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DISTRIBUTION AND CHARACTERISTICS OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES: 1993–2001

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Abstract. Effective conservation and management of an endangered species requires knowledge of its abundance, distribution, and breeding site characteristics. Using published literature, unpublished reports, and personal communications, we synthesized information on all known Southwestern Willow Flycatcher (*Empidonax traillii extimus*) breeding sites from 1993 through 2001. Due to extensive survey efforts throughout the Southwest, the number of known flycatcher territories has increased from 111 (in 1993) to 986 (in 2001); the number of known breeding sites similarly increased from 30 to 221. Most territories are found within small breeding sites (those sites with five or fewer territories); only two sites have 50 or more territories. Sixty-five sites have been extirpated since 1993; 61 of these had five or fewer territories. The states of California, Arizona, and New Mexico account for 89% of known territories; Nevada, Colorado, and Utah collectively have 11%. Approximately half of territories are in habitats comprised of >90% native plants; the other half have a >10% exotic tree and/or shrub component. Approximately 90% of territories are in habitats where willow (*Salix* spp.), saltcedar (*Tamarix ramosissima*), or boxelder (*Acer negundo*) are the dominant tree species; boxelder use occurs only in the Cliff-Gila Valley, New Mexico. Slightly less than half of all sites are on federally-controlled lands; 26% are on private lands. Privately owned sites account for 37% of known territories, and one-third (35%) of these are found in the Cliff-Gila Valley. No data are available on the current status of the Southwestern Willow Flycatcher in Texas or northern Mexico.

Key Words: breeding sites, distribution, *Empidonax traillii extimus*, extirpation, habitat, saltcedar, Southwestern Willow Flycatcher, status.

A basic need in the conservation and management of rare and endangered species is an understanding of the species' abundance and geographic distribution; also important is knowing the ecological and administrative characteristics of the sites in which it occurs. Such data are important for determining the species' current status, evaluating different conservation options, and for comparing past and future data. Rangewide data are often difficult to obtain, especially for organisms with a large geographic range that crosses numerous political and administrative boundaries.

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is an endangered bird known to breed only in dense riparian habitats in six southwestern states (southern California, extreme southern Nevada, southern Utah and Colorado, Arizona, and New Mexico). Unitt (1987) produced the first synthesis of the status and distribution of *E. t. extimus*, and noted that flycatchers had been lost from many historic breeding sites, current flycatcher sites were mostly small and widely scattered, and the total number of flycatchers was perilously low. Unitt found evidence of less than 200 pairs overall, and estimated that the total rangewide population of *extimus* was probably only 500–1000 pairs. Unitt's work focused attention on the decline of the flycatcher, emphasized the need for additional surveys, and formed an important basis for the federal government's decision to list the species as endangered.

Marshall (2000) provided the next summary of the rangewide abundance and distribution of the flycatcher. Compiling a substantial amount of new information from a wide variety of sources, Marshall presented a 1993–1996 summary of Southwestern Willow Flycatcher population abundance and distribution. His summary included some Utah and Colorado sites located north of the *E. t. extimus* boundary as defined by Unitt (1987) and Browning (1993), but administered as *extimus* by the U.S. Fish and Wildlife Service (USFWS) and other federal and state agencies. Marshall reported a total known population of approximately 550 territories distributed among 109 breeding sites; 77% of sites had only three or fewer territories. He noted examples of recent impacts to breeding sites, and the many conservation challenges posed by small and widely scattered breeding populations. Marshall reiterated Unitt's (1987) call for expanded survey efforts, especially in southwestern Texas, northern Sonora, and Baja California del Norte.

Since 1996, additional Willow Flycatcher surveys were conducted, many new flycatcher breeding sites were located, and many known sites were monitored over multiple years. Given

the large amount of new information and the need to include it in on-going Southwestern Willow Flycatcher conservation and recovery planning efforts, we set out to identify all known Southwestern Willow Flycatcher breeding sites (1993–2001). For each site, we assembled all available data on population size, location, habitat, and other information for as many years as possible. We report the latest information on the geographic distribution and abundance of *E. t. extimus*, and the administrative and ecological characteristics of its breeding sites.

