies, but other habitat types may be used. For example, dense stands of the introduced shrub, saltcedar (*Tamarix chinensis*) have been used by nesting southwestern willow flycatchers (Paradzick et al. 2000) and yellow-billed cuckoos (Riparian Habitat Joint Venture (RHJV) 2000). Habitat for the least Bell's vireo often requires small patches of open areas (Franzreb 1990), and the southwestern willow flycatcher is often associated with open patches of saturated soils or open water (Sogge et al. 1997). The size of vegetated habitats used by the southwestern willow flycatcher range from 1.5 acres (0.6 ha) to more than 500 acres (200 ha). However, it is not uncommon for areas between 18 and 60 acres (7 and 24 ha) to support breeding populations (RHJV 2000). Yellow-billed cuckoos only have approximately a 50-percent occupancy rate for habitat patches under 100 acres (40 ha); therefore, habitat patches may have to be over 200 acres (80 ha) to support viable breeding populations (RHJV 2000). A pair of least Bell's vireos require a territory approximately 1.8 acres (0.7 ha) in size. Minimum acreage of habitat to support viable populations of this vireo will depend on the reproductive success of breeding pairs, philopatry of individuals to the area, and distance to the nearest source area of potential immigrants (Brown 1993). Managing large, contiguous areas of habitat should benefit all three subspecies (Latta, Beardmore, and Corman 1999; Finch et al. 2000).

<b>Table 1 Protection Status of Sensitive Western Riparian Songbirds</b>							
<b>STATES</b>		<b>Southwestern Willow Flycatcher</b>		<b>Least Bell's Vireo</b>		<b>Western Yellow-billed Cuckoo</b>	
		<b>Federal<sup>1</sup></b>	<b>State</b>	<b>Federal<sup>1</sup></b>	<b>State</b>	<b>Federal</b>	<b>State</b>
<b>Pacific</b>	CA	FE	SE	FE	SE		SE
	ID					W <sup>1</sup>	SSC <sup>1</sup>
	NV	FE	SP				SP
	OR						SSC <sup>1</sup>
	WA						C <sup>1</sup>
	HI						
<b>Southwest</b>	AZ	FE	SSC				SSC
	NM	FE	SE				
	OK						
	TX	FE	SE				
<b>Mountain-Prairie</b>	CO	FE	SE				
	KS						
	MT						
	ND						
	NE						
	SD						
	UT	FE	SE				ST <sup>1</sup>
	WY						SSC <sup>1</sup>
<b>Total States</b>		<b>7</b>		<b>1</b>		<b>8</b>	
<sup>1</sup> Refers to the Yellow-billed Cuckoo ( <i>Coccyzus americanus</i> ); exact subspecies is debatable at this time.							
<b>FE=</b> Federally endangered species <b>FT=</b> Federally threatened species <b>SE=</b> State endangered species <b>ST=</b> State threatened species <b>SP=</b> State protected <b>SSC=</b> State species of special concern <b>W=</b> Federal watch list (no official protection) based on certain criteria such as populations that are on the periphery of the range, unique habitat, or status of the species is poorly understood <b>C=</b> Candidate species under review for state protection as sensitive, threaten, or endangered.							

**IMPACTS AND RECOVERY:** Loss and degradation of riparian habitats throughout the Southwest are the primary factors influencing population declines of all three subspecies. Most losses are due to urbanization, water diversion and impoundment, dredging and channelization, cattle grazing, and agricultural practices (Franzreb 1987; Dobkin 1994; Marshall and Stoleson 2000). Seven southwestern states have lost an average of 55 percent of original riparian habitats, while California and Arizona have lost 90 percent or more (Dahl 1990; Bell 1998). Along the lower Colorado River, loss of riparian habitat is estimated at 99 percent (Marshall and Stoleson 2000). With the loss of riparian habitats, populations of these birds have become increasingly small and isolated. Approximately 70 percent of breeding populations of the southwestern willow flycatcher are composed of three breeding territories or less (Marshall 2000). Small isolated populations become vulnerable to increased predation and parasitism that occur in fragmented habitats, thus increasing the risk of local extirpations. Moreover, small populations can be eliminated by catastrophic events such as fires and floods, increasing the probability of extinction for the species (Marshall 2000).

