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Southwestern Willow Flycatcher Breeding Site and Territory Summary – 2004

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Southwestern Willow Flycatcher Breeding Site and Territory Summary - 2004

Introduction

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is an endangered bird that breeds only in dense riparian habitats in six southwestern states (southern California, extreme southern Nevada, southern Utah, southwestern Colorado, Arizona, and New Mexico). Since 1993, hundreds of Southwestern Willow Flycatcher surveys have been conducted each year, with many new flycatcher breeding sites located. This document synthesizes information on all known Southwestern Willow Flycatcher breeding sites, and is used primarily as a tool for the U.S. Fish and Wildlife Service's (USFWS) Southwestern Willow Flycatcher Recovery Team.

This rangewide data synthesis was designed to meet these objectives:

1 – identify all known Southwestern Willow Flycatcher breeding sites, and
2 – assemble data on population size, location, habitat, and other information for all breeding sites, for as many years as possible, from 1993 through 2004.

This report provides data summaries in terms of the number of flycatcher sites and the number of territories. When interpreting and using this information, the following must be kept in mind:

A site is a location where one or more Willow Flycatchers establish a territory in which they attempt 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 five different sites in one state, but only a single site in another state. This lack of standardization makes comparisons based on "site" problematic. For this report, we deferred to 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, for purposes of this report a territory is roughly equivalent to a pair of flycatchers. The concept of territory is more similar among states and different investigators, thus it is a more "robust" unit to use for summaries and comparisons.

For each breeding site, we referred to reports or spoke directly with researchers and managers to gather information such as management entity/agency, location (state, drainage, elevation), gross habitat type (native, exotic, or mixed; dominant tree species), and flycatcher population size (number of territories).

Gathering and synthesizing the information on more than 200 breeding sites was made more difficult because annual survey reporting requirements are not standardized range-wide, and the nature and degree of readily available information varied widely from state to state. Some states have produced detailed statewide annual summary reports based on standardized data sheets submitted by surveyors; these resources were tremendously helpful in producing this report. Synthesizing survey data was more challenging for areas where surveyors either are not required to submit standardized flycatcher survey forms, or fail to do so. The lack of consistent reporting makes it difficult to determine precise survey locations, compare locations between years, standardize site names, and evaluate site-specific characteristics. It also introduces long delays in access to basic site and population information.

This report includes all flycatcher breeding sites reported between 1993 and 2004. 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, 122 sites that had no flycatchers in the most recent survey year (as judged by the agencies consolidating statewide survey data) are still 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.

We sincerely thank the many people who generously provided information from the sites they were surveying and monitoring (see following sections listing data sources and contacts and acknowledgements). Every effort was made to locate and include all survey information for every known Southwestern Willow Flycatcher breeding site; however, due to delays in reporting for some sites, some 2004-season survey information may not be available until after this report is produced (October 2005). Also, there may be some extant sites that have not yet been reported and are therefore not included herein. New 2004 survey information that is not included herein will be incorporated in future rangewide reports. Hopefully, the preparation and dissemination of this report will prompt additional and more comprehensive reporting, such that future annual rangewide summaries become more complete with each iteration.

Additional Considerations in Using and Interpreting the Data in this Report: 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 should be interpreted and used in context. Following is a discussion of cautions to consider when using these data.

Subspecies status of each site: The Willow Flycatcher sites entered into this database all fall within the geographic range of the southwestern subspecies (*E.t. extimus*), as defined by Unitt (1987), Browning (1993), Sogge et al. (1997), and USFWS (2002). Recent studies of flycatcher genetics (e.g., Paxton 2000) and song patterns (e.g., Sedgwick 2001) support a more southern range boundary for *E.t. extimus* than was used for the 1999 summary (Sogge et al. 2000). Future research may provide more insight into subspecies range boundaries; therefore, additional sites 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 rangewide comparisons among years.