METHODS

We consulted published and unpublished reports, including state-wide syntheses and site-specific agency and consulting firm reports (detailed in Sogge et al. 2002), and spoke directly with surveyors, researchers, and managers working on flycatcher projects and/or conservation issues (see ACKNOWLEDGMENTS). Most data came from surveys conducted according to Tibbitts et al. (1994) and Sogge et al. (1997) Southwestern Willow Flycatcher survey protocols, which use tape-broadcast flycatcher vocalizations to elicit vocal responses from territorial flycatchers. For each site where known or suspected territorial flycatchers were found, we extracted information on its location (state, drainage, elevation), gross estimates of whether the overall tree/shrub component was comprised of native and/or exotic plants, dominant tree species, flycatcher population size (number of territories), and management entity/agency responsible for administering the site. Site-specific information came from copies of field data sheets, summary reports, and/or conversations with biologists familiar with each site.

We included information on all flycatcher breeding sites reported between 1993 and 2001; this composite approach was necessary because not all sites were surveyed annually. The statistics included herein are based on survey data from the most recent year during which surveys were conducted, whether flycatchers were detected or not. Therefore, some sites with no flycatchers during the most recent survey year (as judged by the agencies consolidating statewide survey data) are included in the site tallies if they had resident flycatchers during one or more years since 1993. This report does not include data from sites where only migrant Willow Flycatchers were detected. Every effort was made to locate and include all survey information for every known Southwestern Willow Flycatcher breeding site; however, it is likely that some occupied sites have not yet been publicly reported and are therefore not included.

RESULTS AND DISCUSSION

Gathering and synthesizing information on breeding sites was challenging due to inconsistencies in practices of collecting and reporting flycatcher information across states. Rangewide, annual survey reporting requirements are not standardized and the nature and degree of readily available information varied widely. Some states and U.S. Fish and Wildlife Service regions require standard data sheets be submitted each year, and produce detailed statewide summary reports. For other areas, synthesis of annual flycatcher survey data was minimal or lacking. This lack of standardized, annual, state-based synthesis and reporting is the most immediate obstacle to rangewide synthesis of data.

Definitions of Units

We summarize data in terms of the number of flycatcher *sites* and the number of *territories*.

A site is defined as a location where one or more Willow Flycatchers establish a territory in which to breed. Sites with unpaired territorial males are considered breeding sites even if no nesting attempts were documented. A site is often a discrete patch of habitat; however, there is no standardized definition for site and its use varies among states. For example, five occupied habitat patches along a 10-km stretch of river might be considered as five different sites in one state, but as only a single site in another state. We deferred to the statewide summary documents, or to local managers and researchers, when delineating a site for inclusion in the database. Due to differences in site definitions, one should not evaluate the relative importance of a geographic region (drainage, watershed, state, etc.) based simply on the number of flycatcher sites.

A territory is an exclusive defended area within a breeding site. Although detailed monitoring studies have identified unpaired territorial males and/or polygynous males at some flycatcher breeding sites, a territory may be thought of as roughly equivalent to a pair of flycatchers. The concept of territory was more similar between states and among different investigators than was site, so the number of territories is a more appropriate unit to use for summaries and comparisons. Estimates of the number of territories were taken directly from the original data source.

Considerations in Using and Interpreting the Data

We used data from a wide variety of sources, and the amount of information and level of detail varied greatly among sites. Because survey methodology and effort varied among sites and/or between years, these summary data must be interpreted and used in context. Following are cautions to consider when using these data.

Subspecies status of each site

Determination of a precise "boundary line" between Willow Flycatcher subspecies is difficult. Based on analysis of song patterns, Sedgwick (2001) suggested that *E. t. extimus* may not

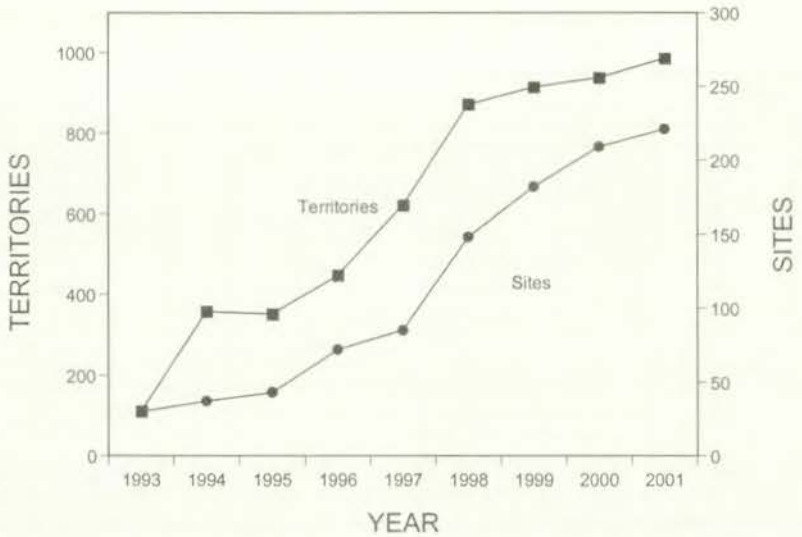

FIGURE 1. The increase in the number of known Southwestern Willow Flycatcher breeding sites (filled squares) and territories (filled circles), from 1993 to 2001. Note that this increase is due primarily to increased survey effort.

