SOUTHWESTERN WILLOW FLYCATCHER
2006 SURVEY AND NEST MONITORING REPORT

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EXECUTIVE SUMMARY

Purpose. The southwestern willow flycatcher (flycatcher) was federally listed as endangered in 1995. Probable factors contributing to population declines are loss, alteration, and fragmentation of native riparian breeding habitat, loss of wintering habitat, nest predation, and brood parasitism by brown-headed cowbirds. Prompted by concern for population declines, statewide surveys for the flycatcher were initiated in 1993. In 1996, the Arizona Game and Fish Department (AGFD) entered into a cooperative agreement with the U.S. Bureau of Reclamation (Reclamation) to conduct a 10-year project to fulfill mandates of the 1996 Biological Opinion related to the modification to Roosevelt Dam. One of the main objectives was to document effects of inundation at Roosevelt Lake on flycatcher dispersal and productivity. The lake rose to near capacity in 2005, presenting the first opportunity for AGFD and cooperating agencies to determine effects of inundation on flycatchers. In 2006, we extended our 10-year project for an 11th year to further investigate impacts of the 2005 inundation on flycatchers and their habitat. Results of the 2006 survey and nest monitoring effort are summarized in this report.

Surveys, Detections, and Distribution. AGFD and cooperators spent 2,590 hours surveying 203 sites covering approximately 388 linear km of riparian habitat. Because survey effort was much reduced in some key areas (e.g., sites at the San Pedro River study area that have formerly supported relatively large numbers of flycatchers) in 2006, statewide results should not be compared to previous years. Surveyors detected 624 resident flycatchers at 53 sites along 12 drainages. We located 351 flycatcher territories, with 276 pairs documented at 39 sites (the remaining 75 territories were classified as lone males, though mates may have been present, but not detected). The major concentrations at low elevations (<1,115 m) occurred at the Roosevelt Lake complex (Salt River study area and Tonto Creek study area), the San Pedro River/Gila River complex (San Pedro River study area and Gila River study area), and the Gila-Safford area. Resident flycatchers were documented at 3 high elevation (>2,400 m) sites: 2 on the Little Colorado River (River Reservoir and Greer Townsite) and 1 on the San Francisco River (Alpine Horse Pasture). Resident flycatchers were not documented at mid-elevation (between 1,115 m and 2,400 m).

Nesting Attempts and Nest Success. Statewide, surveyors documented 320 flycatcher nesting attempts at 36 sites throughout Arizona. Of these, 218 nests were monitored. Nest fate (success or failure) was determined for 210 nests within AGFD's study areas (Salt River and Tonto Creek, and Gila River) and cooperators' study sites with nest monitoring (Big Sandy River Downstream US 93, Monkey's Head, Topock Marsh, Grand Wash Bay, and Horseshoe North). Of the 210 nests with known outcomes, 96 (46%) were successful (this includes 5 territories where fledglings were found but the nest was not located). Of the 114 failed nests, 74 were depredated, 9 were deserted, 6 failed directly due to brown-headed cowbird parasitism, 5 were infertile, and 20 failed due to weather or other causes.

Data were sufficient to calculate Mayfield nest success for 186 nests at AGFD's 3 study areas and the 5 cooperators' sites with nest monitoring; we estimated 208 young fledged from 91 of these nests. Mayfield nest success for all nests combined was 46.5%. Average seasonal productivity, calculated at AGFD sites, was 1.11 fledglings per nesting attempt per female for the 74 females (107 nests) that we intensively monitored during the breeding season. Among the 210 nests with known outcomes, 28 were parasitized by brown-headed cowbirds (parasitism

events directly caused only 6 of these nests to fail). Cowbirds were documented during surveys and nest monitoring at 33 of the 36 flycatcher breeding sites. Cowbird trapping was conducted at the Topock Marsh breeding site on the Colorado River.

Adult Movement. At AGFD study areas, we resighted adults banded in previous years and documented 18 flycatcher movements at the Roosevelt Lake complex. There were 10 between-year movements between sites within a study area (average distance: 3.6 km); 7 movements were within the Tonto Creek study area and 3 were within the Salt River study area. There were 6 between-year movements between the Tonto Creek and Salt River study areas (average distance: 32.7 km); 4 adults moved from Tonto Creek to the Salt River, whereas 2 moved from the Salt River to Tonto Creek. We also detected 2 adults that moved between years from the San Pedro River study area to the Roosevelt Lake complex (average distance: 131.7 km). Additionally, EcoPlan Associates detected a between-year movement between the Roosevelt Lake complex and Horseshoe Lake (distance: 51.1 km) and Reclamation detected a between-year movement within the San Pedro River drainage (distance: 78.2 km).

Nesting Habitat Characterization. Statewide, nesting substrate was documented for 266 of the 320 nesting attempts. Of the 266 nesting attempts with known substrates, 176 were located at the Roosevelt Lake and San Pedro River/Gila River complexes; therefore, reported data may not be representative of flycatcher use statewide. Tamarisk was the predominant nesting substrate (181 nests). Nests were also found in Goodding's willow (68 nests), cottonwood (6 nests), mesquite (4 nests), snags (4 nests; 2 willow and 2 tamarisk), coyote willow (2 nests), and velvet ash (1 nest). Mean nest height was 3.80 m ($s = \pm 1.40$, $n = 68$) at the Roosevelt Lake complex.

Management Recommendations. During the past 11 years, in cooperation with Reclamation and Colorado Plateau Research Station at Northern Arizona University (CPRS), we have gained knowledge of flycatcher habitat requirements, productivity, survivorship, and movement patterns. Our surveys, combined with cooperators' surveys, have documented key breeding sites throughout the state. This information has contributed directly to goals outlined by the flycatcher's Recovery Plan (USFWS 2002) and has affected management decisions on both the local and range-wide level.