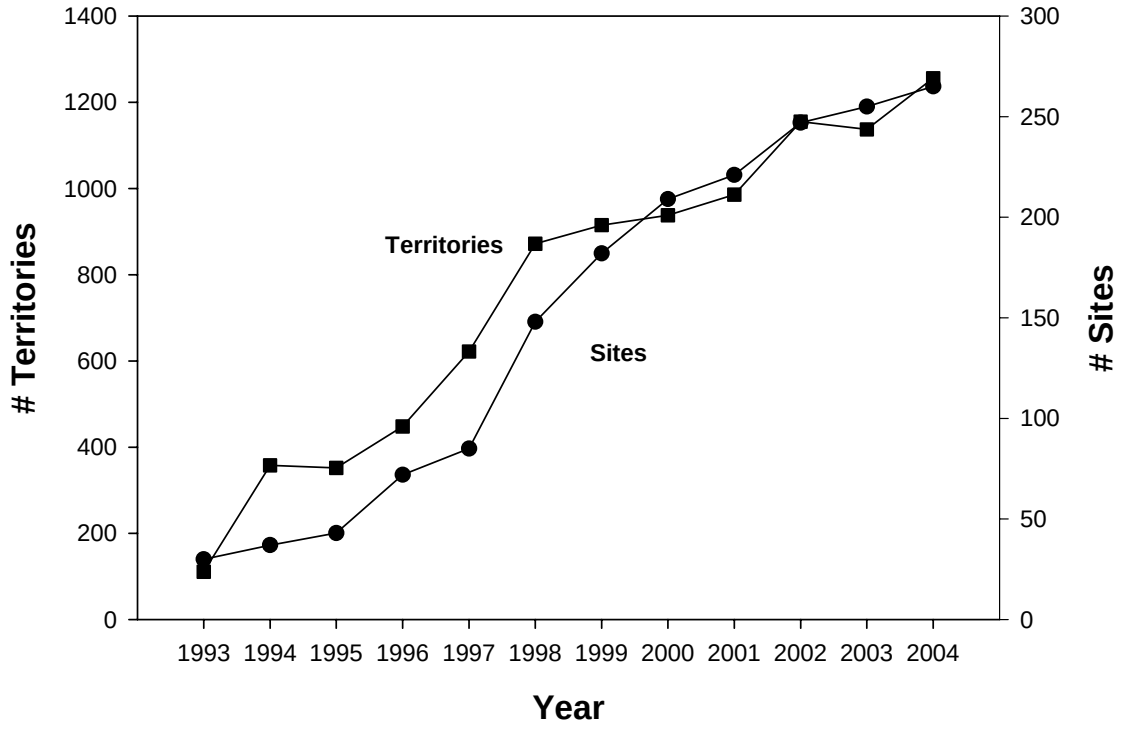
Population estimates: Population estimates are just that – **estimates**. Their accuracy and precision vary with survey effort, surveyor experience, habitat density, flycatcher behavior, and even background noise levels. The population estimates often represent the minimum number of flycatchers present; i.e., if surveyors suspected 12 to 14 flycatchers, the lower (more conservative) number was used. Therefore, although estimates may be very accurate for some intensively surveyed sites, the overall statistics presented in this report should be recognized as approximate.

DATA SUMMARIES

Changes in the number of known territories over time

Since 1993, extensive survey effort in Arizona, California, Colorado, Nevada, New Mexico and Utah has greatly increased the number of known breeding sites and breeding territories. From a 1993 estimate of roughly 30 sites and 111 territories, we now have data for 265 sites and 1256 territories (Figure 1). This increase should NOT be interpreted entirely as a Southwestern Willow Flycatcher population increase. Rather, it is to a great extent 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. Determination of trends (positive or negative) can be made in only a few cases, and original data sources (e.g., reports, survey data sheets, etc.) must be consulted when trying to elucidate population trends.

FIGURE 1
Number of known breeding sites and territories, 1993 – 2004.