The brown-headed cowbird (*Molothrus ater*), a nest parasite that has expanded its range into the Southwest during the past 70 years, poses a serious threat to the persistence of southwestern willow flycatchers and least Bell's vireos. Populations of the least Bell's vireo began to seriously decline upon the expansion of the cowbird into southern California around 1900. Although this vireo can frequently raise at least one vireo chick per parasitized nest, overall reproductive success is greatly reduced (Robinson et al. 1995). The southwestern willow flycatcher is a common host of the cowbird and is rarely able to successfully reproduce when nests have been parasitized (Uyehara, Whitfield, and Goldwasser 2000). Population increases for these two subspecies have only been observed after intensive cowbird control has been initiated (Franzreb 1990; Uyehara, Whitfield, and Goldwasser 2000). In order to utilize periodic outbreaks of food resources, the yellow-billed cuckoo has evolved an extremely rapid nesting period, where a breeding pair can nest and fledge young in only 17 days. This adaptation helps protect the yellow-billed cuckoo from cowbird parasitism (Hughes 1999), although populations remain vulnerable to predation in small habitat remnants. Historically, large expanses of habitat could buffer populations of all three species from high predation rates; however, with smaller populations presently inhabiting small remnant patches of habitat, predation and parasitism rates are expected to have a detrimental effect on the ability of populations to persist (Laymon 1987; Greenwald 1998).

The quality of remaining riparian habitats has also been diminished by several exotic plant species that have spread throughout most riparian areas in the southwestern United States. Saltcedar is an introduced shrub adapted to disturbed conditions. This species possesses an extremely long tap-root system that allows it to access water resources deep below the ground, so it is particularly successful in arid environments. Saltcedar out-competes native vegetation and lowers vegetative structure by replacing understory and midstory components with one dense mass of vegetation. The domination of saltcedar lowers both plant and avian diversity in native riparian systems. Unfortunately, most water diversion projects, including dam construction, channelization, and reservoir operations, often create conditions that promote saltcedar over native plant communities. The ability of saltcedar to resprout after fire, severe floods, or even treatment with herbicides, makes it very difficult and expensive to control (Brotherson and Field 1987). In deserts and other arid environments with extended summers, saltcedar stands may not provide sufficient cover to insulate birds from excessive heat, thus lowering bird use and reproductive success in these areas (Hunter, Ohmart, and

Anderson 1988). Habitat patches dominated by saltcedar are also susceptible to fires. Historically, fire was rare in western riparian systems, but now in areas dominated by saltcedar, fire has become another factor that can destroy existing breeding habitat for birds (Greenwald 1998). Another introduced plant species, giant cane (*Arundo donax*), was intentionally established in the Los Angeles area during the 1820's. Native to the Mediterranean region, the excessive growth rate of this species allows it to form huge dense thickets and successfully out-compete willows and cottonwoods, hence altering nesting habitat for the bird community. Giant cane is also susceptible to fires and it creates a fire-defined system where it dominates (Bell 1998). Isolated remnants of riparian habitat are especially susceptible to invasion of giant cane, and invasion of the species constitutes one of the greatest threats to the conservation of riparian habitats in southern California (Bell 1998).

Several Corps projects and military installations are now in the process of identifying populations of southwestern willow flycatchers and least Bell's vireos, and implementing appropriate management programs (USBOR 1997). The recent proposal to list the western yellow-billed cuckoo will also instigate research on this subspecies as well. Interagency agreements and cooperation should be strongly encouraged. The Corps, USFWS, U.S. Marine Corps at Camp Pendleton, and the California Department of Fish and Game formed partnerships to protect and monitor the least Bell's vireo, and its population has increased significantly after it was listed as endangered in 1986 (Mitchell and Martin 2000; NPWRC 2000). Population increases for the least Bell's vireo and the southwestern willow flycatcher have been observed when cowbird control has been implemented. However, capturing and destroying brown-headed cowbirds is costly, both in terms of labor and funds; therefore, it should be viewed as a short-term action necessary to preserve current populations. Conservation of all three subspecies should emphasize the protection of existing large patches of riparian habitat and the restoration of riparian habitats where possible. Untimely water releases and high reservoir levels may flood breeding populations during the early- and mid-spring months (Greenwald 1998). Channelization, dredging, and water release schedules all serve to stabilize stochastic hydrologic systems, yet these activities promote invasion of exotic plant species. Control of these plants is costly and rarely successful. The best method to preserve native riparian habitats and to prevent invasion by exotic species is to preserve the natural hydrology of riparian systems (Finch et al. 2000).

