SOUTHWESTERN WILLOW FLYCATCHER SURVEYS, DEMOGRAPHY, AND ECOLOGY ALONG THE LOWER COLORADO RIVER AND TRIBUTARIES, 2004

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Annual Report

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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 2003, 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 in Arizona. Willow flycatchers also have been detected during the breeding season at several sites along the Colorado River south of the Bill Williams River to the Mexico border, with over 200 detections recorded in 2003. Behavioral observations and timing of detections strongly suggest this section of the river corridor is a major flyway for migrant willow flycatchers in spring. The degree to which Southwestern Willow Flycatchers use this riparian corridor is unknown and requires further study.

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 2004. We completed presence/absence surveys and site descriptions at 92 pre-selected sites in 15 study areas from the Pahranagat National Wildlife Refuge (NWR), Nevada, south to Yuma, Arizona. We also conducted intensive life history studies at 4 of the 15 areas: Pahranagat 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 recorded broadcasts of willow flycatcher song and calls to elicit responses from willow flycatchers at 92 sites, ranging in size from 1 to 92 ha, along the Virgin and lower Colorado Rivers and tributaries between 15 May and 25 July 2004, following a 10-survey protocol. We detected willow flycatchers on at least one occasion at 72 of these sites. Resident, breeding flycatchers were detected at 17 sites within the following six study areas: Pahranagat NWR, Littlefield, Mesquite, Mormon Mesa, Grand Canyon, and Topock Marsh. South of Bill Williams,

over 600 willow flycatchers were recorded at 35 of the 37 sites between 15 May and 24 June, with a single detection recorded on 23 July. Monitoring results at these sites suggest these flycatchers were not resident, breeding individuals and were most likely migrants.

We used targeted mist net and passive netting techniques to capture and uniquely color-band adult and fledgling willow flycatchers at the four life history study areas and at all survey sites where resident willow flycatchers were detected. Nestlings were banded between 8 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 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 the four life history study areas and at Littlefield, Muddy River, Grand Canyon, and Bill Williams (all monitoring sites), we color-banded a total of 57 new adult flycatchers; recaptured 23 individuals banded in previous years, including 7 flycatchers banded as juveniles in 2003; and resighted an additional 30 previously banded flycatchers. Of the resighted flycatchers, 24 could be identified to individual, including 2 that had been banded as juveniles in 2003. Of the resighted flycatchers that could not be identified to individual, two had been banded as juveniles in 2003. We banded 81 nestlings from 35 nests. In addition, we recaptured three fledglings that had been banded as nestlings, and captured five previously unbanded fledglings.

Color-banding effort in 2004 was expanded in Nevada to include Key Pittman Wildlife Management Area and lands along the Virgin River near Mesquite. Field personnel from unrelated willow flycatcher projects were surveying and/or monitoring flycatchers in these areas and provided us with the locations of nests and territorial flycatchers. Banding was conducted opportunistically at both areas. At Key Pittman, we captured and color-banded two new adults, recaptured one individual banded as a nestling in 2003, and banded six nestlings from three nests. Along the Virgin River at Mesquite, we captured and color-banded four new adults and recaptured two adult flycatchers. One of the recaptured adults had been banded as a nestling in 2003, and the other had been banded as a nestling in 2002 and not detected in 2003. We also banded two nestlings along the Virgin River.

As in 2003, we conducted color-banding studies at sites along the Gila River and the Colorado River from Martinez Lake south to the Mexico border from 10 to 30 June to better determine flycatcher residency, breeding status, and movement patterns in this area. Of 40 willow flycatcher detections, we captured and color-banded four adults at one site. All four individuals were determined to be second-year birds (hatched in 2003). Flycatcher behavioral observations strongly suggest these individuals were northbound migrants.

At the four life history study areas and at Littlefield, Muddy River, Grand Canyon, and Bill Williams we recorded a total of 81 territories. Of these, 64 (79%) consisted of paired flycatchers and 17 (21%) consisted of unpaired individuals. Eight breeding males were polygynous, each being paired with two females.

Of the 54 adult willow flycatchers identified to individual in 2003, 28 (52%) returned in 2004; all returned to the same study area. At the same area where it was originally banded, we detected one individual banded as an adult in 2000 and not detected in 2003. No adult within-season movements were recorded in 2004.