We recommend cooperative workshops and sharing of standardized data to identify similarities and differences between local population characteristics. Conservation and recovery of the flycatcher will be dependent on the cooperation and support of federal and state agencies, as well as that of private landowners, Native American nations, and non-governmental organizations. Such cooperation is especially critical to curtail the recent trend in decreased flycatcher surveys in Arizona; a trend contrary to meeting downlisting and delisting recovery goals (USFWS 2002). In this report, we recommend sites where comprehensive surveys should continue or increase. In addition to comprehensive surveys in key areas, recovery goals should include the protection, restoration, and maintenance of riparian ecosystem integrity.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

SOUTHWESTERN WILLOW FLYCATCHER
2006 SURVEY AND NEST MONITORING REPORT

Allen E. Graber, Dominique M. Weddle, Heather C. English,
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INTRODUCTION

The willow flycatcher (*Empidonax traillii)* is a widely distributed summer resident of much of the United States and southern Canada (Brown 1988). The 4 or 5 subspecies of willow flycatcher recognized in North America (Figure 1) are distinguished from each other by breeding range and subtle differences in color and morphology (Aldrich 1953, Browning 1993, Hubbard 1987, Phillips 1948, Unitt 1987). The current breeding range of the southwestern willow flycatcher (*E.t. extimus*; flycatcher) includes Arizona, southern California, New Mexico, southern Nevada, southern Utah, and southwestern Colorado. Few historical breeding records exist for extreme northwestern Mexico and southwestern Texas (Unitt 1987, Wilbur 1987).

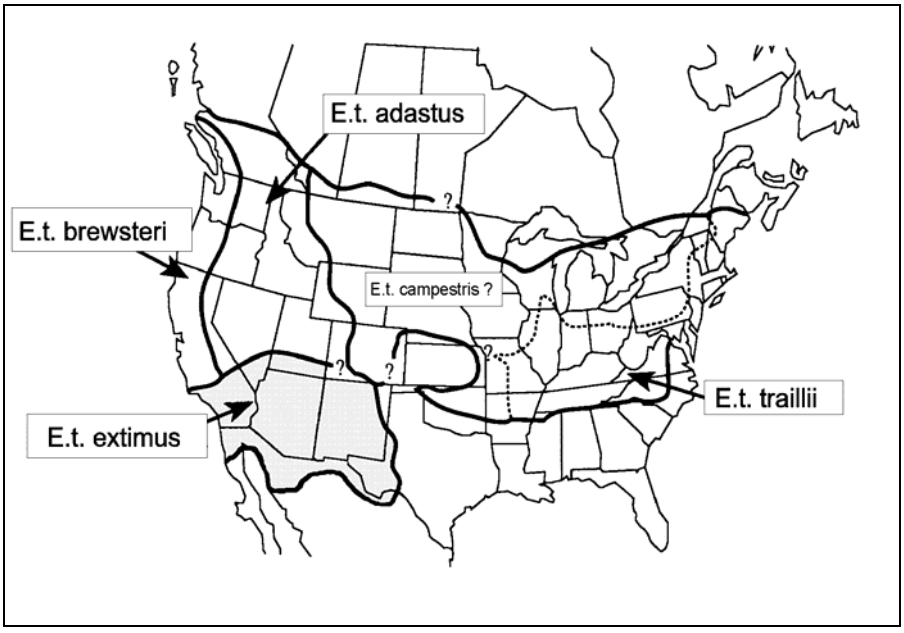

Figure 1. Distribution of willow flycatcher subspecies. Question marks represent areas where the actual location of the subspecies boundary is unknown. Adapted from Browning (1993) and Unitt (1987).

The flycatcher is a riparian obligate breeder, restricted to dense, mesic habitats. Concern over declining populations and degradation of native riparian habitat prompted Arizona Partners in Flight, an interagency program dedicated to conserving land birds, and the Arizona Game and Fish Department (AGFD), as the coordinating agency, to initiate statewide flycatcher surveys in 1993 (Muiznieks et al. 1994). At that time, the primary objective was to survey suitable and/or historical riparian and wetland habitat, using standardized methods, to determine status of the flycatcher in Arizona. As a result of that survey effort, collection of habitat and nest success information was determined to be important. In 1994, AGFD began to monitor nests to calculate simple nest success and measure vegetation characteristics at occupied flycatcher sites. Statewide

surveys continued in 1994, but few breeding sites were documented and most of these were comprised of 5 or fewer territories.

In 1995, the flycatcher was federally listed as endangered with designation of critical habitat postponed (events leading to listing and designation of critical habitat are described in U.S. Fish and Wildlife Service Federal Register filings [1991, 1992, 1993, 1995, 1997]). On 11 May 2001, as a result of a court ruling, critical habitat was set aside for the flycatcher. The final rule redesignating critical habitat was published on 19 October 2005 and went into effect 18 November 2005 (USFWS 2005). The flycatcher is also included in the AGFD list, *Wildlife of Special Concern in Arizona* (AGFD 1996) and is identified as a Species of Greatest Conservation Need in AGFD's *Comprehensive Wildlife Conservation Strategy* (AGFD 2006).

Modifications to Roosevelt Dam, completed in 1996, raised the height of the dam and increased the storage capacity of the reservoir. As a result of the 1996 Biological Opinion regarding these modifications (USFWS 1996), AGFD entered into a 10-year cooperative agreement with the U.S. Bureau of Reclamation (Reclamation) to locate and monitor nests at 4 breeding areas (Salt River and Tonto Creek study areas, collectively referred to as the Roosevelt Lake complex, and San Pedro River and Gila River study areas, collectively referred to as the San Pedro River/Gila River complex [previously referred to as Winkelman]; Figure 2). The agreement also required AGFD to conduct surveys at the 4 breeding areas to determine flycatcher presence-absence and to estimate numbers of adults, pairs, and territories. From 1997 to 2005, intensive surveys and nest monitoring took place at these 4 study areas in order to collect detailed local population estimates and nest productivity data. This effort continued in 2006 with the exception that AGFD did not conduct field work at the San Pedro River study area. We continued surveys at the Gila River study area in 2006 with nest monitoring occurring as time permitted. This report will refer to the following AGFD study areas: the Salt River and Tonto Creek study areas at the Roosevelt Lake complex and the Gila River study area at the San Pedro River/Gila River complex. When comparing this report to previous annual reports, note that we use the terms *Roosevelt Lake complex* and *San Pedro River/Gila River complex* (in this report) in place of *Roosevelt Lake* and *Winkelman* (as used in previous annual reports), respectively.