### **SOUTHWESTERN WILLOW FLYCATCHER (*Empidonax traillii extimus*)**

**Distribution:** The southwestern willow flycatcher is one of four subspecies of the willow flycatcher (*Empidonax traillii*). The southwestern willow flycatcher is known to breed in only 75 isolated riparian sites scattered through southern California, Arizona, New Mexico, southwestern Colorado and Texas, and the extreme southern portions of Nevada and Utah (Sogge et al. 1997; Marshall 2000) (Figure 1). Arizona has the highest number of breeding localities (44) of any southwestern state (Marshall 2000). Some breeding individuals may occur in Baja California, Mexico. In general, willow flycatchers winter in the neotropics, particularly southwestern Mexico, northern Central America and Panama; however, specific wintering areas are not known for the subspecies (DeGraaf and Rappole 1995; Finch, Kelly, and Cartron 2000).

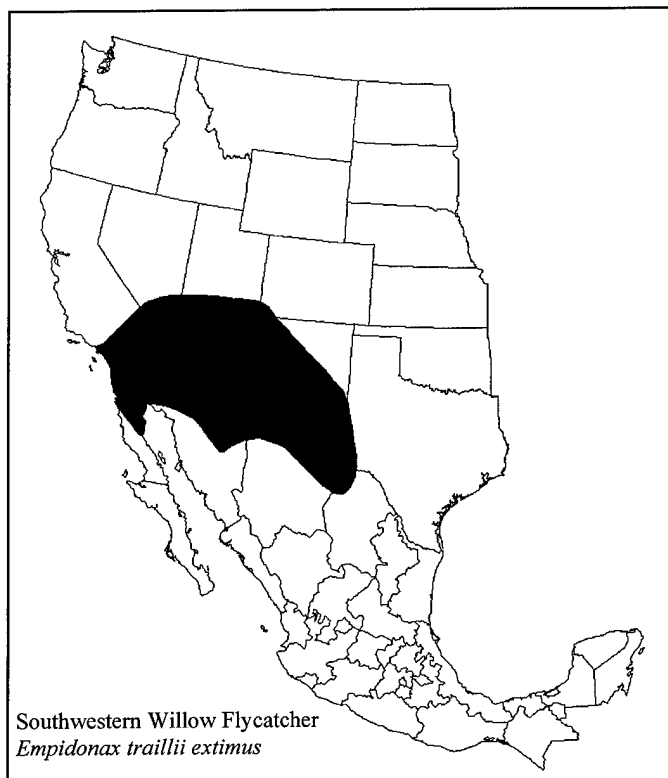


Figure 1. Breeding range of the southwestern willow flycatcher in North America and Mexico (adapted from Unitt (1987))

**Status:** Originally part of the willow-alder flycatcher (*E. alnorum*) complex, the willow flycatcher was not designated as a species until 1973 (American Ornithologists' Union (AOU) 1973), and subspecies designation was accepted later (Unitt 1987). Data collected during national breeding bird surveys lumped the willow and alder flycatchers together between 1965 and 1979 because of the confusion about these species (Sogge et al. 1997). Nevertheless, breeding bird surveys during this period showed relatively stable populations nationally, except in the southwestern populations, where precipitous declines were observed (Robbins, Bystrak, and Geissler 1986). The southwestern willow flycatcher was first listed as a candidate for endangered status in 1991 (USFWS 1991) and formally proposed for endangered status in 1993 (USFWS 1993). The subspecies was officially listed as endangered on February 17, 1995 (USFWS 1995), and critical habitat was designated for the species on July 22, 1997 (USFWS 1997). Range-wide surveys during 1996 detected only 549 territorial males and 386 breeding pairs (Marshall 2000). Approximately 454 breeding pairs were detected in 1997 (USBOR 1997).

**Habitat:** On the breeding grounds, the southwestern willow flycatcher is dependent on dense vegetation associated with riparian areas and often places its nest within 82 ft (25 m) of open areas with surface water or saturated soils (USFWS 1995; Sogge et al. 1997; Sogge and Marshall 2000). Vegetation is typically about 13-23 ft (4-7 m) in height, and often with dense canopy cover (USFWS 1995). The subspecies uses riparian areas at sea level in California, or as high as 8,500 ft (2,600 m)

above sea level in Arizona and southwestern Colorado (Sogge et al. 1997; Sogge 2000). At higher elevations, these birds nest in dense stands of coyote willow (*S. exigua*), and Goodding's willow (*S. goodingii*), with a dense understory consisting of sedges, rushes, and other wetland species (Sogge et al. 1997). At lower to middle elevation levels, stands of native broadleaf trees are used, including stands of cottonwood, willow, boxelder (*Acer negrundo*), ash (*Fraxinus* spp.), and buttonbush (*Cephalanthus occidentalis*) (New Mexico Game and Fish (NMGF) 2000a; Sogge and Marshall 2000). Broadleaf forests tend to be taller (10 to 50 ft) (3 - 15 m), with distinct canopy, subcanopy, and understory vegetative layers. Stands dominated by exotic species, such as saltcedar and Russian olive (*Elaeagnus angustifolia*), are also used (Sogge 2000). These exotic plant species occur primarily in the understory, but occasionally dominate the canopy layer. The primary feature of the nesting area is the presence of dense patches of vegetation interspersed with openings having low vegetative growth or open water. Vegetated patches used for breeding by southwestern willow flycatchers range from 1.5 acres (0.6 ha) to several hundred acres (about 80 ha), and are rarely less than 33 ft (10 m) in width (Sogge 2000).