Of 61 juveniles banded in 2003 that were known to have fledged, 13 (21%) were detected in 2004. Of these, 11 were identified to individual: 9 at monitoring sites and 2 at the two banding areas added in 2004. Of the 11 returning juveniles of known identity, 6 (55%) were detected at a different study area than where originally banded, and 5 (45%) were detected at the same study area. Of eight individuals banded as juveniles in 2002 or earlier and not detected in 2003, two (25%) were detected at study areas other than where they were originally banded, and six (75%) were detected at the same study area. The median dispersal distance for all returning juvenile flycatchers exhibiting between-year movements in 2004 was 58 km. Juvenile dispersal is an important population variable in terms of both gene flow and the establishment of new flycatcher populations.

We documented a total of 91 willow flycatcher nesting attempts at the four life history study areas, Littlefield, and Grand Canyon, 81 (89%) of which contained eggs and were used in calculating nest success and productivity. Thirty-eight (47%) nests were successful and fledged young; 41 (51%) failed; and two were of undetermined fate. Mayfield survival probability at the four life history study areas and Littlefield ranged from 0.24 to 0.73 and was 0.44 for all sites combined; survival probabilities were not calculated for the Grand Canyon nesting attempts because nest fate was undetermined. Depredation was the major cause of nest failure at all sites, accounting for 47% of all failed nests and 59% of nests that failed after flycatcher eggs were laid.

Twenty-one of the 81 nests (26%) that contained flycatcher eggs were brood parasitized by Brown-headed Cowbirds. The effect of parasitism on nest fate was variable, but parasitism reduced the likelihood that a nest that contained flycatcher eggs would fledge flycatcher young. Three nests parasitized prior to flycatcher eggs being laid were subsequently abandoned, and we observed six nests in which the disappearance of flycatcher eggs coincided with a parasitism event, with cowbirds suspected of ejecting the eggs. Therefore, an undetermined number of depredation events on eggs and nestlings were probably attributable to cowbirds. Cowbird impacts to flycatcher populations may be more severe than parasitism rates alone suggest, and baseline nesting studies in conjunction with cowbird control experiments need to be continued to determine whether brood parasitism presents a serious problem for populations at the life history study areas.

For the second consecutive year, 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 77, 21, 25, and 45 Brown-headed Cowbirds at Pahranagat, Mesquite, Mormon Mesa, and Topock, respectively. Similar to 2003 results, 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.

Compared to data collected in 1997–2002, preliminary 2004 data indicate a significant decline in parasitism rate at Pahranagat since the implementation of trapping, with no brood parasitism documented in 2003 or 2004. There was no change in parasitism rates at Mesquite, Mormon Mesa, or Topock. At Mesquite, cowbird brood parasitism rates have been high (16 to 60%) since flycatcher monitoring began in 1997, with a relatively large number of nest failures directly attributed to cowbirds. Extensive human development immediately adjacent to the study area has greatly enhanced cowbird habitat. Further study is needed to investigate whether a more aggressive cowbird removal program is warranted at Mesquite.

We gathered data on vegetation and habitat characteristics at 79 nest plots and 75 non-use plots within the four life history study areas. To obtain an overall description of entire habitat blocks at each life history study area, we gathered data at an additional 37 randomly selected plots. The life history study areas vary in vegetation age, structure, and species composition. The habitat block at Pahranagat 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 ranged from 1.1 to 10.0 m (mean = 3.2 m, SE = 0.2). Flycatchers placed 63% of all nests in tamarisk (*Tamarix* sp.), 12% in coyote willow (*Salix exigua*), 20% in Goodding willow (*Salix gooddingii*), and 5% in snags. 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. Breeding riparian birds in the desert Southwest are exposed to extreme environmental conditions, and dense vegetation at the nest may be needed to provide a more suitable microclimate for raising offspring.

We collected microclimate data simultaneously at nest, within-territory, and non-use sites at the four life history study areas between May and July 2004. The microclimate assessment indicated that Southwestern Willow Flycatchers placed their nests in habitats that were cooler, exhibited smaller temperature fluctuations, were more humid, and had higher soil moisture than non-use sites. To a lesser extent, flycatchers also placed nests within their territories at sites exhibiting cooler temperatures and smaller temperature fluctuations.