One of the objectives of the Biological Opinion was to assess dispersal from occupied habitat that becomes inundated. Roosevelt Lake rose to near capacity in 2005 due to increased winter rainfall and runoff. This presented the first opportunity for AGFD and cooperating agencies to investigate effects of habitat inundation on flycatcher dispersal. In 2005, almost all of the 2004 breeding sites at the Roosevelt Lake complex were rendered unsuitable by complete or partial inundation of vegetation. Territories at the Roosevelt Lake complex decreased 27% from 2004 to 2005 (English et al. 2006). Prior to this decline, the largest decline (8%) was documented in 2003 (likely due to drought-caused reproductive failure in 2002; Causey et al. 2006, Smith et al. 2003). In 2005, flycatchers moved to upstream sites at both the Tonto Creek and Salt River study areas (English et al. 2006). Flycatchers breeding at these sites experienced similar nest success compared to previous years (English et al. 2006). An increase in movements to drainages away from the lake was not apparent in 2005; 4 adults moved to nearby Pinal Creek and 1 adult moved to the San Pedro River study area (Causey et al. 2006, English et al. 2006). In 2006, AGFD

continued to locate and monitor nests and determine between-year movements at the Tonto Creek, Salt River, and Gila River study areas to further investigate impacts of the 2005 inundation to flycatchers at Roosevelt Lake.

This document serves as the summary report for 2006 AGFD activities. It also contains a summary of related work by cooperators, including: 1) surveys: the systematic search of riparian habitat to record the presence and abundance of flycatchers in Arizona; and 2) monitoring: the estimation of nest success and productivity, and documentation of vegetation characteristics at some of the nests.

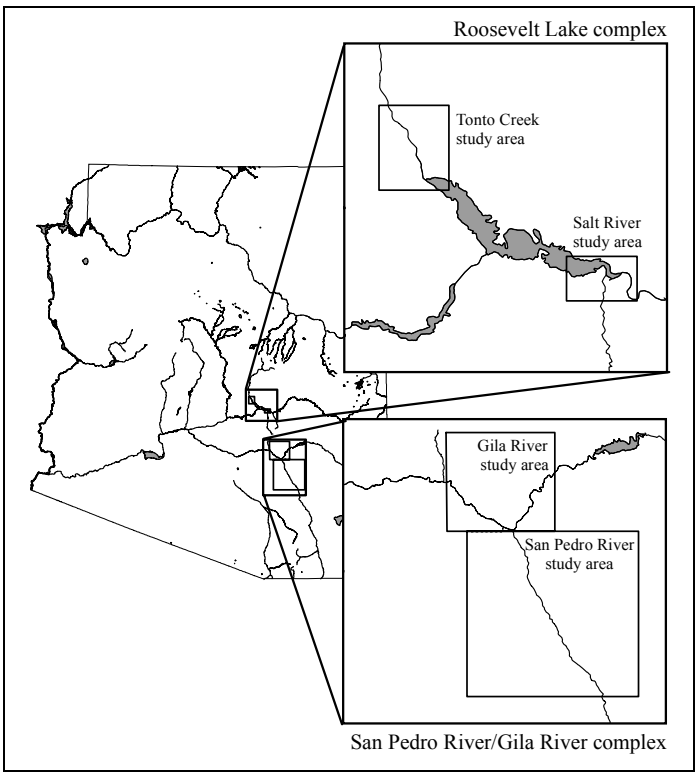

Figure 2. Location of AGFD study areas at the Roosevelt Lake complex (Tonto Creek and Salt River study areas) and the San Pedro River/Gila River complex (Gila River and San Pedro River study areas).

Specifically, the 2006 AGFD objectives were as follows:

1. Coordinate survey and monitoring efforts with agency and private cooperators,
2. Survey suitable and potentially suitable habitat within 40 km of occupied habitat at the Roosevelt Lake complex where landowner permission was obtained. Survey suitable and potentially suitable habitat on the Gila River from Dripping Springs Wash west to the Ashurst-Hayden Diversion Dam where landowner permission was obtained,
3. Monitor nests to determine nest success and productivity at 2 breeding areas: Tonto Creek and Salt River study areas (Roosevelt Lake complex). Monitor nests as time permits at the Gila River study area,

4. Record and report color-band information to U.S. Geological Survey Southwest Biological Science Center, Colorado Plateau Research Station at Northern Arizona University (CPRS), Reclamation, and U.S. Fish and Wildlife Service (USFWS),
5. Document the presence or absence of brown-headed cowbirds (*Molothrus ater*) at survey sites and determine impacts of cowbird parasitism on the flycatcher,
6. Characterize vegetation composition and structure at Roosevelt Lake nest sites,
7. Incorporate survey, monitoring, and geographical data into a comprehensive statewide database,
8. Compile statewide data into an annual report, and
9. Develop management recommendations for the flycatcher.

As noted above, this report includes only the 2006 survey and monitoring data. Prior Arizona survey and monitoring data can be found in: English et al. (2006), McCarthey et al. (1998), Munzer et al. (2005), Paradzick et al. (1999, 2000, 2001), Sferra et al. (1995, 1997), Spencer et al. (1996), and Smith et al. (2002, 2003, 2004). Our work complements that of CPRS (see Causey et al. 2006), and other ongoing research projects. More in-depth discussions on willow flycatcher natural history, demography, and associated threats can be found in: Cardinal and Paxton (2005), Dockens and Ashbeck (2005, 2006), Dockens et al. 2006, Durst et al. (2005), Finch and Stoleson (2000), Koronkiewicz et al. (2006a,b), McLeod et al. (2005, 2006), Owen et al. (2005), Paxton et al. (1996), Pearson et al. (2006), Sedgwick (2000), Sogge et al. (1997b, 2003), SWCA, Inc. Environmental Consultants (1997), USFWS (2005), and Whitfield and Enos (1996). Information regarding conservation measures and recovery efforts for the southwestern willow flycatcher can be found in the Southwestern Willow Flycatcher Recovery Plan (USFWS 2002).

METHODS

STATEWIDE SURVEYS

Prior to the breeding season, cooperators were asked to identify their intended survey sites. AGFD compiled this information and worked to coordinate surveys with agencies and organizations to limit overlap. AGFD, along with CPRS and USFWS, conducted a flycatcher training workshop in May. All new surveyors were required to attend this training as part of the requirements to receive state and federal survey permits.

Surveys were performed according to established protocol (Sogge et al. 1997a). Survey sites were identified by agency and private cooperators on 7.5-minute topographical maps or with Global Positioning System (GPS) units. At a minimum, 1 tape-playback survey was required at each site in each of the following 3 periods: 15 May to 31 May, 1 June to 21 June, and 22 June to 17 July. For areas requiring USFWS project clearance, a minimum of 5 surveys were required; 3 of these surveys were to be performed in the third survey period (USFWS 2000). Surveys had to be performed at least 5 days apart and when birds are most active (from 1 hour prior to sunrise to 10:00 AM).

