

Southwestern Willow Flycatcher Breeding Site and Territory Summary – 2003

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Introduction

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is an endangered bird that is known to breed 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 Willow Flycatcher surveys have been conducted each year, and many new flycatcher breeding sites located. This document arose from efforts to synthesize information on all known Southwestern Willow Flycatcher breeding sites, primarily as a tool for the U.S. Fish and Wildlife Service's (USFWS) Southwestern Willow Flycatcher Recovery Team. Established in 1998, this team depends on access to all available current information in order to effectively plan for the conservation and recovery of the flycatcher.

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 2003.

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 defined as 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 as five different sites in one state, but as only a single site in another state. This makes comparison of information based on “site” problematic. For this report, 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.

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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 between states and among different investigators, so this 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. Most states and USFWS regions require standard data sheets be submitted each year, and produce detailed statewide summary reports; these resources were tremendously helpful in producing this report.

Synthesizing annual Willow Flycatcher survey data was more challenging for areas such as California. There, the USFWS does not require that surveyors submit the standardized flycatcher survey forms; this makes it difficult to determine precise survey locations, compare locations between years, standardize site names, and get important data on site characteristics. It also introduces long delays in access to even the most basic site and population information. The lack of standardized, annual state-based synthesis and reporting is the most immediate obstacle to rangewide synthesis of data. The rangewide compilation of data would be more accurate and efficient if the USFWS in California adopted the same survey reporting requirements that have implemented in USFWS Region 2.

This report includes all flycatcher breeding sites reported between 1993 and 2003. 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, 90 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.

Every effort was made to locate and include all survey information for every known Southwestern Willow Flycatcher breeding site, and 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). However, there may be some extant sites that have not yet been reported and are therefore not included herein. 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.

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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.

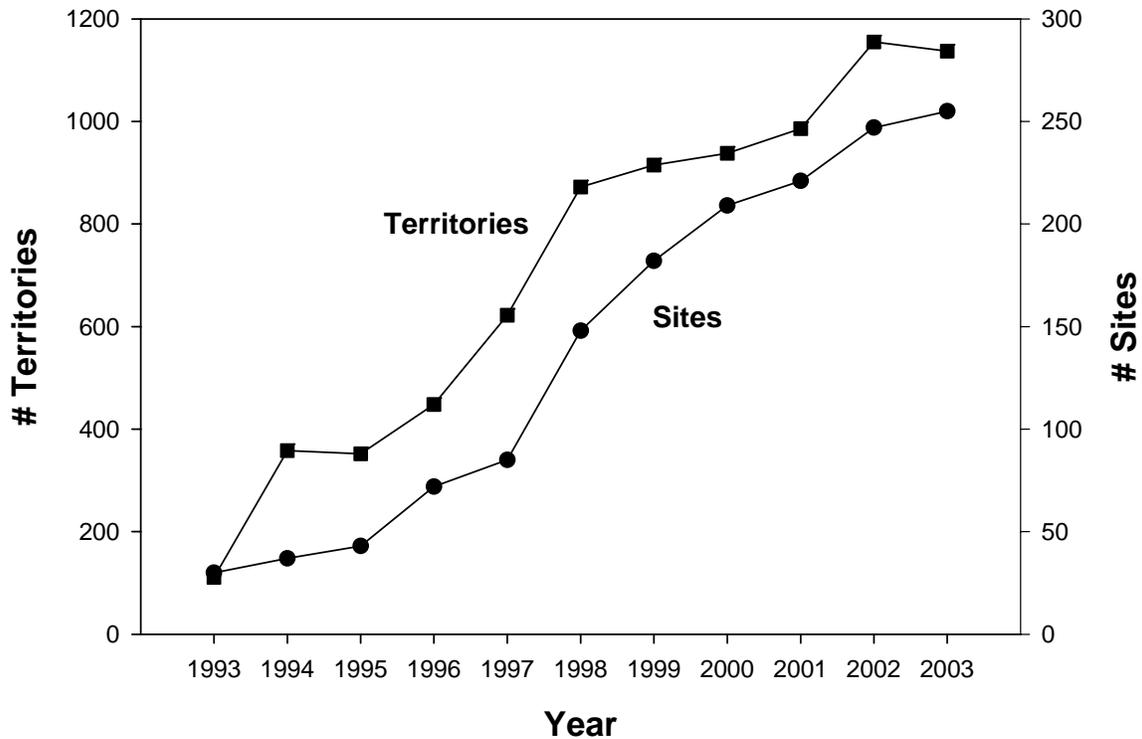
Population estimates: Population estimates are just that – **estimates**. Their accuracy and precision vary with survey effort, surveyor experience, habitat density, and even background noise levels. The population estimates often represent the minimum number of flycatchers present; i.e., if surveyors 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 255 sites and 1137 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 – 2003.



