

Chapter 2:

Population Status on Breeding Grounds

In his review of the overall population status of the southwestern willow flycatcher, Unitt (1987) concluded that “Even if a few hundred pairs persist in New Mexico, the total population of the subspecies is well under 1000 pairs; I suspect 500 is more likely.” Since Unitt’s review, a substantial amount of information has been collected rangewide on the distribution and abundance of the southwestern willow flycatcher. The 1992 petition to list the flycatcher under the Endangered Species Act and the subsequent proposal by the U.S. Fish and Wildlife Service in 1993 to list the subspecies as endangered with critical habitat encouraged survey efforts rangewide. This chapter synthesizes these new distribution and population data to provide a current baseline from which to evaluate the conservation needs of this subspecies.

Unitt (1987) reviewed historical museum specimens and contemporary survey data for *E.t. extimus* to estimate subspecies’ population status and geographic boundaries. Unitt identified critical gaps in museum specimen records which confounded the delineation of distinct sub-specific boundaries in the Central Valley of California, southern Nevada, south-central Utah, southwestern Colorado, and northern New Mexico. These gaps have resulted in confusion over management needs, particularly among state and federal agencies responsible for the conservation of this subspecies. To reduce confusion, some agencies have drawn up provisional boundaries which expand the known

distribution of this subspecies, particularly in central Utah and Colorado. Data are presented in this chapter that include those areas for which the taxonomic status of the willow flycatcher remains unclear.

Methods

To document the current rangewide distribution and population status of the southwestern willow flycatcher, data were compiled from a variety of sources, including federal and state agency reports, reports prepared by private contractors available to the public, and from individuals working at specific study sites. Data were summarized for the years 1993 through 1996, the latter being the most recent year for which complete rangewide data are available. Data sources include the following: Arizona (Sogge and Tibbitts 1992, Sogge et al. 1993, Muiznieks et al. 1994, Sogge and Tibbitts 1994, Sferra et al. 1995, Sogge 1995a, Sogge et al. 1995, Peterson and Sogge 1996, Spencer et al. 1996, Sferra et al. 1997, Sogge et al. 1997b, McKernan 1997 in litt.); California (Camp Pendleton 1994, Whitfield 1994, Griffith and Griffith 1995, Holmgren and Collins 1995, San Diego Natural History Museum 1995, Whitfield and Strong 1995, Pike et al. 1995, Griffith and Griffith 1996 in litt., Haas 1996 in litt., Kus 1996, Whitfield and Enos 1996); Colorado (T. Ireland 1994 in litt., Stransky 1995); New Mexico (Maynard 1995, Cooper 1996,

1997, Skaggs 1996); Nevada (C. Tomlinson 1995 in litt.); Utah (McDonald et al. 1995, Sogge 1995b).

Since 1993 more than 800 historical and new locations have been surveyed rangewide to document the status of the southwestern willow flycatcher (some sites in southern California have been surveyed since the late 1980s). Statewide survey and monitoring efforts were conducted in Arizona and New Mexico, and smaller-scale efforts in Colorado, Nevada, and Utah. A small number of sites in California have been surveyed and/or intensively monitored by several dedicated individuals, but the state as a whole lacks a coordinated survey and monitoring program. Formal survey efforts have not been attempted in southwestern Texas, largely due to difficulties in gaining access to private lands. Survey efforts in some states were conducted under the auspices of state Partners In Flight programs (e.g., Arizona), which served as the coordinating body for survey training sessions and data reporting. Tibbitts et al. (1994) developed the first survey protocol, which served as the basis for training efforts held annually throughout the range of *E.t. extimus*. Sogge et al. (1997a) published an updated version of the survey protocol.

Both Tibbitts et al. (1994) and Sogge et al. (1997a) rely on the use of tape-playback to elicit responses from territorial birds. The revised protocol prepared by Sogge et al. (1997a) requires a minimum of three visits stratified among three survey periods. In addition to summarizing flycatcher biology and habitat use, the protocol provides guidance on interpreting field responses and a set of standardized reporting forms for data collection.