Recency of survey data

The information used in this report is based on the most recent available survey data for each site. However, not all sites are surveyed every year. Of the 265 sites where Southwestern Willow Flycatchers have occurred since 1993, only 147 sites were surveyed in 2004. Although there are some sites that do not include recent survey data, 77% of known sites have been surveyed since 2002. The estimated total number of territories (1256) is based on the summed number of territories detected during the most recent surveys at the 265 known sites. While the estimated total number of territories includes some sites that have not been recently surveyed, sites surveyed since 2002 account for 92% of the rangewide estimated total number of flycatcher territories. Thus, the information used for most of the statistics reported herein is quite recent.

Table 1. Most recent year of survey data for sites and territories included in this report.

Year	# Sites	% Total Sites (n = 265)	# Territories	% Total Territories (n = 1256)
1993	1	0.4	2	0.2
1994	1	0.4	0	0.0
1995	1	0.4	1	0.1
1996	2	0.8	5	0.4
1997	4	1.5	5	0.4
1998	8	3.0	8	0.6
1999	6	2.3	6	0.5
2000	7	2.6	11	0.9
2001	31	11.7	65	5.2
2002	26	9.8	32	2.5
2003	31	11.7	129	10.3
2004	147	55.5	992	79.0

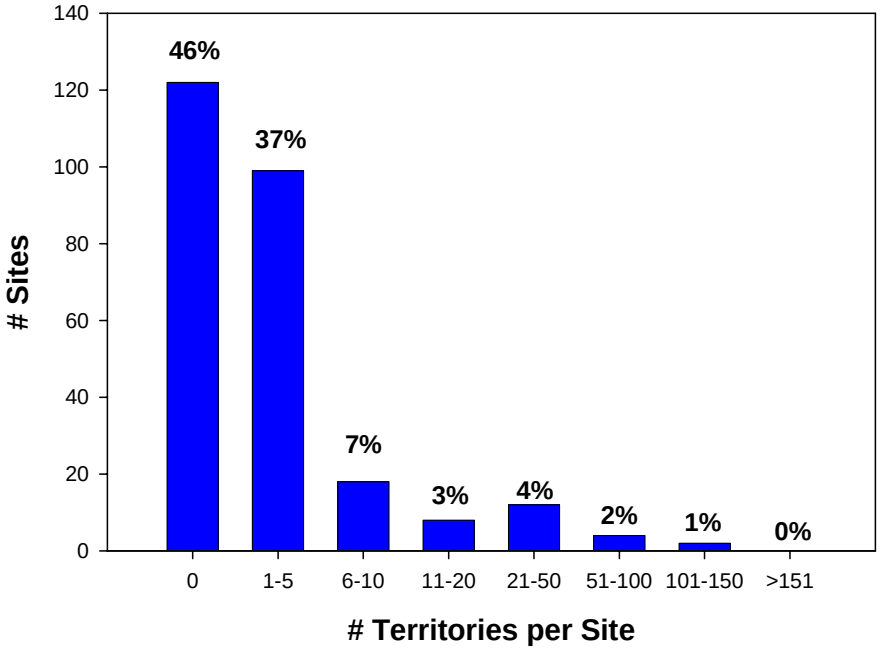
Population sizes of breeding sites

Most Southwestern Willow Flycatcher breeding sites are small, both in terms of population size (hosting five or fewer territories: Figure 2) and habitat patch size. Such small sites are theoretically more susceptible to extirpation, and there is evidence to support this case. Willow Flycatchers have disappeared from 122 of the 265 sites tracked since 1993. All but two of these extirpated sites were composed of five or fewer territories. The two exceptions – Colorado River inflow to Lake Mead, and PZ Ranch on the San Pedro River – were larger sites where habitat was destroyed by flooding and fire, respectively.

Not all birds at these extirpated sites necessarily died. – some of these birds moved to other sites where they attempted to establish breeding territories. We know this is the case for banded flycatchers that moved from the Verde River Tuzigoot Bridge and PZ Ranch to other sites (Paxton and Sogge 1996, Paxton et al. 1997, Netter et al. 1998).