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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 flycatcher breeding sites are surveyed every year. Therefore, the information on some sites will be more current than for others. Of the 255 breeding sites included in this database/report, we have 2003 survey data for 147 sites (Table 1), and 2001 or 2002 data for another 71 sites. Thus our occupancy and population size estimates for 86% of known sites comes from surveys conducted within the last three years. These same surveys account for 95% of the total estimated number of flycatcher territories.

Table 1. The most recent year of available survey data for breeding sites and territories included in this report.

| Most recent year of survey data | # Sites | % Total Sites (n = 255) | # Territories | % Total Territories (n = 1137) |
|----------------------------------------|----------------|--------------------------------|----------------------|---------------------------------------|
| 1993 | 2 | 0.8 | 5 | 0.4 |
| 1994 | 1 | 0.4 | 0 | 0.0 |
| 1995 | 1 | 0.4 | 1 | 0.1 |
| 1996 | 2 | 0.8 | 4 | 0.4 |
| 1997 | 6 | 2.4 | 8 | 0.7 |
| 1998 | 8 | 3.1 | 8 | 0.7 |
| 1999 | 6 | 2.4 | 6 | 0.5 |
| 2000 | 11 | 4.3 | 29 | 2.6 |
| 2001 | 44 | 17.3 | 103 | 9.1 |
| 2002 | 27 | 10.6 | 24 | 2.1 |
| 2003 | 147 | 57.6 | 949 | 83.5 |

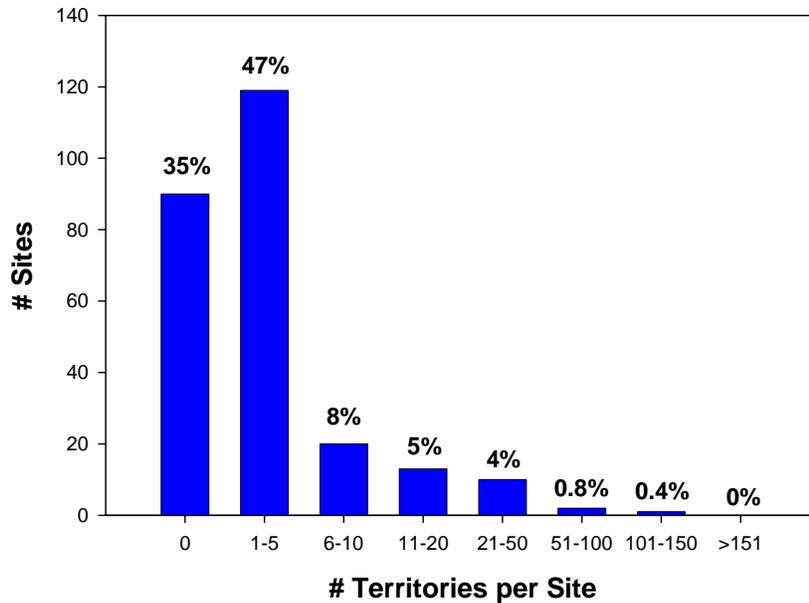
Population sizes of breeding sites

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 90 of the 255 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 may have moved elsewhere. 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 (119 of 165; 72%) have five or fewer territories. Because most of the 90 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 – 2003



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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 14% of territories, primarily because they 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 2003.

| State | # Sites | % of Total Sites | # Territories | % of Total Territories |
|--------------|----------------|-------------------------|----------------------|-------------------------------|
| AZ | 109 | 42.7 | 424 | 37.3 |
| CA | 85 | 33.3 | 228 | 20.1 |
| CO | 10 | 3.9 | 81 | 7.1 |
| NM | 36 | 14.1 | 330 | 29.0 |
| NV | 12 | 4.7 | 66 | 5.8 |
| UT | 3 | 1.2 | 8 | 0.7 |
| TOTAL | 255 | | 1137 | |

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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, and along with the Pahrnagat River, 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 2003 breeding season.