Flycatchers were considered territorial (or "resident" within a site) if they were detected within the 15 June and 20 July "residency window", regardless of whether a possible or known mate was observed. Additionally, flycatchers were considered territorial if observations of nesting activity or nests were found before or after the "residency window". Some birds that were detected only during the first few days of the "residency window" were considered migrants based on additional field observations (that is, they were not seen on repeated visits). Floaters (non-territorial adults) were considered "resident" if color-banded and observed multiple times after 15 June. Flycatchers documented prior to 15 June, but not detected in subsequent visits during the end of the second survey period or anytime during the third survey period, were considered migrants. Birds initially detected after 25 July were also considered migrants. An "unknown" designation was given to birds if follow-up surveys were not completed according to protocol or if not enough information was available to determine resident or migrant status. When time permitted, AGFD and cooperators with nest monitoring permits performed intensive nest searches in areas where flycatcher pairs were documented.

Flycatcher survey data were recorded on a standardized form (Appendix A) and returned to AGFD and USFWS by August 1st. To keep site designations and reporting consistent, all sites were geographically defined using start and stop Universal Transverse Mercator (UTM) coordinates. Survey data were interpreted (based on the above definitions for resident, migrant, and unknown flycatchers) and entered into AGFD's Willow Flycatcher Database. Survey data, including flycatcher territory and nest UTM coordinates, were also made available to AGFD's Heritage Database Management System (HDMS), and cooperating agencies: USFWS, Reclamation, and CPRS. Incidental detections of other special status species during surveys were recorded in the HDMS.

AGFD Survey Techniques

Landowner permission for all potential AGFD survey sites was requested prior to the 2006 breeding season. AGFD surveys were conducted according to established survey protocol (Sogge et al. 1997a), except at sites determined to be unsuitable for flycatchers (e.g., Old Salt on the Salt River and sites between the Florence-Kelvin Bridge and Ashurst-Hayden Diversion Dam on the Gila River). Sites were determined to be unsuitable if vegetation clearly lacked structural complexity necessary to support flycatchers (e.g., vegetation was dead or too thin, such as 1 to 2 tree lengths wide with sparse understory; Finch and Stoleson 2000). Surveys at the Roosevelt Lake complex and the Gila River study area were completed by kayak where land access was not feasible. In 2005 following inundation, habitat at the Roosevelt Lake complex that had not been surveyed previously or had not been surveyed in several years was surveyed if deemed potentially suitable for flycatchers and landowner permission was granted; we also surveyed those sites in 2006. When flycatchers were detected, repeat visits were conducted until pair status was confirmed. For resident adult flycatchers at AGFD sites, we assumed that pairs were monogamous unless evidence from color-banded individuals indicated polygyny. Polygyny was determined if a color-banded male was concurrently attending nests of 2 or more females.

AGFD NEST MONITORING TECHNIQUES

Nest monitoring methods used by AGFD followed the Southwestern Willow Flycatcher Nest Monitoring Protocol (Rourke et al. 1999), a modification of the Breeding Biology Research and Monitoring Database (BBIRD) field protocol (Martin et al. 1997). Nest searches were conducted from mid-May through August. Nests were located by watching adults return to a nest or by systematically searching suspected nest areas. Nests were monitored every 2 to 4 days after incubation was confirmed (incubation was confirmed by observing the female on the nest for ≥10 min). If nests were found during building or laying stages, the start date of incubation was estimated and the nest was next checked on that date. During incubation, nest contents were observed directly using a compass mirror, mirror pole, or miniature video camera. After hatching, number of nestlings was also confirmed using the same techniques, with the exception of very tall nests where nestling number was confirmed visually with binoculars. Once nestlings were confirmed, nests were observed from a distance to reduce the risk of nest predation and the possibility of premature fledging. If no adult or nestling activity was observed at a previously active nest, the nest was checked directly to identify nest contents and a search of the general area was conducted to locate possible fledglings if the nest was empty.

We considered a nest successful if any of 4 conditions was documented: 1) 1 or more young were visually confirmed fledging from the nest or located near the nest; 2) adults were seen feeding fledglings; 3) parents behaved as if dependent young were nearby (feeding trips, defensive behavior, and/or adults agitated) when the nest was empty; or 4) nestlings were observed in the nest within 2 days of the estimated fledge date (fledging considered to occur at 12 days; Rourke et al. 1999). This assumption is based on observations of southwestern willow flycatchers successfully fledging at 10 days of age (AGFD, unpublished data). This assumption was not upheld if subsequent visits to the territory provided evidence that fledging did not occur (e.g., building or incubation dates for a renest contradicted the possible fledge date). Assuming fledging when we were unable to confirm fledglings might cause nest success calculations to be overestimated; however, excluding these nests may cause an even greater underestimation. More exact numbers would require a greater level of disturbance with visits conducted at a time when birds are most likely to fledge prematurely.

We considered a nest to have failed if any of 6 outcomes was documented: 1) depredated: the nest was found empty or destroyed more than 2 days prior to the estimated fledge date; 2) parasitized: the nest fledged no flycatcher young but contained cowbird eggs or young; 3) deserted: the nest was deserted with eggs remaining; 4) abandoned: the nest was abandoned prior to egg laying; 5) weather: the nest was destroyed due to weather; or 6) infertile: the entire clutch was incubated unsuccessfully for more than 20 days. An "unknown outcome" was designated if success or failure could not be determined (generally due to infrequent visits to a nest).

The method for selecting nest monitoring areas at the Roosevelt Lake and San Pedro River/Gila River complexes changed in 2001. From 1995 to 2000, we monitored all flycatcher nests at a select number of sites within each area; these sites included those designated as nest monitoring sites in the Roosevelt Lake Biological Opinion (USFWS 1996). From 2001 to 2005, we selected

a set of known females (marked or distinctly isolated) to monitor from all sites, not just the nest monitoring sites used from 1995 to 2000. We selected females only if we were able to monitor all nesting attempts in compliance with established protocol (Rourke et al. 1999). This method of monitoring known females has allowed us to monitor a representative sample of nests within the study areas and has enabled comparisons of productivity among several sites. It has also allowed us to calculate individual female seasonal fecundity, a better indicator of population nest success and productivity than individual nest-based measurements (Pease and Grzybowski 1995, Thompson et al. 2001). We continued this method in 2006. These changes in monitoring techniques must be accounted for when making comparisons with years prior to 2001.