If we look again at the size distribution of breeding sites and exclude the extirpated sites, the picture remains much the same - the vast majority of sites (99 of 143; 69%) have five or fewer territories. Because most of the 122 extirpated sites had very small populations (usually only one or two territories), their loss does not greatly affect the overall rangewide territory estimates, nor many of the territory statistics that we report herein.

Figure 2
Size of Willow Flycatcher Breeding Sites, all sites 1993 – 2004.



Distribution of territories by state

Arizona, New Mexico, and California account for the greatest number of known Southwestern Willow Flycatcher sites and territories (Table 2). Nevada, Colorado, and Utah account for only about 11% of territories, primarily because these states have few known Willow Flycatcher breeding sites occurring far enough south to fall within the range of *E.t. extimus*. Texas is absent from this table because there were no recent survey data or other records to shed light on current status and distribution within the state. We believe this is an unfortunate data gap and hope that coordinated survey work is soon initiated within southwestern Texas.

Table 2. The number of Southwestern Willow Flycatcher breeding sites and territories by state, as of 2004.

State	# Sites	% of Total Sites	# Territories	% of Total Territories
AZ	112	42.3	544	43.3
CA	91	34.3	200	15.9
CO	10	3.8	65	5.2
NM	36	13.6	372	29.6
NV	13	4.9	68	5.4
UT	3	1.1	7	0.6
TOTAL	265		1256	

Distribution of territories by drainage

More flycatcher territories are found along the Gila River than any other major drainage (Table 3); one of the largest known populations (in the Cliff-Gila Valley, NM) contributes many of the territories within this drainage. Elsewhere in New Mexico, and in southwest Colorado, most territories are along the Rio Grande. The primary flycatcher drainages in California are the Kern, Owen's, San Luis Rey, Santa Ana, and Santa Margarita rivers. In Arizona, most flycatchers are found along the Gila, San Pedro, and Salt River drainages. The Virgin River drainage supports the majority of flycatchers in Utah. The Virgin River and the Pahranagat River support most of the flycatchers in Nevada. Sites along the Colorado River are in Arizona, California, and Utah.

Table 3. The number of Southwestern Willow Flycatcher breeding sites and territories by major river drainage, as of the 2004 breeding season.

DRAINAGE	# Sites	% of Total Sites	# Territories	% of Total Territories
Colorado River	40	15.1	40	3.2
Gila River	41	15.5	242	19.3
Kern River	2	0.8	20	1.6
Owen's River	5	1.9	28	2.2
Pahranagat River	4	1.5	28	2.2
Rio Grande	24	9.1	216	17.2
Salt River	6	2.3	138	11.0
San Luis Rey River	8	3.0	59	4.7
San Pedro River	17	6.4	166	13.2
Santa Ana River	27	10.2	36	2.9
Santa Margarita River	3	1.1	24	1.9
Virgin River	8	3.0	47	3.7
All others	80	30.2	212	16.9
Total	265		1256	

Distribution of territories by Recovery Unit

We tallied the number of breeding sites and territories by Recovery Unit and Management Unit (Table 4), as defined in the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002). Note that in some Management Units, the number of territories is **less than** the number of sites; this occurs where Management Units include primarily small sites, one or more of which no longer contains territorial flycatchers as of the most recent survey ("extirpated" sites).

Table 4. The currently known number of flycatcher breeding sites and territories (as of 2004 data), by Recovery Unit and Management Unit.