occur in Colorado, and that northern New Mexico may be a zone of intergradation between subspecies. However, Paxton (2000) found evidence of *E. t. extimus* genetic characteristic as far north as northwestern New Mexico and southwestern Colorado. For our analysis, we included Willow Flycatcher breeding sites within the geographic range of *E. t. extimus* as defined by Unitt (1987), Browning (1993), and the U.S. Fish and Wildlife Service Southwestern Willow Flycatcher recovery plan (USFWS 2002). Future studies or administrative decisions could ultimately reinforce or change the accepted boundary designations for *E. t. extimus*. Thus, some of the sites reported herein may eventually be removed from management as *extimus*, and/or new geographic areas and sites could be added. This should be considered when producing updates in future years, and when making range-wide comparisons among years.

Population estimates

Population estimates for a site vary with survey effort, surveyor experience, habitat density, and even background noise levels. Population estimates often represent the minimum number of flycatchers present; i.e., if surveyors suspected 12 to 14 flycatchers, we used the lower (more conservative) number. Therefore, although estimates may be very accurate for some intensively surveyed sites, the overall statistics presented herein should be recognized as approximations.

Recency of Survey Data

The information we report is based on the most recent available survey data for each site. Although there were a few sites (N = 5) for which the most recent survey data came from 1995 or earlier, 2000 and/or 2001 data were available for 185 sites (accounting for 84% of sites and 93% of territories).

Changes in the Number of Known Territories Over Time

Since 1993, extensive survey efforts in Arizona, California, Colorado, New Mexico and Utah have greatly increased the number of known breeding sites and breeding territories. From a 1993 estimate of 30 sites and 111 territories, we now know of 986 territories, located among 221 sites (Fig. 1). This increase should not be interpreted as a Southwestern Willow Flycatcher population increase. Rather, it is mostly a function of increased survey effort over time. Although population increases and decreases undoubtedly occur at some sites, movements of birds among sites and lack of standardized survey effort/reporting make it difficult to separate population trends from variances in survey effort. Original data sources (e.g., reports, survey data sheets, etc.) should be consulted when trying to elucidate population trends.

Population Sizes of Breeding Sites

Most (82%) Southwestern Willow Flycatcher breeding sites are small, both in terms of pop-

TABLE 1. NUMBER OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES (TERR) FOR SIX WESTERN STATES, BY BREEDING SITE POPULATION SIZE

Site Size (number of territories)	AZ		CA		CO		NM		NV		UT		Overall	
	Sites	Terr	Sites	Terr	Sites	Terr	Sites	Terr	Sites	Terr	Sites	Terr	Sites	Terr
0	42	0	12	0	0	0	8	0	2	0	1	0	65	0
1–5	36	70	59	107	4	8	16	45	2	5	1	3	118	238
6–10	6	50	1	7	0	0	4	32	3	22	0	0	14	111
11–20	8	125	0	0	0	0	2	30	3	46	0	0	13	201
21–50	2	49	5	142	1	29	1	25	0	0	0	0	9	245
51–100	1	65	0	0	0	0	0	0	0	0	0	0	1	65
100+	0	0	0	0	0	0	1	126	0	0	0	0	1	126
Total	95	359	77	256	5	37	32	258	10	73	2	3	221	986

Notes: Data are for all known 1993–2001 breeding sites; the number of territories is based on last available survey data for each site. A breeding site was counted as having 0 territories if it was occupied during any year from 1993 to 2000, but had no flycatchers during subsequent surveys.

ulation size (five or fewer territories; Table 1) and habitat patch size. Smaller sites are more susceptible to extirpation; 61 of the 65 sites from which flycatchers were extirpated since 1993 were composed of five or fewer territories. Losses of the larger breeding sites at the Colorado River inflow to Lake Mead and the San Pedro River at PZ Ranch involved destruction of habitat by flooding and fire, respectively. However, flycatchers were also lost from sites at the Virgin River near St. George and on the San Pedro River near Indian Hills (both of which had >10 territories during their highest count), despite no large-scale habitat loss. Not all birds at extirpated sites necessarily died—some may have moved elsewhere. We know this is the case for banded flycatchers that moved from the Verde River (Tuzigoot Bridge) and San Pedro River (PZ Ranch) to other sites (Paxton and Sogge 1996, Paxton et al. 1997, Netter et al. 1998). Even excluding extirpated sites, 76% of extant breeding sites have five or fewer territories. Because most extirpated sites had very small populations (usually only one or two territories), their loss does not greatly affect the overall rangewide population estimates, nor the territory summary statistics that we report.

