

EXECUTIVE SUMMARY

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*), listed as federally endangered in 1995, breeds in dense, mesic riparian habitats at scattered, isolated sites in New Mexico, Arizona, southern California, southern Nevada, southern Utah, southwestern Colorado, and, at least historically, extreme northwestern Mexico. Historical breeding records and museum collections indicate a sizable population of Southwestern Willow Flycatchers may have existed along the extreme southern stretches of the lower Colorado River region. Factors contributing to the decline of flycatchers on the breeding grounds include loss, degradation and/or fragmentation of riparian habitat; invasion by nonnative plants; and brood parasitism by Brown-headed Cowbirds (*Molothrus ater*).

Willow flycatcher studies have been conducted along the Virgin and lower Colorado Rivers and tributaries annually since 1996, in compliance with requirements set forth by the U.S. Fish and Wildlife Service regarding U.S. Bureau of Reclamation routine operations and maintenance along the lower Colorado River. From 1997 to 2001, breeding populations of Southwestern Willow Flycatchers were documented along the Virgin and lower Colorado Rivers and tributaries at seven study areas, from Mesquite, Nevada south to the Bill Williams River. Willow flycatchers have been detected during the breeding season at several sites along the Colorado River south of the Bill Williams River to the Mexico border from 1996 to 2001, but more information is needed to determine flycatcher residency, breeding status, and demography in this area.

SWCA[®] Environmental Consultants was contracted by the U.S. Bureau of Reclamation to continue surveys, monitoring, and demographic and ecological studies of the Southwestern Willow Flycatcher in suitable and/or historical riparian and wetland habitats throughout the Virgin and lower Colorado River regions in 2003. We completed presence/absence surveys and site descriptions at 95 pre-selected sites and conducted intensive life history studies at Pahranaagat National Wildlife Refuge (NWR), Mesquite, and Mormon Mesa, Nevada, and Topock Marsh, Arizona. At these life history study areas, we monitored willow flycatcher nests to document predation and brood parasitism rates and nesting success; color-banded and resighted as many willow flycatchers as possible to determine the breeding status of territorial flycatchers and document movement and recruitment; measured characteristics of vegetation and microclimate at nest sites and at unused sites to assess factors important in nest-site selection; and implemented trapping and removal of Brown-headed Cowbirds to evaluate the effects of trapping on nest brood parasitism and flycatcher nest success.

We used tape recorded broadcasts of willow flycatcher song and calls to elicit responses from willow flycatchers at 95 sites, ranging in size from 1 to 70 ha, along the Virgin and lower Colorado Rivers and tributaries between 15 May and 25 July 2003, following a 10-survey protocol. We detected willow flycatchers on at least one occasion at 54 of these sites. Resident, breeding flycatchers were detected at 11 sites within the following five study areas: Pahranaagat NWR, Mesquite, Mormon Mesa, Topock Marsh, and the Bill Williams River NWR. Although many flycatchers were recorded at 32 of the 38 sites south of Bill Williams until 18 June with a single detection recorded on 2 July, monitoring results at these sites suggest these flycatchers were not resident, breeding individuals and were most likely northbound migrants.

We used targeted mist net and passive netting techniques to capture and uniquely color-band adult and fledgling willow flycatchers. Nestlings were banded between 7 and 10 days of age. We banded each adult and fledged willow flycatcher with a single anodized (colored), numbered U.S. federal aluminum band on one leg and one colored metal (aluminum) band on the other. Nestlings were banded with a single anodized numbered federal band, uniquely identifying it as a returning nestling in the event it returns in a subsequent year. We used binoculars to determine the identity of previously color-banded flycatchers by observing, from a distance, the unique color combination on its legs. At all study areas where breeding flycatchers were located in 2003, we color-banded 26 new adult flycatchers, recaptured 20 adults banded in previous years, resighted 17 additional adults banded in previous years, and banded 63 nestlings from 23 nests.

At the four life history study areas and Bill Williams, we recorded a total of 60 territories. Of these, 40 (67%) consisted of paired flycatchers and 20 (33%) consisted of unpaired individuals. Four breeding males were polygynous, each being paired with two females. Five of the 20 unpaired territories were abandoned before mid-June and averaged nine days of activity. These individuals most likely were northbound migrants.