Recovery Unit	Management Unit	# of Sites	# of Territories
Basin and Mojave	Owens	5	28
	Kern	2	20
	Amargosa	2	1
	Mojave	6	3
	Salton	1	4
	TOTAL	***16***	***56***
Coastal California	Santa Ynez	4	7
	Santa Clara	12	10
	Santa Ana	30	36
	San Diego	23	91
	TOTAL	***69***	***144***
Gila	Verde	6	19
	Hassayampa - Agua Fria	2	1
	Roosevelt	7	196
	San Francisco	2	3
	Upper Gila	18	228
	Gila – San Pedro	40	186
	Santa Cruz	1	0
	TOTAL	***76***	***633***
Lower Colorado	Pahranagat	6	29
	Virgin	7	46
	Little Colorado	4	6
	Middle Colorado	20	4
	Hoover - Parker	6	35
	Bill Williams	9	61
	Parker – Southern. Intl Boundary	15	1
	Amargosa	1	1
	TOTAL	***68***	***183***
Rio Grande	San Luis Valley	6	57
	Upper Rio Grande	15	31
	Middle Rio Grande	8	138
	Lower Rio Grande	2	6
	TOTAL	***31***	***232***
Upper Colorado River	Upper San Juan	5	8
	Lower San Juan	0	0
	Powell	0	0
	TOTAL	***5***	***8***
GRAND TOTAL		**265**	**1256**

Elevational range of breeding territories

The Southwestern Willow Flycatcher is distributed over a wide elevational range. The majority of sites occur between 0 and 1000 m elevation (Figure 3a). Most territories are found between 0 and 1600 m (Figure 3b), with "spikes" at 601-800 m (the Gila/San Pedro River confluence and Roosevelt Lake in AZ) and 1401-1600 m (the Cliff-Gila Valley in NM). Although relatively few territories are known to occur above 2000 m elevation, Willow Flycatchers breed at four sites that are above 2500 m.

Figure 3.

Figure 3a. The percentage of flycatcher breeding sites located at different elevations, 1993 – 2004 (200 = 0 - 200 m, 400 = 201 - 400 m, etc.).

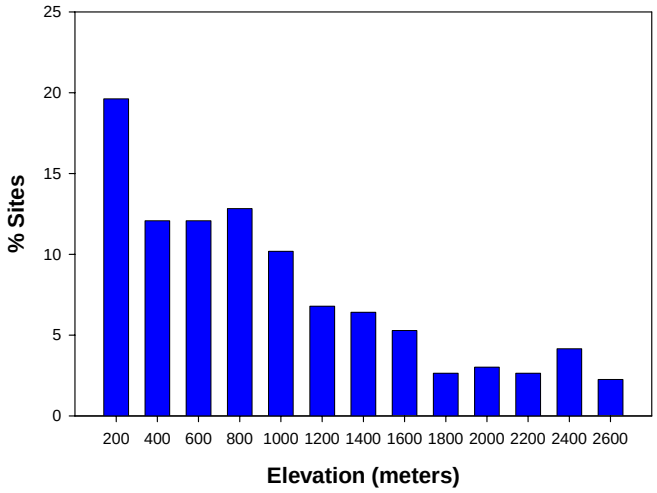
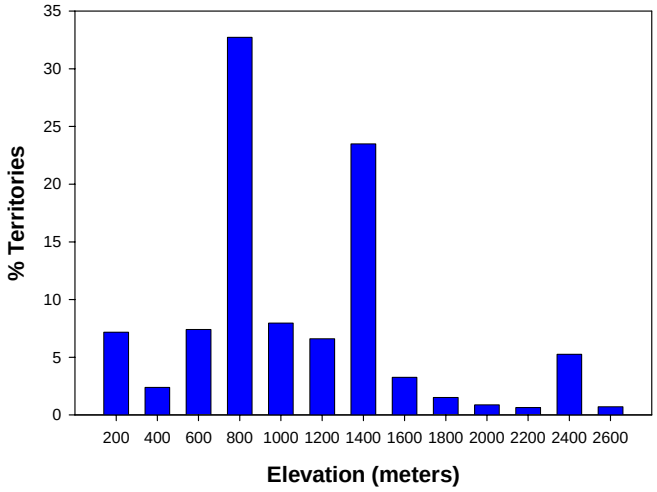


Figure 3b. The percentage of flycatcher territories occurring at differing elevations, 1993 – 2004 (200 = 0 - 200 m, 400 = 201 - 400 m, etc.).