DISTRIBUTION OF TERRITORIES BY STATE

Arizona, New Mexico, and California have the greatest number of known Southwestern Willow Flycatcher sites and territories (Table 1). Nevada, Colorado, and Utah account for less than 15% of territories. There were no recent survey data or other records on current status and distribution in Texas and Mexico.

DISTRIBUTION OF TERRITORIES BY DRAINAGE

Between 1993 and 2001, Southwestern Willow Flycatchers bred within 40 river drainages. The Gila River, Rio Grande, Salt River, and San Pedro River drainages support the greatest number of flycatchers (Table 2). The primary flycatcher drainages in California are the Kern, San Luis Rey, Santa Ana, Santa Margarita, and Santa Ynez rivers.

ELEVATIONAL RANGE OF BREEDING TERRITORIES

As might be expected of a species that ranges over such a wide geographic area, the Southwestern Willow Flycatcher is distributed over a wide elevational range. Approximately 60% of sites occur between 0 and 800 m elevation, with another 28% between 801 and 1600 m (Table 3). Only 9% of territories are known to occur above 2000 m elevation.

USE OF NATIVE AND EXOTIC HABITATS

Many flycatcher breeding sites are comprised of spatially complex habitat mosaics, often including both exotic and native vegetation. Within a site, flycatchers often use only a part of the patch, with territories frequently clumped and/or distributed near the patch edge (Sogge and Marshall 2000). Therefore, the vegetative composition of individual territories may differ from the overall composition of the patch. Although detailed territory-based habitat measurements are lacking for the majority of Southwestern Willow Flycatcher breeding sites, it is useful to characterize the relative use of native and exotic habitats. To do so, we classified the habitat at each site based on the reported overall species composition of the tree/shrub layer(s). Because habitat descriptions varied widely, ranging from cursory examinations to detailed quantitative measurements, we grouped sites into several broad categories: Native (>90% native vegetation), Mixed—Mostly Native (>50–90% native vegetation), Mixed—Mostly Exotic (>50–90% exotic vegetation), and Exotic (>90% exotic vegetation).

Habitat patches comprised of native vegetation account for approximately half (48%) of the

TABLE 2. NUMBER OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES LOCATED IN EACH RIVER DRAINAGE

Drainage	Number of Sites	Number of Territories	Drainage	Number of Sites	Number of Territories
Agua Hedionda, CA	1	0	San Dieguito River, CA	3	4
Amargosa River, NV	2	3	San Felipe Creek, CA	1	2
Big Sandy River, AZ	2	13	San Francisco River		
Bill Williams River, AZ	5	18	AZ	1	1
Canadian River, NM	3	12	NM	1	2
Chama River, NM	2	4	San Gabriel River, CA	1	1
Colorado River			San Juan Creek, CA	1	1
AZ	29	30	San Juan River		
CA	8	4	CO	3	3
Gila River			NM	1	0
AZ	28	69	San Luis Rey River, CA	9	61
NM	7	158	San Mateo Creek, CA	1	2
Hassayampa River, AZ	1	0	San Pedro River, AZ	14	80
Kern River, CA	2	23	Santa Ana River, CA	21	38
Las Flores Creek, CA	1	2	Santa Clara River, CA	6	12
Little Colorado River			Santa Cruz River, AZ	1	1
AZ	2	2	Santa Margarita River, CA	2	23
NM	2	4	Santa Maria River, AZ	1	1
Meadow Valley Wash, NV	1	0	Santa Ynez River, CA	3	33
Mojave River, CA	5	13	Sweet River, CA	2	2
Owens River, CA	5	28	Temecula Creek, CA	2	4
Pahranagat River, NV	3	32	Tonto Creek, AZ	1	27
Rio Grande			Verde River, AZ	4	3
CO	2	34	Virgin River		
NM	16	78	AZ	1	1
Salt River, AZ	5	113	NV	4	38
San Diego Creek, CA	1	0	UT	2	3
San Diego River, CA	2	3			