Although we concentrated nest monitoring efforts on selected females from 2001 to 2005, additional nests were monitored as time permitted during those years. In 2006, nests found at the Gila River study area were monitored as time permitted. This population consisted of only a few marked adults, though we were able to confidently identify some unmarked females (based on observations of adjacent territorial pairs with active nests).

AGFD Nest Monitoring Study Areas

Two study areas were surveyed and monitored by AGFD at the Roosevelt Lake complex during 2006: the Salt River and Tonto Creek study areas. A third study area, the Gila River study area (part of the San Pedro River/Gila River complex), was surveyed with nests monitored as time permitted.

Roosevelt Lake Complex

The Salt River and Tonto Creek flow into Roosevelt Lake and are the major sources of water for the lake. The Salt River and Tonto Creek study areas are approximately 640 m in elevation and are comprised of USFS (Tonto National Forest) and private land. We surveyed and conducted nest monitoring along 31 km of suitable and potentially suitable habitat at the Roosevelt Lake complex where landowner permission was granted. We also surveyed 18 km of suitable and potentially suitable habitat within 40 km of the Roosevelt Lake complex (e.g., Cherry Creek, Coon Creek) where landowner permission was granted.

As previously mentioned, Roosevelt Lake filled to near capacity in early 2005 (Figure 3) due to increased winter rainfall (Figure 4) and runoff. As a result, almost all of the breeding sites occupied in 2004 were rendered unsuitable by complete or partial inundation of vegetation in 2005. Flycatchers responded by moving to upstream sites, including to sites not previously documented with residents (English et al. 2006). Lake levels began to drop during the 2005 breeding season and continued to drop through the 2006 breeding season until monsoons increased the level of the lake slightly in August (Figure 3). Several areas that had been partially inundated in 2005 consisted of live, dead, and dying trees in 2006. Areas of tamarisk (*Tamarix* spp.) were observed to be especially susceptible to die-off from inundation (see Discussion: Habitat section).

Salt River Study Area. The Salt River flows into the southeastern end of Roosevelt Lake, approximately 104 km from the confluence of the White and Black rivers (where the Salt River is formed) between the Mogollon Rim and the Natanes Plateau. The study area (Figure 2), a perennial stretch of the Salt River, includes the inflow site and approximately 15 km upstream. Riparian habitat at the study area is surrounded by Arizona Upland, a subdivision of the Sonoran Desertscrub biome (Turner and Brown 1994). We surveyed and monitored nests along roughly 15 km of suitable and potentially suitable habitat, ranging from 640 m to 680 m in elevation. Prior to the lake filling to near capacity in 2005, vegetation varied from monotypic tamarisk to nearly monotypic Goodding's willow (*Salix gooddingii*). Much of the native species were completely submerged in 2005 and 2006 and did not survive. As a result, breeding habitat in 2006 was primarily monotypic tamarisk. The exception was at Shangri-la where a small patch of Goodding's willow survived nearly complete inundation in 2005 and partial inundation in 2006. In some areas where residents were detected in 2005 (e.g., Old Salt and the southernmost portion of Shangri-la), suitable habitat declined due to increased vegetation die-off following the 2005 breeding season. In 2006, canopy height in surveyed areas varied from 5 m to 8 m.

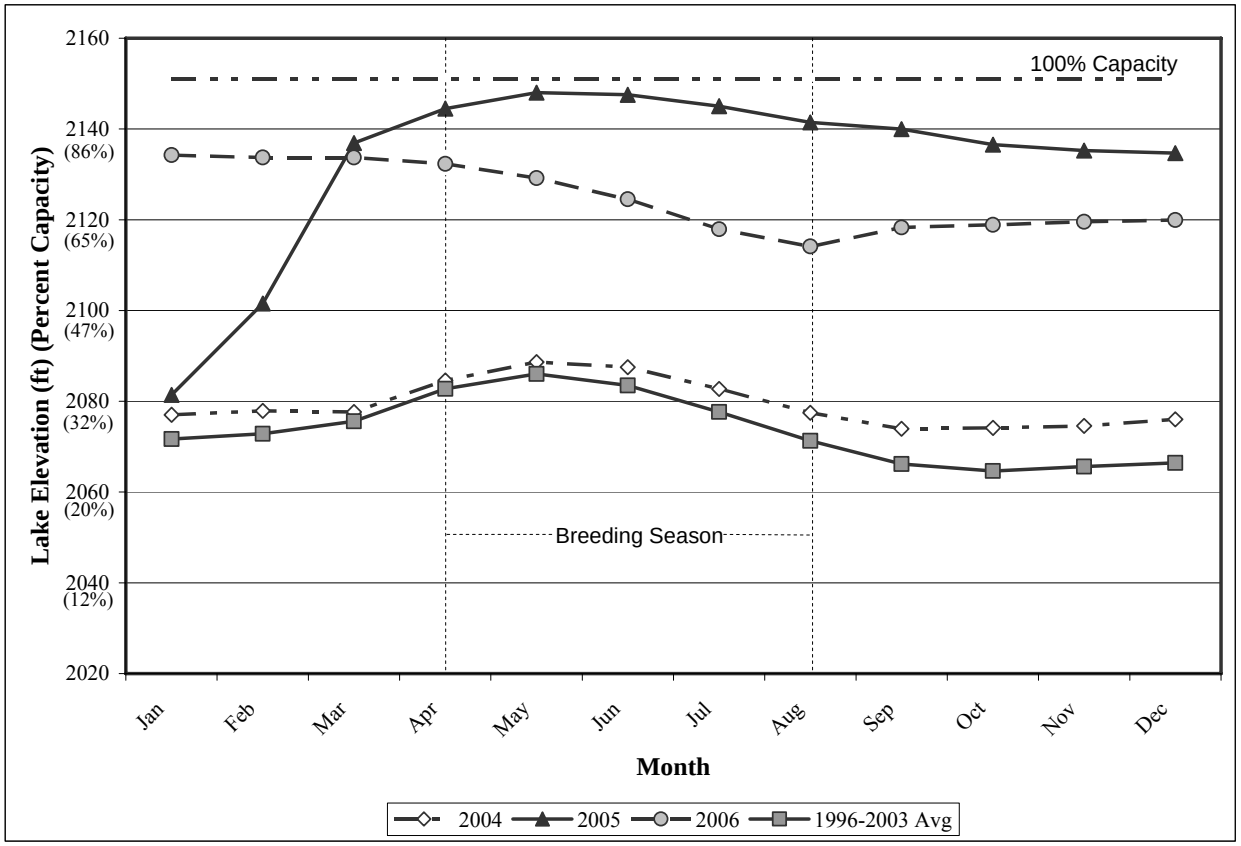

Figure 3. Lake elevations for Roosevelt Lake, January 2004 to December 2006 and monthly averages from 1996 to 2003 (Dallas Reigle and Tim Skarupa, Salt River Project [SRP], pers. comm.). Each point represents the elevation of the lake on the first day of each month. For exact elevations and percent capacities of Roosevelt Lake refer to Appendix B.