Use of native and exotic habitats

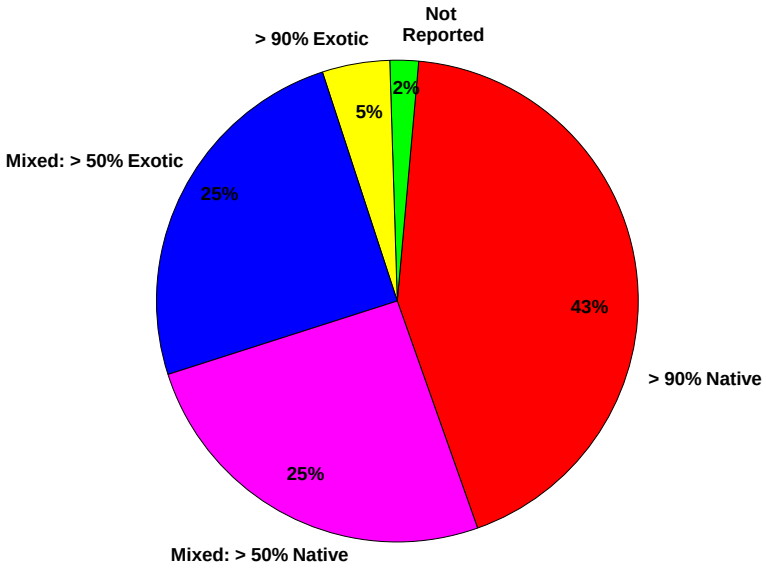
Many (perhaps most) flycatcher breeding sites are comprised of spatially complex habitat mosaics, often including both exotic and native vegetation. Within a site, flycatchers often use only a part of the patch, with territories frequently clumped and/or distributed near the patch edge. Therefore, the 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 important to characterize the use of native and exotic habitats. To do so, we classified the habitat at each site into one of four broad categories, based on the overall species composition of the tree/shrub layer(s) of the site. The categories were:

Native	(>90% native vegetation)
Mixed – >50% Native	(50-90% native vegetation)
Mixed – >50% Exotic	(50-90% exotic vegetation)
Exotic	(>90% exotic vegetation)

Habitat patches comprised of Native vegetation account for less than half (43%) of the known flycatcher territories (Figure 4). Although only 5% of territories occur at Exotic sites, another 50% are located within sites where the habitat includes native/exotic mixtures. In many of these cases, exotics are contributing significantly to the habitat structure by providing the dense lower-strata vegetation that flycatchers prefer.

Figure 4.
Percentage of flycatcher territories occurring within breeding sites of differing compositions of native and exotic vegetation, as of the 2004 breeding season.



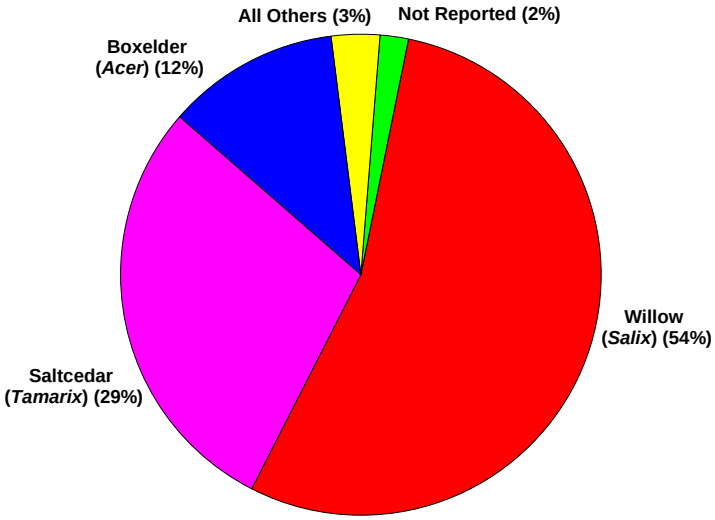
Dominant tree species at breeding sites

Most flycatcher breeding sites are comprised of spatially complex mosaics of different tree species. Within a site, flycatchers often use only a part of the patch, with territories frequently clumped and/or distributed near the patch edge. Therefore, 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 the majority of Southwestern Willow Flycatcher breeding sites. Despite this limitation, it is useful to characterize the dominant tree species within known flycatcher breeding sites.