The basic unit of analysis for this dataset is the "site." In most cases, site refers to a manageable survey unit of one to several hectares that can be reported on standardized data forms provided in Tibbitts et al. (1994) and Sogge et al. (1997a). However, in some cases a site encompasses several relatively discrete breeding locations spread throughout a drainage (e.g., Whitfield's data for the South Fork Kern River in California where several breeding locations occur over the entire 5.6 km study area). Data were compiled for sites that had documented breeding, suspected or probable breeding, or confirmed territorial birds (Sogge et al. 1997a). Migrants and detections with inadequate data to confirm resident status were omitted from analyses.

All analyses represent a composite of data collected between 1993 and 1996. This was necessary because many sites were not surveyed annually and excluding them may bias population estimates. For sites with multiple years' data, the most recent years' data (with positive results) were used. This "composite" approach, however, also has potential biases. Data from 1993 are treated equally with data from 1996, leaving open the possibility of overestimating or underestimating

population sizes for sites that were not surveyed in each year. For example, at several sites flycatchers were absent during one or more years. However, for this chapter I considered these sites extant and used the most recent years' data (with positive survey results) for estimating population status. While this approach may overestimate population abundance, survey coverage was not complete for any given drainage and local movement of breeding groups could have gone undetected.

Data on population status are summarized as the number of territories, pairs, and the total number of individual flycatchers. Estimates of the number of territories and pairs were taken directly from the data source, whereas the total number of individuals represents the sum of territories plus half the number of documented pairs. A territory is defined as an individual singing in the same location during each of the survey periods outlined in the protocol. It is the basic unit the protocol is designed to estimate. Data on the number of pairs probably represent minimum values, because documenting breeding status (i.e., unmated/mated and confirmation of breeding) requires considerable effort above what is required to estimate the number of territories (Sogge et al. 1997a). Site data were not always reported consistently across years. In some cases nearby sites were combined or split for survey or reporting purposes. Thus, there may be some minor discrepancies with the original reports in the total number of sites per state. In addition, territory estimates were sometimes reported as a range of values (e.g., six to seven territories). For the purposes of this summary, the larger value was used to compile population estimates.

Several additional attributes were determined for each site, including the site's land management status/ownership pattern (e.g., federal, state, private, etc.), the county and drainage in which the site was located, the elevation at which the site occurred, and the general habitat type (e.g., mixed native broadleaf, monotypic saltcedar).

Results and Discussion

Rangewide Distribution and Abundance

Southwestern willow flycatchers are currently found in six states from near sea level in southern California to 2700 m (9000 ft) in southwestern Colorado (Table 2-1). Their current status in southwestern Texas, northern Sonora, Mexico, and Baja California Norte is not known due to a lack of survey effort in those areas. Based on survey data collected between 1993 and 1996, the total known population of southwestern willow flycatchers is estimated to be 549 territories (Table 2-1). At least 386 (70%) of these territories were documented as confirmed or probable breeding pairs.

Table 2-1. Population status of the southwestern willow flycatcher by state (1993-1996).

State	Estimated No. of Territories	Estimated No. of Pairs	Estimated No. of SWWF	Estimated No. of Sites	No. of Drainages
New Mexico	223 (40) ^a	175 (45)	398 (42)	25 (23)	9
Arizona	163 (30)	113 (29)	276 (30)	44 (40)	11
California	121 (22)	80 (21)	201 (21)	22 (20)	13
Colorado	28 (5)	9 (2)	37 (4)	10 (9)	8
Utah	12 (2)	8 (2)	20 (2)	7 (6)	6
Nevada	2 (1)	1 (1)	3 (1)	1 (1)	1
Texas	—	—	—	—	—
Sonora, MX	—	—	—	—	—
Baja, MX	—	—	—	—	—
Total	549	386	935	109	43 ^b

^a Parenthetical data represent within-column percentages.