Of the 27 willow flycatchers that returned from previous years for which original banding locations were available, 17 (63%) returned to the same site at which they were banded and 10 (37%) returned to a different site. Of the 10 returning individuals detected at a different site from where originally banded, 8 (80%) were banded as nestlings. We also detected one within-year movement of an adult male flycatcher that originally held an unpaired territory at Mormon Mesa and was later recaptured approximately 40 km to the northwest at Mesquite West.

We initiated color-banding studies at sites along the Gila River and the Colorado River from the Gila confluence south to the Mexico border from 10 to 30 June to better determine flycatcher residency, breeding status, and movement patterns in this area. Of 59 willow flycatcher detections, we captured and color-banded four adults at three sites. All four individuals were determined to be second-year birds (born in 2002). Flycatcher behavioral observations in combination with active molt patterns exhibited on captured individuals suggest strongly that the individuals detected at these sites were northbound migrants.

We documented 57 willow flycatcher nesting attempts at the four life history study areas and Bill Williams, 50 (88%) of which contained eggs and were used in calculating nest success and productivity. Twenty-seven (54%) nests were successful and fledged young, and 23 (46%) failed. Depredation was the major cause of nest failure, accounting for 57% of all failed nests and 74% of nests that failed after flycatcher eggs were laid. Seven of the 50 nests (14%) that contained flycatcher eggs were brood parasitized by Brown-headed Cowbirds. One additional flycatcher nest was abandoned prior to egg laying after being parasitized. Mayfield survival probability at the four life history study areas and Bill Williams ranged from 0 to 100% and was 56% for all sites combined.

We used a variation of the Australian crow trap to capture and remove Brown-headed Cowbirds at each of the four life history study areas. Cowbird traps were deployed at least two weeks prior to the initiation of flycatcher nesting (mid-May) and continually operated until all nests were past the egg stage (mid-August). We captured and removed 115, 6, 3, and 113 Brown-headed

Cowbirds at Pahranaagat, Mesquite, Mormon Mesa, and Topock, respectively. Variability in trapping success among sites did not appear to be directly related to the total number of traps per site or relative abundance of cowbirds at each site. Landscape characteristics of the sites and/or trap locations may have affected capture success. We detected no obvious differences in brood parasitism rates at any of the study areas during 2003 compared to previous years, although one year of trapping is probably insufficient to detect any differences in flycatcher parasitism rates or reproductive success.

We gathered data on vegetation and habitat characteristics at 49 nest plots and 48 non-use plots. We gathered data at an additional 35 plots at the life history study areas to obtain an overall description of entire habitat blocks at each study area. The life history study areas vary in vegetation age, vegetation structure, and species composition. The habitat block at Pahranaagat consists of mature, native, large-diameter trees with little shrub and sapling understory. The habitat blocks at Mesquite, Mormon Mesa and Topock are composed primarily of very dense stands of both mixed-native (Mesquite and Mormon Mesa) and exotic (Topock) woody vegetation.

We found willow flycatchers nesting in a diverse array of riparian habitats. Willow flycatcher nest heights at the four life history study areas and Bill Williams ranged from 1.0 to 9.3 m (mean=2.9 m, SE=0.19). Flycatchers placed 57% of all nests at these five study areas in tamarisk (*Tamarix* sp.), 18% in coyote willow (*Salix exigua*), and 24% in Goodding willow (*Salix gooddingii*). Differences in nest-site characteristics between study areas were reflective of the differences in overall habitat characteristics of the sites.

Nest sites consistently differed from non-use sites in several variables. We found greater canopy closure at nest sites than at non-use sites, and three of the four life history study areas (Mesquite, Mormon Mesa, and Topock) had taller canopy height at nest sites than at non-use sites. At all study areas, vertical foliage density was greatest at and immediately above mean nest height.

Microclimate assessment along the Virgin and lower Colorado Rivers indicated that Southwestern Willow Flycatchers placed their nests in habitats exhibiting the lowest mean maximum diurnal temperatures (i.e., the coolest locales). To a lesser extent, flycatchers also placed nests within their territories at sites exhibiting the lowest mean diurnal temperature (i.e., locales with the most thermally moderate microclimate). Non-use sites tended to exhibit less canopy closure, were hotter and drier, and had a greater mean daily temperature range (i.e., were less thermally stable) than either nest or within-territory locales.