Notes: Data are for all known 1993–2001 breeding sites (N = 221); the number of territories is based on last available survey data for each site (N = 986 territories).

known flycatcher territories (Table 4). While this underscores the importance of native habitats, 25% of flycatcher territories are found in habitat patches with ≥50% exotic vegetation. In many of these cases, exotics are contributing significantly to the habitat structure by providing the dense lower-strata vegetation that flycatchers prefer (Sogge and Marshall 2000). Dominance of native vegetation at the single largest flycatcher site (126 territories in the Gila—Cliff Valley, NM) substantially affects this habitat summary. Removing the Gila-Cliff site from the analysis, the proportion of rangewide territories occurring in Native sites decreases to 40%, Mixed—Mostly Native sites account for 27%,

TABLE 3. ELEVATIONAL RANGE OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES

Elevation range (m)	# Sites	# Territories
0–400	74	154
401–800	54	340
801–1200	37	160
1201–1600	25	237
1601–2000	12	28
2001–2400	14	62
>2401	5	5

Notes: Data are for all known 1993–2001 breeding sites (N = 221); the number of territories is based on last available survey data for each site (N = 986 territories).

TABLE 4. NUMBER OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES OCCURRING IN BREEDING SITES OF NATIVE, EXOTIC, AND MIXED HABITATS

General breeding habitat category	Sites	Territories
Native (>90% Native)	69 (31%)	468 (48%)
Mixed Mostly Native (>50–90% Native)	70 (32%)	231 (23%)
Mixed Mostly Exotic (>50–90% Exotic)	45 (20%)	161 (16%)
Exotic (>90% Exotic)	12 (5%)	90 (9%)
Unknown	25 (12%)	36 (4%)

Notes: Habitat classification is based on rough field estimates of the relative amount of native and exotic tree and shrub species present at the site (not in each specific territory). Data are for all known 1993–2001 breeding sites (N = 221); the number of territories is based on last available survey data for each site (N = 938 territories). Numbers in parentheses are the percentage of total for that category.

TABLE 5. NUMBER OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES OCCURRING IN BREEDING SITES DOMINATED BY DIFFERENT TREE SPECIES, BASED ON THE PREDOMINANT TREE OR SHRUB SPECIES PRESENT AT THE SITE (NOT IN EACH SPECIFIC TERRITORY)

Dominant tree species	Sites	Territories
Willow (*Salix*)	123 (56%)	541 (55%)
Saltcedar (*Tamarix*)	55 (25%)	243 (25%)
Boxelder (*Acer*)	1 (0.5%)	126 (13%)
Cottonwood (*Populus*)	8 (4%)	12 (1%)
All others	34 (15%)	64 (6%)

Notes: Data are for all known 1993–2001 breeding sites (N = 221); the number of territories is based on last available survey data for each site (N = 986 territories). Numbers in parentheses are the percentage of total for that category.

TABLE 6. NUMBER OF SOUTHWESTERN WILLOW FLYCATCHER BREEDING SITES AND TERRITORIES OCCURRING AT BREEDING SITES UNDER DIFFERENT OWNERSHIP/ADMINISTRATIVE CATEGORIES

Administration category	Sites	Territories
Federal government	99 (45%)	483 (48%)
Privately owned	57 (26%)	362 (37%)
State/local/municipal government	24 (11%)	57 (6%)
Tribal government	14 (6%)	44 (5%)
Unknown	27 (12%)	40 (4%)

Notes: Data are for all known 1993–2001 breeding sites (N = 221); the number of territories is based on last available survey data for each site (N = 986 territories). Numbers in parentheses are the percentage of total for that category.

19% occur in Mixed—Mostly Exotic sites, and Exotic sites support 11%.

DOMINANT TREE SPECIES AT BREEDING SITES

Because flycatcher breeding sites are often spatially complex mosaics of different tree species, and flycatchers often use only a part of the patch, the dominant tree species may differ between a patch and an individual territory within that patch. Generally, detailed territory-based habitat measurements are lacking for most Southwestern Willow Flycatcher breeding sites. Despite this limitation, it is useful to characterize the dominant tree species within known flycatcher breeding sites. To determine the degree to which flycatchers breed in habitats dominated by particular tree species, we tallied the number of territories occurring in breeding sites dominated by particular tree species. More territories were found at sites dominated by willow (*Salix* spp.) than by any other species (Table 5). Saltcedar (*Tamarix ramosissima*)-dominated sites support 25% of territories, and boxelder (*Acer* spp.)-dominated sites accounted for 13%. Taken together, sites dominated by all other tree species account for only 6% of territories. The large percentage of territories located in boxelder-dominated habitats might suggest that boxelder sites are widely used across the Southwestern Willow Flycatcher's range. However, boxelder-dominated breeding habitats occur only in the Cliff-Gila Valley, New Mexico. Removing that site from the analysis, no territories are found in boxelder dominated habitats, and the proportions of rangewide territories at willow and saltcedar sites increase to 63% and 28%, respectively.