To characterize 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. Over half (54%) of territories are found at sites where willow (*Salix spp*) is the dominant tree species (Figure 5). More than 25% of territories are located at sites where saltcedar (*Tamarix spp*) predominates, and 12% are in patches where boxelder (*Acer spp*) is the most common habitat component. Taken together, sites dominated by all other tree species account for only about 3% 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 (Stoleson and Finch 2003).

Figure 5.
Percentage of flycatcher territories occurring within breeding sites dominated by particular tree species, as of the 2004 breeding season.



Administration/management of sites and territories

One factor important in conservation and recovery planning is the nature of ownership or "administration" of a site – e.g., whether management of the site is the responsibility of private landowners, the government, or some other entity. We examined this in two ways – first by site, then by territory.

By Site (Figure 6a): Forty-four percent of known breeding sites are under federal government administration, and 27% are on privately owned lands. State/local/municipal governments account for another 14% of sites, and 5% are administered by Native American tribes.

By Territory (Figure 6b): Federal lands account for 54% of flycatcher territories, and private for 37%. This underscores the importance of working with private landowners as flycatcher conservation and recovery efforts proceed. Roughly a third (33%) of the flycatcher territories found on privately owned lands are in the Cliff-Gila Valley, New Mexico.

Figure 6

Figure 6a. Percentage of flycatcher breeding sites found under different land ownership, as of the 2004 breeding season.

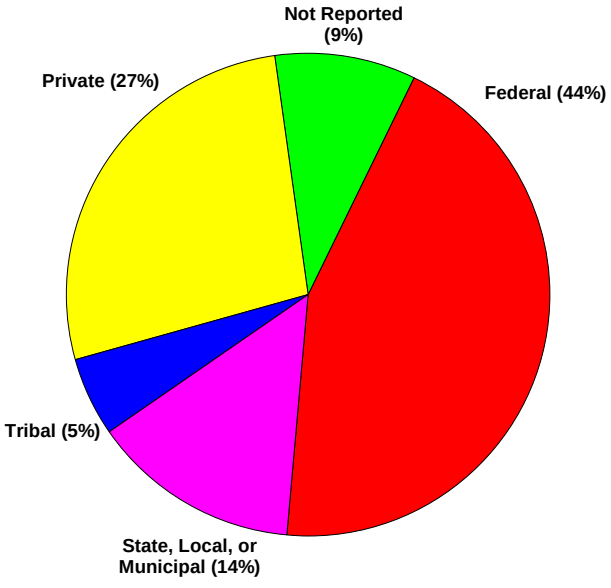
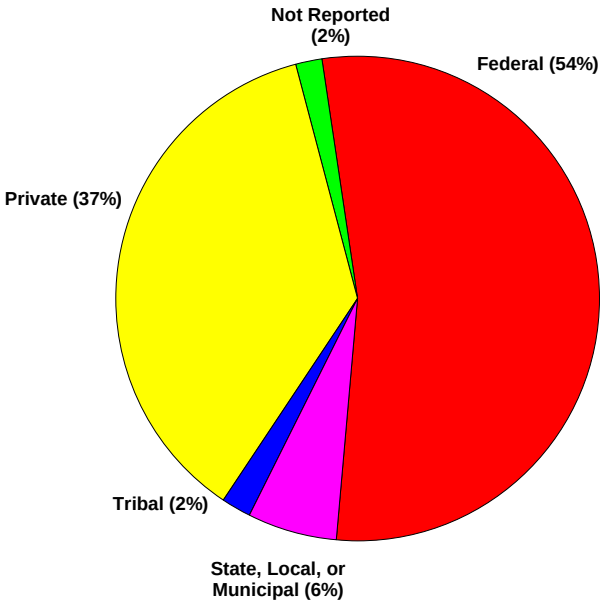


Figure 6b. Percentage of flycatcher territories found under differnet land ownership, as of the 2004 breeding season.