^b The disparity between the number of drainages/state and the total reflects that flycatcher sites were found on portions of the Colorado, Gila, Virgin, and San Francisco rivers in multiple states (see Table 2-4).

Southwestern willow flycatchers have been documented at a total of 109 sites on 43 drainages throughout the southwestern U.S. (Table 2-1). The bulk of the population occurs in Arizona, California, and New Mexico. Combined, the three states hold 92% of all territories (Table 2-1). However, the majority of sites are comprised of small numbers of flycatchers; more than 70% (n=77) of all sites had only three or fewer flycatcher territories (Table 2-2). As a proportion of the rangewide population, those 77 sites contained 22% only of all flycatcher territories. Many of the smallest sites apparently lacked breeding pairs. In fact, 17% (19) of the 109 documented sites were comprised of single, unmated individuals.

Nearly half (47%) of all flycatcher territories were distributed among 99 sites containing ten or fewer territories; 14% of all territories were distributed among six sites containing 11 to 20 territories; 15% of all territories were distributed among three sites containing 21 to 30 territories; and 24% of all territories were found at one site which had an estimated 134 flycatcher territories (Table 2-2). Table 2-3 provides this breakdown by state and illustrates the widely-scattered nature of the larger sites (>10 territories), in particular.

Combining site data by drainage provides a population summary at a larger scale and eliminates biases associated with comparing sites of different sizes, habitat composition, etc. (Table 2-4). These data indicate that of the 43 drainages where southwestern willow flycatchers have been documented, 72% (31) had ten or fewer flycatcher territories; nine percent (4) of the drainages had between 11 and 20 territories; 12% (5) had between 21 and 30 territories; and seven percent (3) had more than 30 territories. Additional survey effort, particularly in California, may add to the overall number of sites and territories per drainage.

Table 2-2. Frequency distribution for the number of southwestern willow flycatcher territories per site (1993-1996).

No. of Territories/ Site	Frequency (number of sites)	Percent of Sites	Cumulative Percent
1	42	38.5	38.5
2	23	21.1	59.6
3	12	11.0	70.6
4	7	6.4	77.1
5	4	3.7	80.7
6	4	3.7	84.4
7	2	1.8	86.2
8	2	1.8	88.1
10	3	2.8	90.8
11	2	1.8	92.7
12	1	0.9	93.6
13	1	0.9	94.5
15	1	0.9	95.4
17	1	0.9	96.3
22	1	0.9	97.2
29	1	0.9	98.2
30	1	0.9	99.1
134	1	0.9	100.0
Total	109	100.0	100.0

However, given that approximately 13% of sites surveyed rangewide have yielded positive results, it is highly unlikely that the addition of new sites and territories will substantially change the distribution and abundance patterns described above.

During the four year study period, 53% of the southwestern willow flycatcher population occurred at just ten sites rangewide, and the remaining 47% occurred in small groups of ten or fewer territories spread out among 99 sites. The estimates of 549 territories and 109 sites rangewide should be viewed cautiously,

Table 2-3. Distribution of southwestern willow flycatcher sites by size and state (1993-1996).

	No. of Sites w/ ≤10 Terr.	No. of Sites w/ 11-20 Terr.	No. of Sites w/ 21-30 Terr.	No. of Sites w/ ≥ 31 Terr.
Arizona	41	2	1	
New Mexico	21	3		1
California	19	1	2	
Colorado	10			
Utah	7			
Nevada	1			
Total	99	6	3	1

Table 2-4. Southwestern willow flycatcher population estimates by state and drainage (1993-1996).