ADMINISTRATION/MANAGEMENT OF SITES AND TERRITORIES

Another factor important in conservation and recovery planning is the nature of ownership or administration of a site. Slightly less than half of known breeding sites are under federal government administration and 26% are on privately owned lands (Table 6). State/local/municipal governments account for another 11% of sites, and 6% are administered by Native American tribes. Private lands account for 37% of territories, underscoring the importance of developing partnerships between the federal government and other landowners to encourage flycatcher conservation and recovery efforts. About one-third (35%) of the flycatcher territories on privately-owned lands are in the Cliff-Gila Valley, New Mexico.

CONCLUSIONS

Extensive flycatcher surveys conducted between 1993 and 2001 located many flycatcher breeding sites and territories that were not known when Unitt (1987) formulated the first rangewide population estimate for *E. t. extimus*. However, the reported population still falls within the upper end of Unitt's estimate of 500–1000 pairs, and is low enough that the status of the flycatcher remains a concern. Of particular concern is the fact that so many flycatcher breeding sites are small in terms of the number of breeding territories, and in the actual size of the habitat patch. Small populations and habitat patches are highly susceptible to loss due to natural events and human activities, and 61 small breeding sites have been lost since 1993. Even comparatively large populations have been impacted by human-related causes such as fire and flooding (Marshall 2000), and similar losses may occur in the future.

Although recent flycatcher surveys have covered large portions of potential Southwestern Willow Flycatcher breeding habitat (especially in the core of its range: Arizona, California, New Mexico), much riparian habitat remains to be surveyed, particularly on private and tribal

lands. Even basic presence/absence data are missing for southwestern Texas and the northern portions of Baja California and Sonora, Mexico. A better accounting of the distribution and abundance of the flycatcher, and continued surveys and synthesis of rangewide data, are clearly needed for effective Southwestern Willow Flycatcher management and conservation.

Rangewide population trends are obscured by variations in annual survey effort and locations, so we do not know if the overall population increased, decreased, or remained stable from 1993 to 2001. Even at a more local scale (e.g., drainages or individual breeding sites), trends are generally impossible to discern because not all sites are surveyed each year, survey effort is not equal among years, new sites are still being discovered in newly surveyed areas, and individual birds move among sites. These limitations occur primarily because the flycatcher was only recently listed as endangered; thus, there has been limited time to develop baseline data. Furthermore, surveys are often initiated by regulatory requirements associated with various development projects, and thus occur in a piecemeal fashion. Hopefully, management and regulatory agencies will develop and implement a more coordinated and programmatic survey program such that temporal trends can be determined (USFWS 2002).

Some breeding site characteristics highlight Southwestern Willow Flycatcher conservation and recovery opportunities. The wide geographic distribution of breeding sites, and their location on numerous different river drainages offers protection against wholesale loss from large-scale or local catastrophic events. Its widespread distribution also benefits recovery efforts by providing more geographic locations at which habitat can be created or restored in close proximity to currently occupied sites (thus increasing the potential for colonization of the new site). The fact that flycatchers will occupy small habitat patches (e.g., <10 ha) means that the flycatcher may benefit from small-scale riparian protection and/or restoration programs, as well as larger (and typically more expensive) projects. Because flycatchers breed in a variety of riparian habitat types (including native and some exotic vegetation), there are more habitat restoration options available than would be the case if flycatcher habitat use was restricted to the historical willow-cottonwood associations. The presence of so many flycatchers on non-government lands provides many opportunities for government-private partnerships to protect and enhance flycatcher populations and habitats.

The data we present raise some important questions for which additional research is warranted. Are flycatchers breeding in groups or clusters of small breeding sites collectively as productive as one larger site? How does habitat type influence flycatcher productivity and survival? With saltcedar being such a prevalent habitat component at many flycatcher breeding sites, what are the ramifications of saltcedar control and/or conversion to native habitats? The answers to these and the other questions highlighted above are important for effectively planning and implementing Southwestern Willow Flycatcher conservation and recovery.

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