Tonto Creek Study Area. Tonto Creek flows into the northwestern end of Roosevelt Lake, approximately 68 km from its headwaters below the Mogollon Rim. The study area (Figure 2) includes the inflow site and approximately 16 km upstream. Tonto Creek has intermittent flows dependent on spring snowmelt and summer monsoon rains. Riparian habitat at the study area is surrounded by Arizona Upland, a subdivision of the Sonoran Desertscrub biome (Turner and Brown 1994). We surveyed and monitored nests along roughly 16 km of suitable and potentially suitable habitat, ranging from 610 m to 694 m in elevation. Prior to the lake filling to near capacity in 2005 (Figure 3), vegetation varied from a tamarisk-dominated understory with patchy Fremont cottonwood (*Populus fremontii*) and/or Goodding's willow overstory to stands of monotypic tamarisk or Goodding's willow. Vegetation structure and composition changed in 2005, varying from partially inundated monotypic willow to stands dominated by tamarisk (English et al. 2006). Some locations within Tonto Creek Inflow and areas upstream that were partially inundated in 2005 were no longer inundated in 2006 because lake levels continued to drop. In 2006, canopy height in surveyed areas varied from 4 m to 8 m.

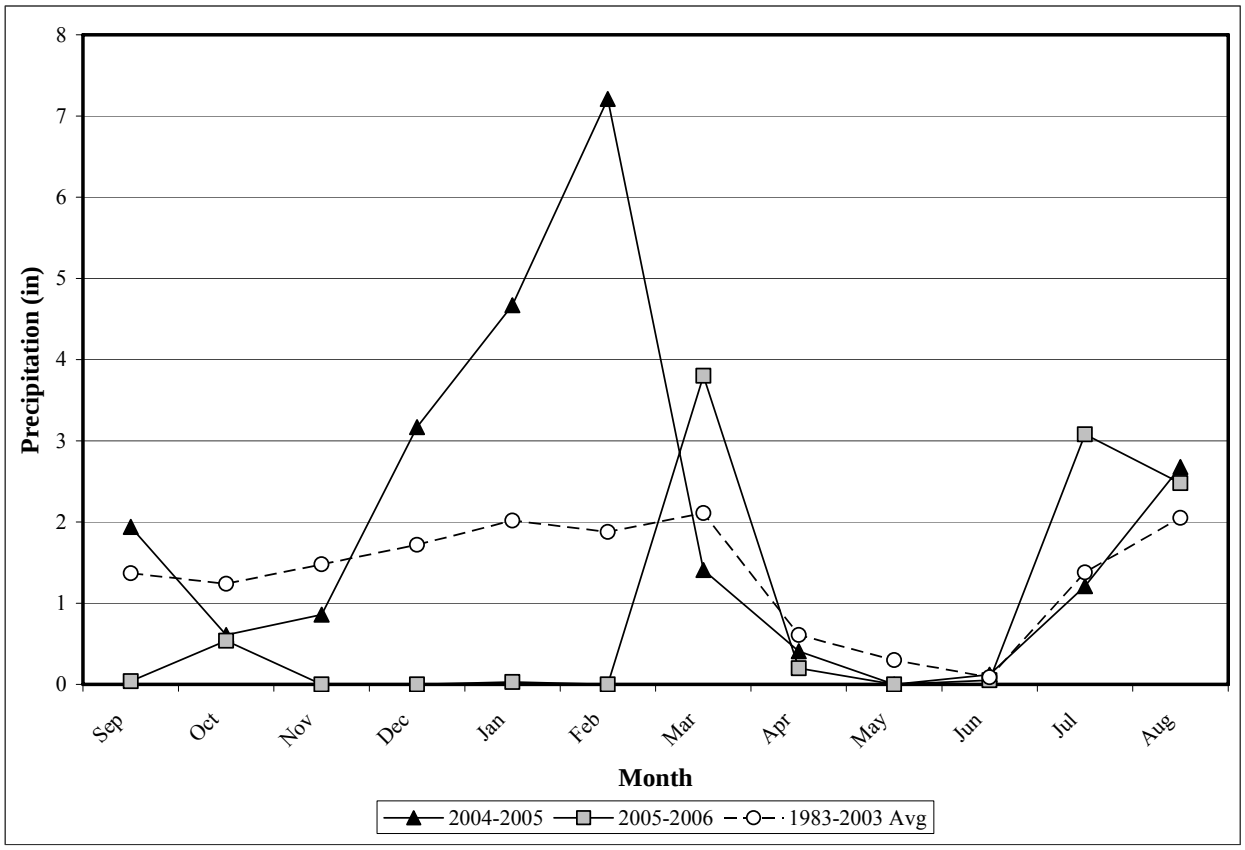

Figure 4. Total monthly precipitation (in inches) recorded by Roosevelt 1 WNW weather station, September 2004 to August 2006 and monthly averages from 1983 to 2003. (Western Regional Climate Center [WRCC 2007] and Jim Ashby, WRCC, pers. comm.). For exact precipitation totals by month for Roosevelt Lake refer to Appendix C.

Additional Sites. Areas surveyed by AGFD within 40 km of the Roosevelt Lake complex included Pinto Creek, Cherry Creek, Coon Creek, and Granite Reef in the Salt River drainage, and Rye Creek, Gisela, and Del Shay in the Tonto Creek drainage, Rock Creek in the Verde River drainage, and Whitlow Dam in Queen Creek (Gila River drainage). At these sites, we surveyed approximately 18 km of suitable and potentially suitable habitat ranging from 402 m to 904 m in elevation. These sites ranged from 3 m to 15 m in canopy height and varied from mixed native and exotic vegetation (primarily Fremont cottonwood, Goodding's willow, and tamarisk) to native vegetation (Fremont cottonwood, Goodding's willow, and Arizona sycamore [*Platanus wrightii*]).