| DRAINAGE | # Sites | % of Total Sites | # Territories | % of Total Territories |
|-----------------------|----------------|-------------------------|----------------------|-------------------------------|
| Colorado River | 40 | 15.7 | 19 | 1.7 |
| Gila River | 41 | 16.1 | 229 | 20.1 |
| Kern River | 2 | 0.8 | 20 | 1.8 |
| Owen's River | 5 | 2.0 | 28 | 2.5 |
| Pahrnagat River | 4 | 1.6 | 25 | 2.2 |
| Rio Grande | 24 | 9.4 | 209 | 18.4 |
| Salt River | 5 | 2.0 | 111 | 9.8 |
| San Luis Rey River | 10 | 3.9 | 67 | 5.9 |
| San Pedro River | 17 | 6.7 | 143 | 12.6 |
| Santa Ana River | 24 | 9.4 | 40 | 3.5 |
| Santa Margarita River | 2 | 0.8 | 19 | 1.7 |
| Virgin River | 8 | 3.1 | 48 | 4.2 |
| All others | 73 | 28.6 | 179 | 15.7 |
| Total | 255 | | 1137 | |

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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 contain territorial flycatchers as of the most recent survey (e.g., “extirpated” sites).

Table 4. The currently known number of flycatcher breeding sites and territories (as of 2003 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 | 10 |
| | Salton | 1 | 2 |
| | TOTAL | 16 | 61 |
| Coastal California | Santa Ynez | 3 | 8 |
| | Santa Clara | 10 | 16 |
| | Santa Ana | 26 | 41 |
| | San Diego | 24 | 100 |
| | TOTAL | 63 | 165 |
| Gila | Verde | 6 | 15 |
| | Hassayampa - Agua Fria | 1 | 0 |
| | Roosevelt | 6 | 134 |
| | San Francisco | 2 | 3 |
| | Upper Gila | 18 | 203 |
| | Gila – San Pedro | 39 | 169 |
| | Santa Cruz | 1 | 0 |
| | TOTAL | 73 | 524 |
| Lower Colorado | Pahranagat | 6 | 27 |
| | Virgin | 7 | 46 |
| | Little Colorado | 4 | 5 |
| | Middle Colorado | 20 | 3 |
| | Hoover - Parker | 6 | 12 |
| | Bill Williams | 9 | 53 |
| | Parker – Southern International Boundary | 15 | 4 |
| | TOTAL | 67 | 150 |
| Rio Grande | San Luis Valley | 6 | 73 |
| | Upper Rio Grande | 15 | 43 |
| | Middle Rio Grande | 8 | 107 |
| | Lower Rio Grande | 2 | 6 |
| | TOTAL | 31 | 229 |
| Upper Colorado River | Upper San Juan | 5 | 8 |
| | Lower San Juan | 0 | 0 |
| | Powell | 0 | 0 |
| | TOTAL | 5 | 8 |
| GRAND TOTAL | | 255 | 1137 |

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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. 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 three sites that are above 2500 m.

Figure 3.

Figure 3a. The percentage of flycatcher breeding sites located at different elevations, 1993 – 2003 (200 = 0 - 200 m, 400 = 201 – 400 m, etc.).

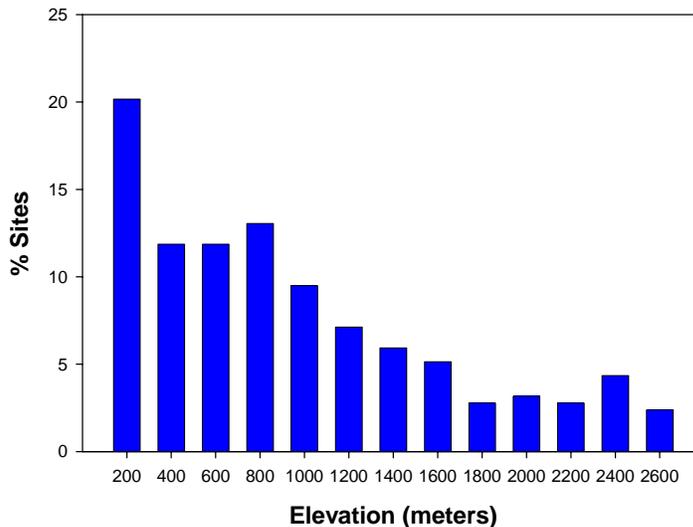
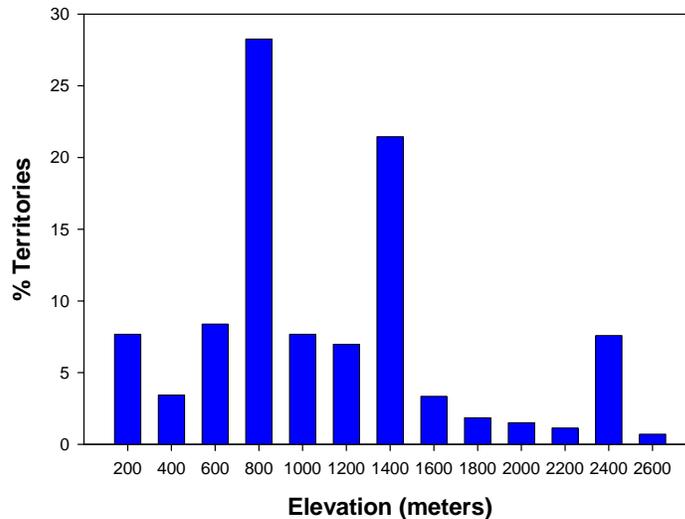


