The Southwestern Willow Flycatcher – Saltcedar/Willow – Saltcedar Biological Control Debate: Popular Concepts – How Realistic?

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Abstract

The southwestern Willow Flycatcher, *Empidonax trailii* (Audubon) subspecies *extimus* Phillips ("flycatcher" hereafter) is a small, insectivorous, obligate riparian bird that breeds in Arizona (AZ) and parts of adjoining states and winters in Central America. It breeds in broad floodplains, in dense thickets of willows (occasionally in other native small trees), near or over water. Since saltcedars (SC) (*Tamarix* spp.) have displaced the willow, it now nests in SC, preferentially so in AZ but not in other areas, even though willows may be present or abundant. Its populations have decreased since 1948 as SC has increased. It was federally listed as endangered in 1995; total population in 1997 was about 540 adults at 62 sites, mostly with five or fewer adult pairs per site, and more than 20 at only a few sites. Major populations are at the San Pedro/Gila River confluence and Roosevelt Lake, AZ and at Topock Marsh, CA/AZ (all in SC); and on the Gila River at Cliff, and Rio Grande at San Marcial/Elephant Butte Reservoir (SM/EB), NM (both in willow dominated habitat). Former large breeding areas have been lost since SC came to dominate (the lower Colorado and Gila rivers, CA/AZ), but it never bred in large pure stands of SC (the Pecos River, NM/TX). The largest population now is at a site that began in 1996 at SM/EB and in 2009 with 356 fledglings in 294 nests by 224 adult pairs. Of the 1355 nests censused over 11 years (1999-2009), 79% were in willow, 17% in mixed, and 4% in SC dominated territories; cowbird parasitism was 11.7% in willow, 22.0% in exotic and 18.1% in mixed. Populations at some sites have partially shifted from SC to cottonwood/willow (C/W) or vice versa or moved along the river as the habitat changed. A substantial breeding population also is present in the Virgin/Muddy river system, including Pahranagat NWR; recent restoration of native willows on the Virgin adjacent to St. George resulted in increased nest productivity as birds previously nesting in SC made a major behavioral switch to nesting in willows. Saltcedar biological control (SC/BC) was begun by Lloyd Andres (USDA-ARS, Albany, CA) in the 1960s, and Bob Pemberton (ARS, Ft. Lauderdale, FL) in the 1980s. Research began by ARS Temple, TX in 1986 (see DeLoach *et al.*, this Symposium). It met strong opposition from the US Fish and Wildlife Service (FWS), Region 2, Albuquerque, NM, when the *Diorhabda* leaf beetles from Asia were proposed for release in 1994. After 7 years of discussions, the beetles were released in May 2001, but not within 322 km of known flycatcher nesting in SC. By 2011, these beetles had defoliated 3,100 river km of SC in NV, UT, and CO and 100 to 200 km in WY, AZ, NM, by others from Crete and Tunisia in TX (along each of 3 river valleys). The local grasses, forbs and willows had recovered at many locations. The debate between the SC/BC workers and the flycatcher biologists and associated

ecologists has centered on evaluating the impact of SC. According to a 2008 paper by two of the leading flycatcher biologists, "Recent research on southwestern Willow Flycatchers has found no negative effects from breeding in *Tamarix* habitats." However, factors degrading the C/W habitat are many: 1) the shift along controlled rivers from the natural spring snow-melt floods on which the early spring reproduction of C/W is synchronized, to the more constant flows below dams that favor establishment of SC that reproduces from spring through fall, 2) shallow-rooted C/W grows only near streams but deep-rooted SC grows across the entire valley, using much more water than C/W; 3) SC lowers water tables, dries up springs and small streams, and increases soil-surface salinity and wildfires that kill or stunt C/W but to which SC is tolerant; and 4) C/W has many natural enemies in the US but SC has no major enemies, allowing its unrestrained growth and spread. The direct impact of SC on flycatcher mortality includes cowbird nest parasitism (twice as high in SC as in willow) and nest site temperatures above the lethal 43º C that kill bird eggs. Less well documented factors are 1) diversity of food insects high in C/W but low in SC, with no immatures for example but with many pollen/nectar-feeding adults in SC all produced on nearby native plants; 2) possible stress on females caused by producing multiple broods after nesting failures and possibly death during the next migration, accounting for the ca. 25% shortage of females on the breeding territories, and 3) in some areas (but not in other areas) higher predation in SC than in C/W, related to canopy density and/or surface flooding. A misinterpretation of the saltcedar impact on C/W and the flycatcher has implied a high value of the many male territories along the Rio Grande near Yuma, AZ, where no females, no nests and no reproduction occurs, thus of no value. Most reports make no mention of other bird surveys with different conclusions; or of the large, new and thriving flycatcher population at SM/EB, NM; or of the effects of high temperatures on the loss of previous breeding areas on the lower Colorado, Gila, AZ or Rio Grande of western Texas; or if SC is good habitat, why the flycatcher does not breed on the Pecos River. The information presented provides answers to these questions and refutes the concept that no negative effects occur when the flycatcher breeds in SC.