**Behavior:** Migration routes and wintering grounds remain obscure. Willow flycatchers probably follow a circum-Gulf migration along the Gulf of Mexico. In general, *Empidonax* flycatchers rarely sing or call during fall migration, and species-level identification based solely on observation is extremely difficult with this group of birds. Willow flycatchers sing more during spring migration than other *Empidonax* species, yet subspecies designation during this period remains elusive or impossible (Finch, Kelly, and Cartron 2000). Based on data from the breeding grounds, southwestern willow flycatchers arrive on breeding areas in mid-to-late April and early May and begin fall migration in late July through mid-September (McCabe 1991; Sogge et al. 1997). These birds are reported to sing and hold territories on the wintering grounds (McCabe 1991; Finch, Kelly, and Cartron 2000).

**Reproduction:** The southwestern willow flycatcher is primarily monogamous, but polygamous behavior has been reported in approximately 15 percent of a population in California (Sogge et al. 1997). Males appear first on the breeding grounds and the females arrive approximately 1 to 2 weeks later. Nest construction is initiated about a week after pair bond formation; egg laying commences as early as late May to mid-June and lasts until August. Later nesting attempts may occur after initial failures, or may be an attempt at double-brooding. The nest is usually located in a fork between two branches or on a horizontal branch, and is generally about 3 to 20 ft (1-6 m) above the ground (Sogge 2000). Generally, the nest is composed of fibrous materials of bark and grass with a lining of feathers on the rim (USFWS 1995). Recent surveys have shown that the birds will nest in a variety of tree and shrub species including boxelder, saltcedar, buttonbush, baccharis (*Baccharis* spp.), alders (*Alnus* spp.), and even live oak (*Quercus* spp.) (Sogge 2000). Females lay a clutch of 3 to 4 buffy to cream-colored eggs, with successive clutches smaller than initial attempts. Incubation lasts approximately 12 to 13 days and fledging of young occurs in about 12 to 15 days (NMGF 2000a; Sogge 2000). This flycatcher shows considerable variation in its fidelity to specific breeding areas. Some breeding populations have continued to use specific areas for 10 years or more, while other breeding populations use an area for only a few years. These birds may suddenly appear and begin nesting in areas where they have not been reported for up to 5 years (Sogge et al. 1997).

**Food Habits:** Southwestern willow flycatchers are largely insectivorous, foraging among the dense vegetation in riparian areas by capturing flying insects on the wing, or gleaning them off of leaves and branches. The most common food items include bees, wasps, beetles, butterflies, and moths (Sogge 2000). This species has also been recorded to consume elderberries (*Sambucus* spp.), and blackberries (*Rubus* spp.) (NMGF 2000a; Sogge 2000).

**Impacts:** The most devastating factor contributing to the decline of the southwestern willow flycatcher has been the large-scale losses in riparian habitats throughout the Southwest. Habitat has also been degraded by the spread and dominance of saltcedar. Although this flycatcher is known to occasionally nest in saltcedar habitats, reproductive success in these areas is often low (Hunter, Ohmart, and Anderson 1988; Sogge 2000). However, recent research has shown these birds to nest more often in saltcedar than in native willows and cottonwood habitats (Paradzick et al. 2000). Structural modifications (e.g., riprapping, dike and levee construction) along riparian areas often alter flooding regimes that promote saltcedar and prevent the regeneration of prime flycatcher habitat. At elevations less than 3,300 ft (1,000 m), parasitism and habitat loss are the primary factors in population declines (Marshall 2000; Uyehara, Whitfield, and Goldwasser 2000); however, parasitism decreases significantly at higher elevations (Robinson et al. 1995). At elevations between 3,300 and 5,000 ft (1,000-1,500 m) along isolated mountain streams and meadows, degradation of riparian habitat by intensive cattle grazing may be the primary cause of local extirpations (Robinson et al. 1995). Grazing cattle also prefer young shoots of willow and cottonwood to saltcedar; therefore, grazing often results in the establishment of dense saltcedar stands (Marshall and Stoleson 2000).