SUMMARY: 2004

- We have learned of many new breeding sites and territories since the early 1990s, due to extensive survey efforts throughout the southwest. In 1993, there were only 111 known territories distributed among 30 breeding sites. The current count (as of 2004) is 1256 territories located among 265 sites (but remember the earlier caution about lack of standard definition for "site").

- Most territories are found within small breeding sites (those sites with five or fewer territories). There are only six sites with 50 or more territories, though this comparison is confounded by lack of a standard definition of site.

- We know of 122 sites that have been "extirpated" since 1993 - almost all were very small sites (five or fewer territories). Because these were primarily small sites, these extirpations account for only a small percentage of known territories; however, they underscore the vulnerability of small sites to extirpation.

- The states of California, Arizona, and New Mexico account for 89% of known flycatcher territories. Nevada, Colorado, and Utah collectively have 11% of the known territories. We know virtually nothing about the current status of the Southwestern Willow Flycatcher in Texas.

- Southwestern Willow Flycatchers are distributed over a wide elevation range, with most from sea level to 1600 m, but a few sites (n=4) are located as high as 2500 m in elevation.

- Less than half (43%) of territories are in native habitat and 30% are in habitats having a 50% or greater exotic component. A large percentage of the native habitat territories occur at one site – the Cliff-Gila Valley in New Mexico. Over 90% of territories are in habitats where willow, saltcedar, or boxelder are the dominant tree species; flycatchers breed in boxelder-dominated habitats only in the Cliff-Gila Valley, New Mexico.

- Less than half (44%) of sites are on federally-controlled lands and 27% are on private lands; these privately owned sites account for 37% of known territories. Approximately one-third (33%) of territories on privately owned sites are found in the Cliff-Gila Valley, New Mexico.

Acknowledgements

This synthesis of data from so many sites over such a broad geographic range was only made possible by the efforts of numerous cooperators. Originally, these data were gathered by hundreds of agency and non-governmental biologists surveying for thousands of hours, often in very difficult field conditions. Their dedication and efforts are greatly appreciated. Further, the ability to report specific information for each site was aided by agencies and people that provided detailed summary information; our sincere thanks go to the individuals listed below.

For Arizona: Alex Smith, Oliva Munzer and April Tudor (all of the Arizona Game and Fish Department); and Kerry Christensen (Hualapai Tribe). **For California**: Kerry Kenwood and Jay Rourke (USGS), Peter Bloom, Mary Anne McLeod and Tom Koronkiewicz (SWCA, Inc.), Pete Famolaro (Sweetwater Authority); Jim Greaves; William Haas (Varanus Biological Services); Loren Hays (USFWS); Mark Holmgren; David Perekesta (USFWS); and Mary Whitfield (Kern River Research Center). **For Colorado**: Mike Fitzgerald Kelli Stone, and Terry Ireland (USFWS), Jill Lucero (BLM), Lynn Alterman (Ecosphere), and Mike Stake (Hawks Aloft). **For Nevada**: Jeri Krueger (USFWS), Robert McKernan (SBCM), Cris Tomlinson (Nevada Division of Wildlife); Mary Anne McLeod and Tom Koronkiewicz (SWCA, Inc.) **For New Mexico**: Darrel Ahlers and Larry White (US Bureau of Reclamation); and Pat Zenone (USFWS). **For Utah**: Keith Day (BLM) and Frank Howe (Utah Division of Wildlife Resources).

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