Drainage	Total No. of Territories	Total No. of Pairs	Total No. of SWWF
Arizona			
Colorado	32	21	53
San Pedro	30	28	58
Salt	22	18	40
Gila	19	8	27
Tonto Ck.	18	11	29
Little Colorado	13	10	23
Verde	11	8	19
Bill Williams	6	2	8
Big Sandy	5	2	7
Santa Maria	4	2	6
San Francisco	3	3	3
Subtotal	163	113	273
California			
S. Fork Kern	30	30	60
San Luis Rey	29	24	53
Santa Ynez	23	4	27
Santa Margarita	12	4	16
Colorado	7	6	13
Santa Ana	7	4	11
Mohave	4	4	8
Las Flores Ck.	3	3	6
Pilgrim Ck.	2	1	3
De Luz Ck.	1	—	1
Fallbrook Ck.	1	—	1
San Mateo Ck.	1	—	1
San Onofre Ck.	1	—	1
Subtotal	121	80	201
New Mexico			
Gila	156	150	306
Rio Grande	49	21	70
Rio Chama	6	1	7
Coyote Ck.	3	0	3
Nutria Ck.	3	0	3
Rio Grande de Ranchos	2	2	4
Zuni	2	—	2
Blue Water Ck.	1	1	2
San Francisco	1	0	1
Subtotal	223	175	398
Colorado			
Gunnison	10	2	12
Beaver Ck.	5	—	5

(con.)

Table 2-4. (Con.)

Drainage	Total No. of Territories	Total No. of Pairs	Total No. of SWWF
Colorado			
Anthracite Ck.	4	2	6
Plateau Ck.	3	3	3
Colorado	2	1	3
East	2	1	3
San Miguel	1	—	1
West Ck.	1	—	1
Subtotal	28	9	37
Nevada			
Virgin	2	1	3
Utah			
Panguitch Ck.	3	3	6
San Juan	3	2	5
Virgin	3	1	4
Panguitch Lk	1	1	2
Swamp Ck.	1	1	2
Yellow Ck.	1	0	1
Subtotal	12	8	20
Rangewide Total	549	386	932

however. During the study period a number of sites were either extirpated due to high, sustained levels of nest predation, cowbird parasitism and, possibly, drought, or suffered substantial habitat losses as a result of fire, habitat inundation, agricultural clearing, and clearing for roads and bridges (Table 2-5). In addition, some sites with relatively large populations suffered habitat losses or were threatened due to human activities (see Table 2-5; USFWS 1996, 1997a, 1997b). The scope and magnitude of adverse impacts and threats combined with the predominance of small breeding groups vulnerable to stochastic processes, alone, suggests that the population is probably fluctuating spatially and temporally. Without a more comprehensive, annual monitoring effort, however, our ability to track and respond in a management context to these changes is severely compromised.

Conservation Challenge

The overall distribution of flycatchers—many sites with small populations and a small number sites with larger populations—presents a difficult conservation challenge at best. The smallest sites (≤ 10 territories) comprise nearly half of the total population, but are the most vulnerable to demographic and environmental stochasticity. In some cases, we know that reproduction has not been sufficient for these sites to persist on their own, or to yield emigrants for colonization of other sites (Muiznieks et al. 1994, Maynard 1995, Sogge et al. 1997b). However, trends at these sites should not be used as justification for

shifting conservation efforts away from sites with small numbers of flycatcher territories. For one, if this subspecies' population is comprised of a number of metapopulations, then some of these smaller sites probably are regional sources of colonizers, at least in some years. Second, we do not understand the processes or circumstances under which colonization of new sites occurs. Shifting management attention away from smaller sites because they are presumed to have less conservation potential may result in losses that further isolate remaining breeding groups and potentially disrupts regional population dynamics. And third, many opportunities have already been lost at some of the larger sites, which has considerably narrowed management options (see Table 2-5, USFWS 1996, 1997a, 1997b). In evaluating the current pattern of small breeding group size and the potential effects of recent or anticipated habitat and population losses, I speculated (in USFWS 1997b) that,