Figure 3b. The percentage of flycatcher territories occurring at differing elevations, 1993- 2003 (200 = 0 - 200 m, 400 = 201 – 400 m, etc.).



Use of native and exotic habitats

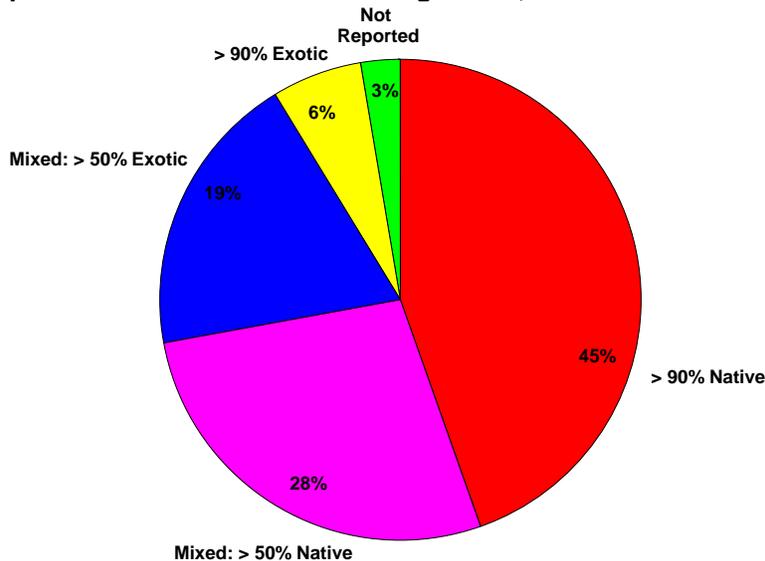
Many (perhaps most) flycatcher breeding sites are comprised of spatially complex habitat mosaics, often including both exotic and native vegetation. Within a site, flycatchers often use only a part of the patch, with territories frequently clumped and/or distributed near the patch edge. Therefore, the 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 slightly less than half (45%) of the known flycatcher territories (Figure 4). Although only 6% of territories occur at Exotic sites, another 47% 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 2003 breeding season.



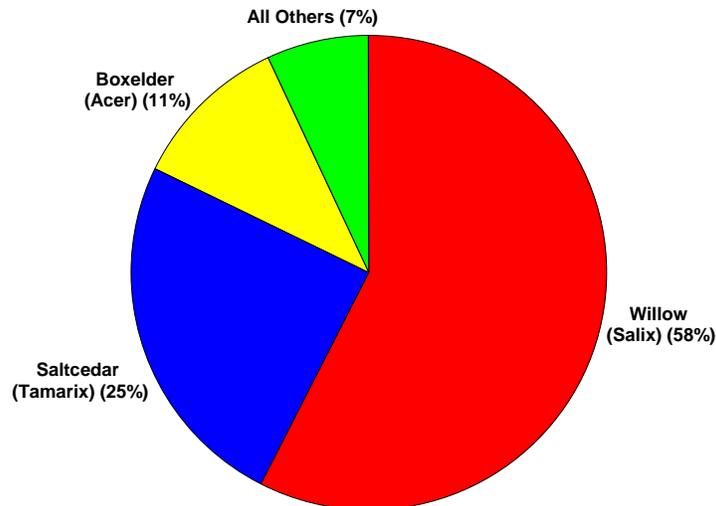
Dominant tree species at breeding sites

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 (58%) of territories are found at sites where willow (*Salix spp*) is the dominant tree species (Figure 5). One-fourth are located at sites where saltcedar (*Tamarix spp*) predominates, and 11% 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 7% 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 2003 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 13% of sites, and 5% are administered by Native American tribes.

By Territory (Figure 6b): Federal lands account for 51% of flycatcher territories, and private for 35%. 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 2003 breeding season.