**Management:** Currently, many known breeding populations of southwestern willow flycatchers are small and exhibit low reproductive potential. The small size and long distances between these populations increase the risk of local extirpations, with ramifications concerning the long-term viability of the entire subspecies. Management goals seek to identify new breeding areas, maintain and protect currently used areas, and protect areas where the bird is known to have bred within recent years. Protection of breeding areas may include eliminating or reducing livestock grazing, limiting forestry practices, and possibly limiting recreational use in riparian areas. Current recovery efforts in Arizona involve locating breeding pairs and monitoring nesting success (Paradzick et al. 2000). Elsewhere, recovery efforts include trapping and removal of cowbirds and potential predators. Other projects have been initiated to improve habitat by removing exotic plant species and replanting native species (USFWS 1995). Flooding regimes are also being managed to create conditions advantageous to native plant communities (USBOR 1997). Restoration of riparian habitat along the Gila River in New Mexico has been ongoing for over 3 years and has been successful in increasing the number of breeding flycatchers (USFWS 1995). Long-term recovery efforts will increasingly focus on restoring riparian habitats and returning riverine processes to the natural pre-modified condition.

#### **LEAST BELL'S VIREO (*Vireo bellii pusillus*)**

**Distribution:** The least Bell's vireo is a subspecies of the Bell's vireo (*Vireo bellii*), which is widely distributed in western and central North America (Brown 1993). The least Bell's vireo is limited to riparian areas in southern California and Mexico (Figure 2). Within California, the species is limited to eight counties, with the largest population in San Diego County. The subspecies



Figure 2. Breeding range (blue) and wintering range (orange) of the least Bell's vireo in North America and Mexico (adapted from DeGraaf and Rappole (1995) and the National Geographic Society (1999)).

winters in extreme portions of Baja California, Mexico, along the Pacific coast of Mexico, and into Central America (DeGraaf and Rappole 1995).

**Status:** The least Bell's vireo was officially listed as endangered under the ESA on May 22, 1986 (USFWS 1986), and critical habitat was designated in 1994 (USFWS 1994) (Table 1). The subspecies was state listed as endangered in California on March 19, 1983. Once a common songbird in riparian habitats, fewer than 300 pairs were known to breed in Southern California in 1986. By 1998 that number increased to 1,346 (USFWS 1998). Statewide, nearly 2,000 breeding pairs were found in 1998 (Greensfelder 2000; USFWS 1998). Approximately 85 percent of the population breeds in San Diego County (Franzreb 1990). A draft recovery plan (USFWS 1998) states a goal of approximately 4,000 pairs in Southern California (Franzreb 1990; Robinson et al. 1995), with a possible reintroduction of the subspecies into California's Central Valley (Franzreb 1990; Robinson et al. 1995; USFWS 1998). If the draft recovery plan meets the stated goals, this subspecies could be downlisted to threatened by 2003 (USFWS 1998).

**Habitat:** The primary breeding habitat of the least Bell's vireo consists of extremely dense, early-successional (5 to 10 years old) riparian thickets dominated by willow, cottonwood, and mule fat (*Baccharis glutinosa*) along streams and rivers in southern California. In desert areas, thickets may

be dominated by mesquite (*Prosopis* spp.). Dense shrub cover, 2 to 10 ft (0.6 - 3.0 m) above the ground is the primary habitat component determining use of an area by breeding vireos (Franzreb 1990; Brown 1993). Other vegetation found in the understory includes blackberry and mugwort (*Artemisia douglasiana*), with live oak in the overstory. Suitable habitat is often located in steep ravines and gullies. Other overstory species in these areas include willow, cottonwood, and California sycamore (*Platanus racemosa*). Thickets are often impenetrable with nearly 100 percent ground cover, but areas of herbaceous cover and open ground are interspersed through the site (Brown 1993).

**Behavior:** A neotropical migrant, this subspecies arrives on the breeding grounds from Mexico and Central America in mid-March and departs for the wintering grounds in mid- to late-September (USFWS 1998). Males are known to sing frequently during spring migration (Brown 1993) and probably arrive on the breeding grounds before females. Several individuals banded in Southern California have been located in Baja California, Mexico during the winter. However, specific locations and habitats used by wintering birds remain obscure (Greensfelder 2000).