“...variation in individual fitness of flycatchers probably translates to variation in responses to habitat loss/degradation and subsequent survivorship and reproductive success. Thus, not all flycatchers are likely to perish as a result of displacement [due to habitat loss] and not all flycatchers are likely to fail to attract mates and breed [after dispersal]. The more likely result would be a regional phenomenon of “loss-disperse-decrease” whereby: (1) large habitat patches occupied by the larger breeding groups are lost either by stochastic (e.g., fire) or deterministic processes (e.g., permitted Federal action); (2) surviving birds are forced to disperse elsewhere, most likely into smaller habitat patches; and (3) this dispersal causes decreases in the probabilities of

survival, of obtaining mates, and of reproducing successfully. This hypothesis is based on the assumption that there is a negative relationship between habitat isolation and flycatcher survival and reproduction. This phenomenon could actually lead to a short-term increase in the number of sites occupied regionally while masking an overall, long-term decrease in population size and fecundity.”

The above quote addressed the specific case of the Lake Mead inflow on the Colorado River where inundation of 445 ha of occupied willow habitat was

anticipated to result in habitat loss, nest loss, and forced dispersal of flycatchers from at least eight territories documented in 1996 and, potentially, up to 25 territories. In fact, three of seven nest attempts at Lake Mead were lost due to treefall in 1996 (McKernan 1997). In 1997, when inundation was more extensive due to rising lake levels, fewer flycatchers returned. Three breeding attempts were documented; one successfully fledged young, one nest was

Table 2-5. Impacts documented or anticipated at Southwestern willow flycatcher sites.

Affected Sites by State	Drainage	Type of Impact	No. of Territories at Site
Arizona			
Roosevelt Lake ^a	Salt & Tonto Ck.	Anticipated loss of habitat for up to 45 terr. from inundation ^b	40
Lake Mead Inflow	Colorado	1100 acres of habitat lost and nests losses due to treefall	≥8
PZ Ranch ^c	San Pedro	Habitat loss due to fire	8
Sanchez Rd. ^d	Gila	Habitat loss due to bridge construction; high levels of cowbird parasitism	4
Tuzigoot	Verde	Extirpation; high levels of predation & parasitism	2
Grand Canyon	Colorado	<3 sites extirpated; high levels of predation & parasitism	1-2
Middle Gila	Gila	~ 6 miles of occupied habitat lost due to fire	?
California			
Lake Isabella ^a	S. Fork Kern	>700 acres of habitat modified and nests lost due to inundation	≤14
Santa Ynez	Santa Ynez	Occupied habitat lost due to agricultural clearing	?
Colorado			
Escalante SWR	Gunnison	Occupied habitat loss due to fire	10
New Mexico			
Gila Valley ^a	Gila	Largest known site threatened by flood control efforts	>134
Fort West Ditch ^a	Gila	Habitat and nest loss due to intentional clearing	15
San Juan Pueblo Bridge ^e	Rio Grande	Habitat loss due to bridge construction & fire	13
San Marcial ^a	Rio Grande	Extirpated 1996, possibly due to drought	11
Bosque del Apache NWR ^f	Rio Grande	Habitat loss due to fire	?

^a Site is one of ten rangewide with more than ten territories.

^b Up to 45 territories were anticipated to be lost by USFWS, which was slightly higher than the number documented at both sites.

^c Up to 18 territories were documented prior to fire.

^d Only 1 territory was present in 1997 after habitat loss.

^e However, additional survey effort revealed more territories after fire.

^f Fire occurred in unsurveyed habitat adjacent to occupied flycatcher area.

lost to treefall, and one nest disappeared, the cause unknown.

Dispersal due to habitat loss is not unique to Lake Mead, but has also been documented at Lake Isabella on the South Fork Kern River in California (Whitfield and Strong 1995), at Elephant Butte Reservoir on the Rio Grande in New Mexico (Hubbard 1987), and is anticipated to occur at the Roosevelt Lake breeding sites in Arizona (USFWS 1996). These areas represent some of the largest known riparian habitat patches in the Southwest. In some cases the habitat modifications (i.e., inundation) occurred during the breeding season. Thus, flycatchers were, in all likelihood, forced to disperse to smaller patches potentially incurring increased risk of predation, increased competition for suitable habitat elsewhere, and delayed or foregone breeding opportunities.