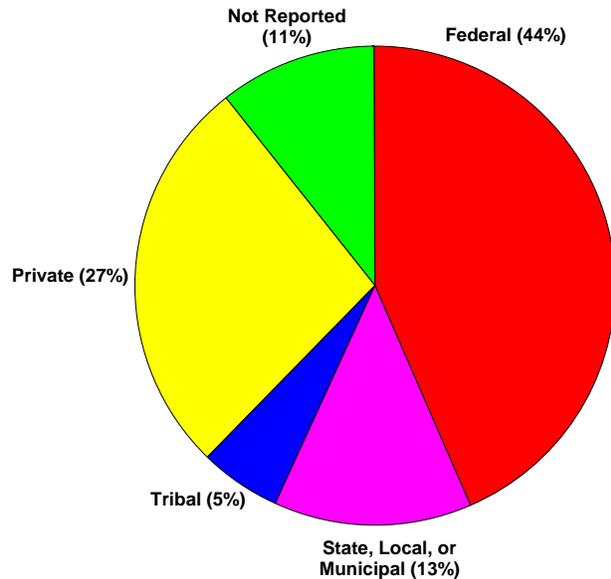
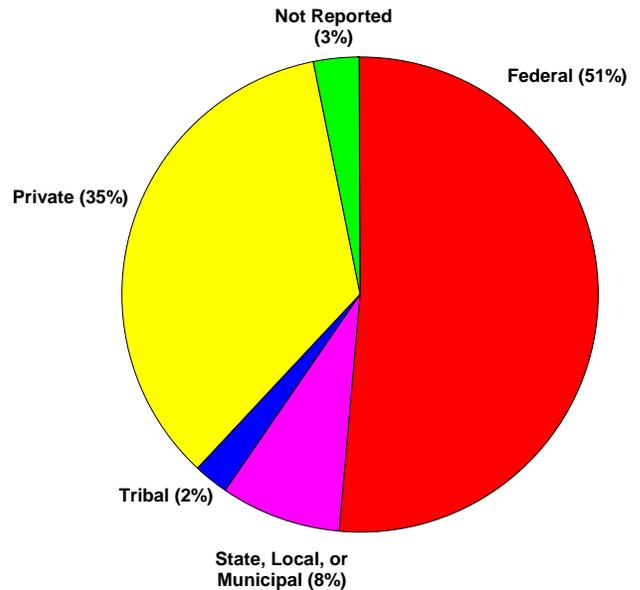


Figure 6b. Percentage of flycatcher territories found under different land ownership, as of the 2003 breeding season.



SUMMARY: 2003

- We have learned of many new breeding sites and territories since the early 1990s, thanks 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 2003) is 1137 territories located among 255 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 three sites with 50 or more territories, though this comparison is confounded by lack of a standard definition of site.
- We know of 90 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 86% of known territories. Nevada, Colorado, and Utah collectively have 14% 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.
- Slightly less than half (45%) of territories are in native habitat, while 25% 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.
- Slightly less than half (44%) of sites are on federally-controlled lands, while 27% are on private lands; these privately owned sites account for 35% of known territories. Approximately one-third (33%) of territories on privately owned sites are found in the Cliff-Gila Valley, New Mexico.

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Acknowledgements

A synthesis of data from so many sites over such a broad geographic range was only made possible by the efforts of a great many cooperators. Originally, these data were gathered by literally 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 and Charles Paradzick (all of the Arizona Game and Fish Department); Tim Tibbitts (National Park Service); and Kerry Christensen (Hualapai Tribe). **For California:** Kerry Kenwood (USGS), Peter Bloom, Gerald Braden (San Bernardino County Museum), Pete Famolaro (Sweetwater Authority); Jim Greaves; William Haas (Varanus Biological Services); Loren Hays (USFWS); Mark Holmgren, Robert McKernan (San Bernardino County Museum); David Perekesta (USFWS); and Mary Whitfield (Kern River Research Center). **For Colorado:** Mike Fitzgerald, Terry Ireland (USFWS), Jill Lucero (BLM), Kelli Stone (USFWS), Lynn Alterman (Ecosphere), and Mike Stake (Hawks Aloft). **For Nevada:** Jeri Krueger (USFWS), Robert McKernan (SBCM), Cris Tomlinson (Nevada Division of Wildlife). **For New Mexico:** Steve Albert (Pueblo of Zuni; Darrel Ahlers and Larry White (US Bureau of Reclamation); Scott Stoleson (US Forest Service); and Pat Zenone. **For Utah:** Keith Day (BLM) and Frank Howe (Utah Division of Wildlife Resources). Charles Drost (USGS), and Eben Paxton provided essential technical assistance with this database. This project was sponsored in part using federal funds from the U.S. Geological Survey and the U.S. Bureau of Reclamation (Phoenix Area Office).

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