Gila River Study Area

The Gila River study area (Figure 2) is located approximately 20 km below San Carlos Reservoir, downstream to the Florence-Kelvin Highway Bridge (hereafter, Kelvin Bridge). Flows are considered intermittent; regulated by releases from Coolidge Dam and natural flow from the San Pedro River. Riparian habitat at the study area is surrounded by Arizona Upland, a subdivision of the Sonoron Desertscrub biome (Turner and Brown 1994). We surveyed (and monitored nests as time permitted) along roughly 40 km of suitable and potentially suitable habitat on the Gila River from Dripping Springs Wash (upstream from the town of Winkelman) to the Kelvin Bridge. We also surveyed 38 km of habitat from the Kelvin Bridge to the Ashurst-Hayden Diversion Dam; this stretch was determined to be unsuitable for flycatchers following the second survey period. From Dripping Springs Wash to the Kelvin Bridge, elevation ranged from 622 m to 548 m, respectively. Riparian habitat along this reach varied from monotypic tamarisk to mixed native and exotic vegetation (primarily Fremont cottonwood, Goodding's willow, and tamarisk). Average canopy height varied from 3 m to 8 m.

In 2005 and 2006, constant releases from San Carlos Reservoir resulted in increased flow (compared to 2002, 2003, and 2004) throughout the breeding season (Figure 5). Near the end of the 2006 breeding season (29 July to 2 August), increased precipitation along the San Pedro River drainage resulted in a significant flood event (Figure 6) that damaged flycatcher habitat (see Discussion: Habitat section). Figures 5 and 6 depict average monthly and daily stream flows, respectively, at 2 gauge sites on the Gila River: Below Coolidge Dam and Kelvin (located at the Kelvin Bridge). Coolidge Dam is located upstream (approximately 31 km) from the confluence of the San Pedro River with the Gila River, and the Kelvin Bridge is downstream (approximately 23 km) from the confluence. Therefore, higher flows on the Gila River caused by increased input from the San Pedro River, as well as from washes along the Gila River downstream from the Below Coolidge Dam gauge were apparent (Figures 5 and 6) at the Kelvin gauge during the 2006 flood event.

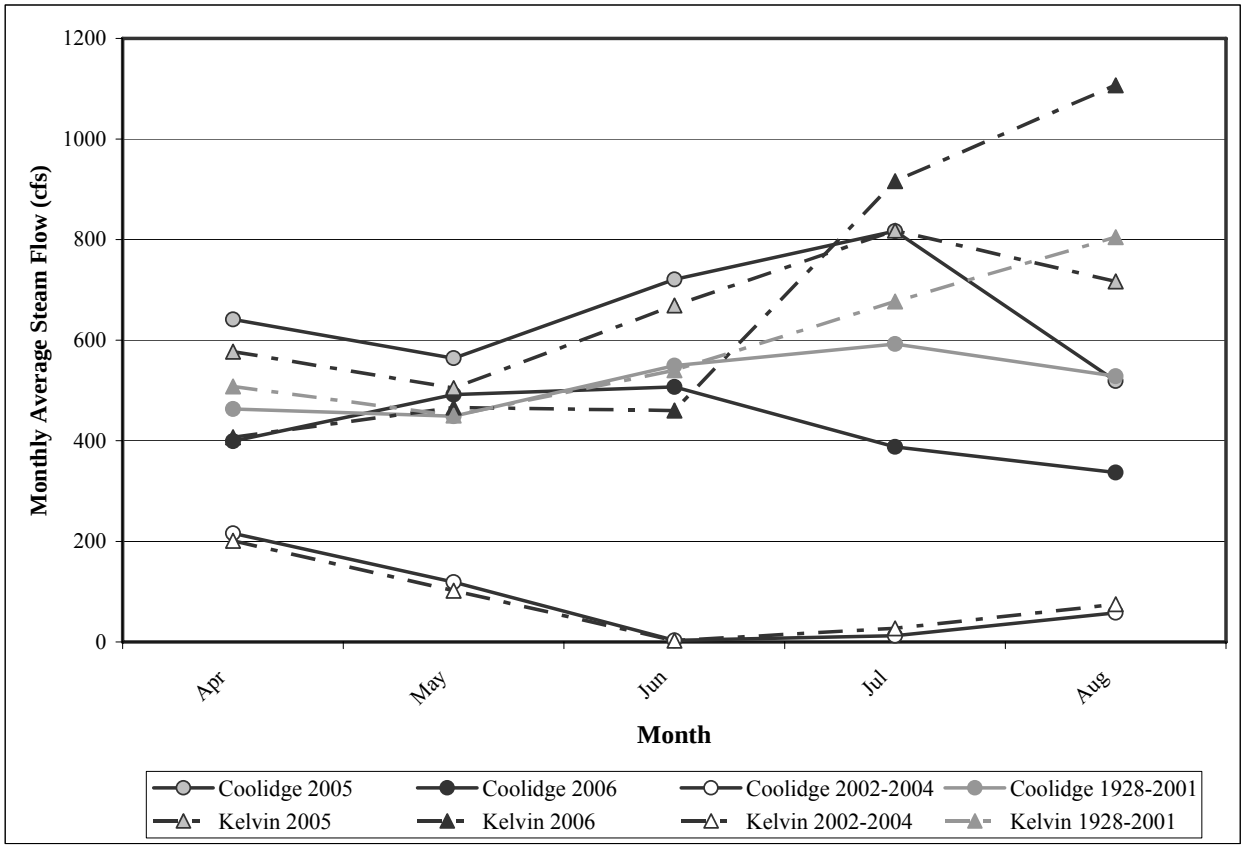

Figure 5. Gila River average monthly stream flows recorded at the Below Coolidge Dam and Kelvin gauges during the breeding season (April to August) from 1928 (post-dam) to 2001, 2002 to 2004, 2005, and 2006 (U.S. Geological Survey [USGS] 2007). For exact Gila River monthly flows recorded at the Below Coolidge Dam and Kelvin gauges refer to Appendix D.