**Reproduction:** Pair bonds between adults usually form within 2 days of the female's arrival on the breeding grounds. Generally, individuals will begin breeding at 1 year of age. Males show strong site tenacity and will use the same breeding territory, sometimes even the previous years' nest, repeatedly (Greaves 1987). The nest is generally built between 2 and 5 ft (0.5-1.5 m) above the ground, and is often suspended from the lateral or terminal forks in branches of bushes or small trees (Brown 1993). The nest resembles a small basket of grass, leaves, plant stems and bark, all held together with spider webbing. The female takes about 4 days to lay 3 to 4 white, lusterless eggs, which are virtually indistinguishable from the eggs of the white-eyed vireo (*Vireo griseus*) (Harrison 1979). Incubation lasts for about 14 days and the altricial young grow rapidly, beginning to hop around the vicinity of the nest within 9 days (Brown 1993). The period of egg-laying to fledging of young takes approximately 26 to 28 days. A breeding pair may be able to raise three broods during one season, and usually attempts at least two broods (Greensfelder 2000). Females frequently shift mates between broods, yet three males were able to keep their mate for several seasons (Greaves 1987). A mated pair will readily re-nest if the nest is lost; one pair was reported to have re-nested six times in one season (Greensfelder 2000).

**Food Habits:** No quantitative studies have been conducted on feeding habits of this subspecies, but it is known to be insectivorous during the breeding season (Nolan 1960, Brown 1993). Birds have been observed to forage at all vegetative layers, even up to 65 ft (20 m), though most foraging takes place below 15 ft (4.5 m) (Brown 1993). Insects are typically gleaned off foliage, bark, and stems (Nolan 1960).

**Impacts:** Populations of the least Bell's vireo have been negatively impacted largely through loss of native riparian habitat required for breeding. Flood control projects, including channelization and reservoir construction, plus irrigation and habitat conversion for agriculture, livestock grazing, and the spread of urban development have all contributed to the loss and fragmentation of riparian habitat (RHJV 2000; Robinson et al. 1995). Road maintenance, gravel/sand mining, and shoreline, bank and channel modification also impact riparian areas. Fragmentation of existing habitats has led to increases in predation rates and parasitism by the brown-headed cowbird. This vireo may be especially prone to predation and parasitism due to the male's conspicuous behavior around the nest

site and the visible placement of the nest (Greensfelder 2000; Powell and Steidl 2000). Cowbird parasitism in southern California occurs in 30 to 50 percent of nests and is currently a primary factor in the decline of this subspecies (RHJV 2000; Powell and Steidl 2000). Generally, parasitism will cut reproductive output by approximately 50 percent (Uyehara, Whitfield, and Goldwasser 2000). Considerable losses are also incurred through predation. Typical predators include coyote (*Canis latrans*), raccoon (*Procyon lotor*), domestic cat (*Felis domesticus*), gopher snake (*Pitouphis melanoleucus*) and the California scrub jay (*Aphelocoma californica*) (Franzreb 1990).

**Management:** Recovery success of the least Bell's vireo has been accomplished largely through concerted efforts to control cowbirds (USFWS 1998), and through interagency cooperation in Southern California (Mitchell and Martin 2000; NPWRC 2000). The recent establishment of both the Sacramento River and the Tijuana Slough National Wildlife Refuges has helped to protect important breeding populations (USFWS 2000b). The strategy stated in the draft recovery plan calls for stabilizing populations of this vireo in southern California by focusing on protecting current breeding populations, controlling cowbirds, purchasing, protecting and restoring riparian habitats, surveying current and historical breeding areas, identifying new breeding areas and changing the existing patterns of land use (Franzreb 1990; RHJV 2000). Land use changes focus particularly on limiting agricultural and urban expansion. Reproductive success is monitored to help guide recovery efforts. This species successfully breeds in restored riparian habitats. Key elements in restored habitats include distance to water, proximity to other natural habitats, and vegetation structure of the restored site (Kus 1998). While the restoration and protection of riparian habitats are crucial to the recovery of this subspecies, populations may never be able to exist without continued efforts to control the brown-headed cowbird (USFWS 1998).

#### **WESTERN YELLOW-BILLED CUCKOO (*Coccyzus americanus occidentalis*)**

**Distribution:** The western yellow-billed cuckoo is found in scattered riparian habitats in southern California, Arizona, New Mexico, Idaho, Utah, Colorado, the extreme southern tip of Nevada, west Texas, and south into Mexico and the tip of the Baja peninsula (Hughes 1999; USFWS 2000a) (Figure 3). This subspecies winters in South America generally east of the Andes (DeGraaf and Rappole 1995; Hughes 1999). It is not known if the western subspecies winters in specific localities, or overlaps with the eastern subspecies.