One conclusion drawn from this line of thinking is that conservation efforts should focus aggressively on (1) protecting extant sites in order to provide breeding groups the greatest chance of persistence; and (2) on vastly increasing habitat options at least drainage-wide to provide local options in the event breeding groups are forced to disperse. In conjunction, research efforts should focus on identifying dispersal patterns and capabilities to better understand regional population dynamics and to determine habitat-specific demographic patterns so that local and regional conservation efforts are more effective.

Land Management Status

The data in Table 2-4 point to 43 potential conservation opportunities (river drainages) for the southwestern willow flycatcher. Portions of some of the drainages listed in Table 2-4 are already receiving some degree of management to benefit the southwestern willow flycatcher. For example, the Kern River Preserve and Kern River Research Center on the South Fork Kern River have been cowbird trapping since

1993, actively managing and restoring habitat throughout the South Fork, and have maintained a comprehensive monitoring and research program since 1989. The U.S. Forest Service removed livestock grazing on the San Luis Rey River in California to benefit both the endangered least Bell's Vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher. Similarly, on the upper San Pedro River in Arizona the Bureau of Land Management removed livestock grazing from the entire Riparian National Conservation Area to benefit the high degree of biological diversity associated with that river corridor, including the flycatcher. On the lower San Pedro River, the Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S.G.S. Biological Resources Division, Arizona Game and Fish Department, and The Nature Conservancy have initiated a comprehensive program of habitat protection, research, and monitoring to protect Arizona's largest breeding group of southwestern willow flycatchers. These programs are being carried out on both public and private lands demonstrating that cooperation among private and public entities can yield significant conservation gains. More of these programs will be necessary as the current distribution of flycatcher sites is spread out among mostly federal and private lands.

Data on land management status were available for 104 of the 109 sites studied. Table 2-6 reveals that 56% of all southwestern willow flycatcher sites occurred on lands managed by Federal agencies, while 32% were on private lands. While the threats to some of these locations are already known and are considerable, a coordinated, rangewide evaluation of the level of protection currently in place as well as the status of riparian habitats surrounding currently-occupied sites has not been completed.

The low overall population status of this subspecies and the potential isolation of breeding groups due to habitat fragmentation suggests several paths for management and research. First, extant breeding sites should be protected to maintain reproductive

Table 2-6. Land management status at southwestern willow flycatcher sites.

State	Land Management Status					Total
	Federal	State	Private	Tribal	Municipal/ County	
Arizona	27 (62) ^a	2 (5)	14 (31)	0	1 (2)	44
California	15 (71)	1 (5)	5 (24)	0	0	21
Colorado	3 (33)	2 (22)	4 (45)	0	0	9
New Mexico	9 (41)	2 (9)	7 (32)	4 (18)	0	22
Nevada	0	0	1 (100)	0	0	1
Utah	4 (57)	0	3 (43)	0	0	7
Total ^b	58 (56)	7 (7)	34 (32)	4 (4)	1 (1)	104

^a Parenthetical values provide within-row percentages for each state.

^b Parenthetical values represent proportion of the five land management categories.

potential and reduce population isolation. Second, habitat protection and management efforts should be focused near existing flycatcher breeding sites and should be incorporated into comprehensive monitoring programs. Third, an evaluation that identifies, in a spatially-explicit manner, gaps in protection as well as opportunities for protection and management is critically needed. And fourth, data on dispersal events (i.e., causes and spatial patterns) and subsequent reproductive success are needed to better understand population dynamics, including regional habitat needs over time and space. These efforts will require considerable resources and a commitment among the various private and public entities interested in promoting conservation and management for this species. The data summarized in this chapter provide a rangewide context from which such an effort could originate.

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