**Status:** The subspecies has declined throughout its western range and may already be extirpated from Nevada. Populations have declined from 15,000 pairs to roughly 300 pairs during the past 100 years (Groschupf 1987; Hughes 1999). On February 17, 2000, the U.S. Fish and Wildlife Service officially proposed to begin the preliminary scientific review process to determine if the western yellow-billed cuckoo should be listed as endangered under the ESA (USFWS 2000a). Formal listing of this subspecies has been delayed due to the uncertainty of its subspecies status. The breeding population in California is currently estimated at only 30 pairs (Hughes 1999). The subspecies was listed as endangered by the state of California in 1996, and as a species of special concern in Arizona (Arizona Game and Fish Department (AGFD) 1996); this subspecies is not protected in Texas, Utah, or Colorado (Hughes 1999) (Table 1).

**Habitat:** In the western United States and Mexico, the western yellow-billed cuckoo is restricted to densely vegetated riparian areas, usually between 2,800 and 9,800 ft (850 and 3,000 m) in elevation

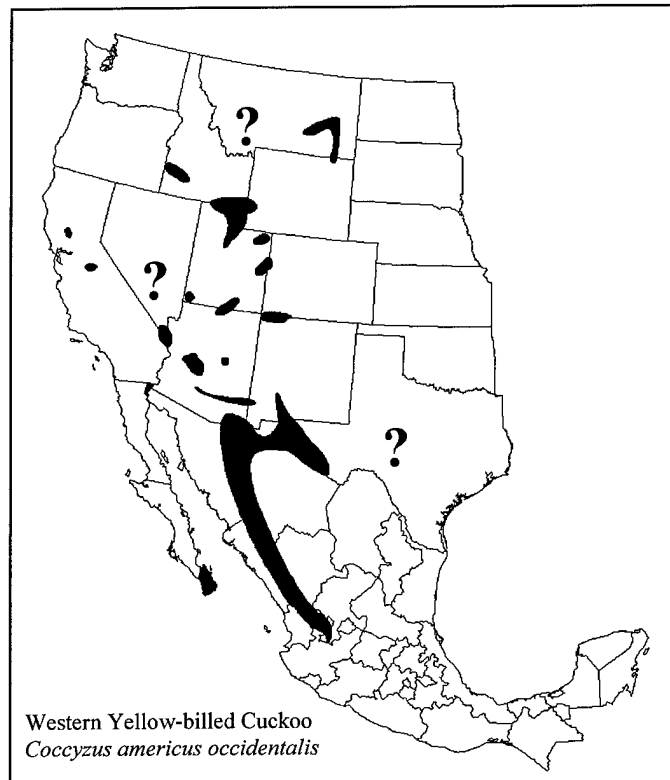


Figure 3. Breeding range of the western yellow-billed cuckoo in North America and Mexico (adapted from the National Geographic Society (1999)). Uncertainty about extent of current range in the western United States is indicated by the '?' symbol

(Hughes 1999; USFWS 2000a). Lowland deciduous forests preferred by the subspecies are often characterized by dense stands of willow, alder thickets, and cottonwood. Habitat patches are often second growth stands, overgrown abandoned farmlands, and orchards (Hughes 1999; NMGF 2000b). Mid- to high elevations may be dominated by white alder (*Alnus rhombifolia*), bigleaf maple (*Acer macrophyllum*), and willow. In the Great Basin shrubsteppe region, this species is associated with stands of shrubs and small trees including big sagebrush (*Artemisia tridentata*), saltbush (*Atriplex confertifolia*), greasewood (*Sarcobatus vermiculatus*), and creosote bush (*Larrea divaricata*). In the Sonoran desert, cuckoos may be found in riparian areas dominated by trees and shrubs, including cottonwood and mesquite (Hughes 1999), paloverde (*Parkinsonia* spp.), and succulents such as pricklypear (*Opuntia* spp.), and giant saguaro (*Cereus giganteus*) (NMGF 2000b). Joshua trees (*Yucca brevifolia*) may be a component of the habitat in Mohave Desert areas. In the Chihuahuan Desert region of New Mexico and Texas, this species is associated with shrub and succulent species including creosote bush, and species of barrelcactus (*Ferocactus* spp. and *Echinocactus* spp.) (NMGF 2000b). Forest patches of at least 100 acres (40 ha) are required to attract breeding pairs in western populations (Laymon and Halterman 1987). Larger areas are likely needed to maintain populations regionally.

**Behavior:** The western yellow-billed cuckoo is a long-distance migrant that travels to South America during the winter season. Birds begin to arrive on the breeding grounds in mid- to late

May, but most do not arrive until mid-June (Groschupf 1987; Hughs 1999). The subspecies appears to follow insect outbreaks and may have a short nomadic period before finally settling to breed (Hughes 1999). Fall departure for western cuckoos begins in late August and most are absent from the breeding areas by September. Migration routes are poorly known, but western yellow-billed cuckoos probably migrate down the Pacific Slope through Mexico and South America (Hughes 1999).

**Reproduction:** Western yellow-billed cuckoos are probably single brooded during the breeding season, whereas the eastern subspecies, due to a longer breeding season may occasionally double brood. The yellow-billed cuckoo has an unusual reproductive life history compared to most North American passerines (Hughes 1999), because on rare occasions it may parasitize nests of other species. In North America, the most common hosts for the yellow-billed cuckoo include the black-billed cuckoo (*Coccyzus erythrophthalmus*), American robin (*Turdus migratorius*), gray catbird (*Dumetella carolinensis*), and the wood thrush (*Hylocichla mustelina*). During parasitic activity, females will most often parasitize other yellow-billed cuckoos, usually during periods of high insect outbreaks, after producing an excess number of eggs, or when the female has no nest (Nolan and Thompson 1975). Despite occasional parasitic behavior, female cuckoos most often breed monogamously with males and produce one single clutch per season. Peak breeding occurs during mid-June in the West. The nest is usually located on a horizontal branch or fork of a small tree or shrub. Both the male and female assist in building the nest, which only takes about 2 days to construct. Typically, the nest is very loosely constructed and consists of only several small to medium-sized sticks and is thinly lined with leaves; the eggs are often visible through the bottom of the nest. Cuckoos generally lay two to three eggs, but occasionally will lay only one or as many as five (Hughes 1999). Because of this species' unusual adaptation to insect outbreaks, it requires an extremely short length of time for nesting. Only 17 days are required from the onset of breeding to the fledging of young. Although the young are altricial, feathers grow rapidly and they will become fully feathered 2 hr after hatching. Both male and female assist in feeding of the young, which are ready to leave the nest after approximately 7 to 9 days (Hughes 1999).

**Food Habits:** Western yellow-billed cuckoos typically feed on large insects including caterpillars, katydids, cicadas, crickets, and grasshoppers (Nolan and Thompson 1975; Hughes 1999). Frogs, lizards, and eggs or young of birds are consumed less frequently (Hughes 1999). While on the wintering grounds, and occasionally while on the breeding grounds, this species will feed on fruit and seeds (Rappole et al. 1983).

**Impacts:** The western yellow-billed cuckoo is highly sensitive to habitat loss. The loss and degradation of riparian habitats west of the Rockies is probably the single most important factor contributing to severe declines and local extirpations. The situation is particularly devastating in California, where loss of riparian habitat is almost 90 percent (Dahl 1990). The western yellow-billed cuckoo is also highly susceptible to pesticides. Individuals collected during spring and fall migration in Florida had unusually high concentrations of DDT, particularly in the fall, suggesting exposure to DDT on the wintering grounds in South America (Grocki and Johnston 1974). The western yellow-billed cuckoo has also been reported to carry the West Nile encephalitis virus (U.S. Geological Survey (USGS) 1999).

**Management:** With the recent proposed listing of the western yellow-billed cuckoo under the ESA, habitat protection and initiation of proper management should be implemented to save this subspecies from extinction in western North America. Management objectives should first focus on identifying and protecting current breeding populations. Identification, protection, and possibly the acquisition of suitable riparian habitat is the next step. In addition to protection, riparian areas may require control of saltcedar, since this species rarely utilizes saltcedar stands for reproduction during the breeding season. Since western yellow-billed cuckoos will readily colonize restored riparian habitat (Hughes 1999), identification of areas to be restored and the implementation of restoration efforts should remain a priority. Pesticide and herbicide applications in agricultural lands adjacent to cuckoo nesting areas should be reduced or eliminated. Potential also exists for reintroduction of the species into specific areas. The Nature Conservancy has suggested that subpopulations of the western yellow-billed cuckoo should consist of habitat patches with  $\geq 25$  breeding pairs to permit exchanges between other subpopulations. A carefully designed landscape of suitable habitat patches may support such subpopulations, and interactions between subpopulations may help to buffer the population from stochastic events that threaten local extinction (Hughes 1999).

**SUMMARY:** Numerous species of songbirds are closely tied to riparian habitats, at least during some stage in their life cycle. The loss, degradation, and fragmentation of riparian habitats, especially in the Southwest, has severely threatened the survival of several songbirds, including the southwestern willow flycatcher, the least Bell's vireo, and the western yellow-billed cuckoo. This note summarizes the biology, life history, and habitat requirements of these birds and provides general guidelines for managing their populations and avoiding land-use conflicts. Corps project personnel should be aware of the potential to improve habitat conditions in riparian ecosystems on their projects for the benefit of these birds and other species.

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