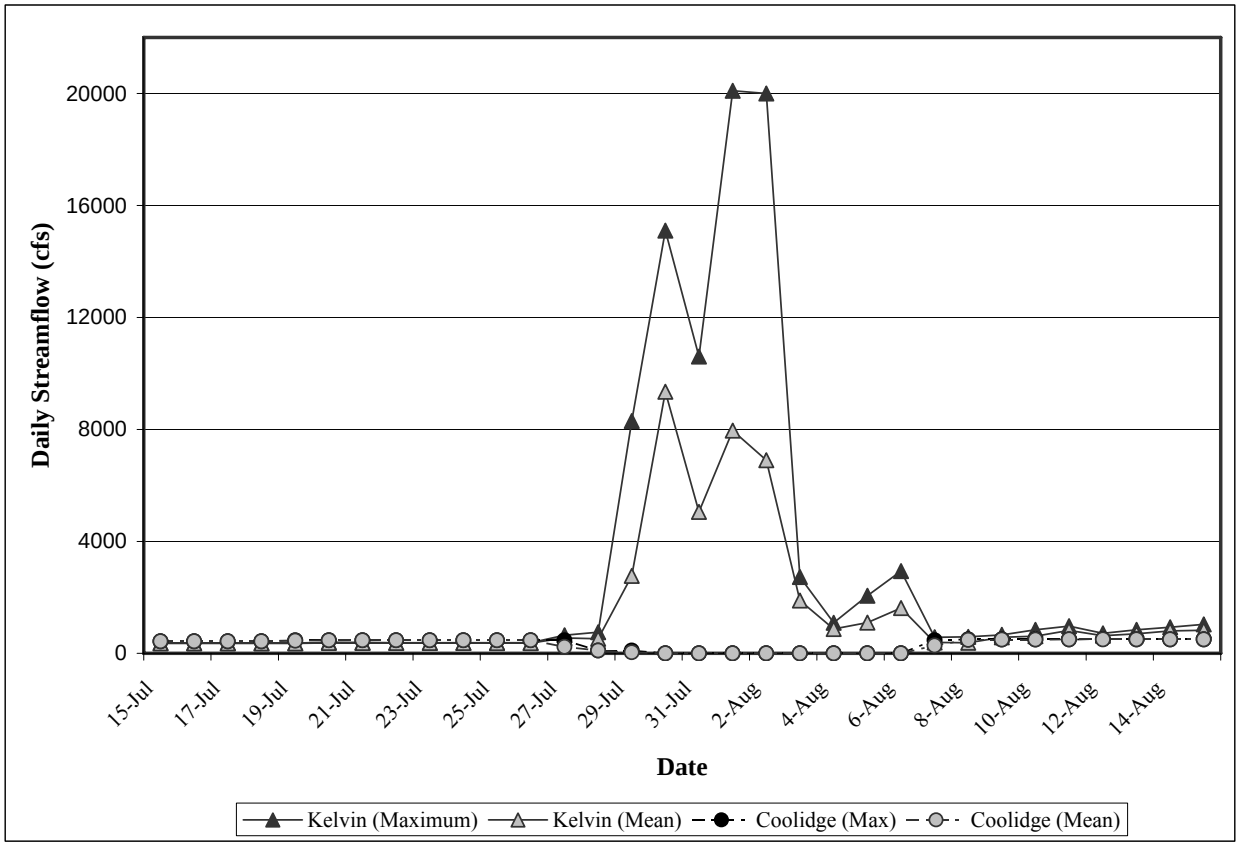

Figure 6. Gila River maximum and mean daily stream flows recorded at the Below Coolidge Dam and Kelvin gauges depicting the 2006 flood event (29 July to 2 August; USGS 2007 and Shirley Francisco, USGS, pers. comm.). Maximum and mean stream flow data are similar for Below Coolidge Dam gauge because flows are regulated. For exact Gila River daily flows from 15 July to 15 August 2006 recorded at the Below Coolidge Dam and Kelvin gauges refer to Appendix E.

COOPERATOR NEST MONITORING

SWCA Environmental Consultants (SWCA) monitored nests at Topock Marsh on the Colorado River, Grand Wash Bay at Lake Mead, and Monkey's Head on the Bill Williams River (see McLeod et al. 2006). EcoPlan Associates monitored nests at Big Sandy River Downstream US 93 and Horseshoe North (Horseshoe Lake, Verde River; see Dockens and Ashbeck 2006). Comparisons between AGFD and cooperator nest monitoring results are not comparable because not all cooperators use the AGFD nest monitoring protocol (Rourke et al. 1999) or the same method of analysis for nest success calculations.

COLOR BANDING

From 2001 to 2005, AGFD personnel color banded flycatchers at the San Pedro River/Gila River complex, while CPRS personnel banded at the San Pedro River/Gila River complex from 1996 to 2000 and the Roosevelt Lake complex from 1996 to 2005. The final year of the AGFD and CPRS banding effort was 2005. For more information regarding the banding methods used and 2005 results of the CPRS project, see Causey et al. (2006). In 2006, SWCA continued their banding effort on the Colorado River. For more information regarding the banding methods and results of the SWCA project, see McLeod et al. (2006).

ADULT MOVEMENT

In 2006, we resighted previously banded birds at the Roosevelt Lake complex and the Gila River study area. Banding efforts by AGFD and CPRS have allowed us to document flycatcher movements between and within study areas and between or within years. Using ArcGIS 9.0 (ESRI, Redlands, CA), we measured distance of movements from the flycatcher's last known territory to the territory it occupied in 2006.

From 2001 to 2005, AGFD reported movements detected only at the San Pedro River/Gila River complex, while from 1996 to 2005 CPRS reported all statewide movements. We previously reported between study area movements as any movements detected at the San Pedro River/Gila River complex from the Roosevelt Lake complex. Here, we define "between study area movement" as any movement between study areas (Tonto Creek, Salt River, and Gila River) rather than between complexes. Any flycatcher that was banded at the San Pedro River study area before 2006 and later moved to other study areas is also reported as a between study area movement. When comparing flycatcher movements to previous AGFD annual reports, an increase in the number of between study area movements is expected in 2006 because we are now reporting movements detected at the Salt River and Tonto Creek study areas (Roosevelt Lake complex) previously reported by CPRS.

COWBIRD TRAPPING

No cowbird trapping occurred at either the Roosevelt Lake complex or the Gila River study area in 2006. SWCA coordinated and conducted cowbird trapping at Topock Marsh on the Colorado River (McLeod et al. 2006).

HABITAT CHARACTERISTICS

Vegetation at occupied flycatcher sites was classified into 4 general categories: 1) native broadleaf plants (entirely or almost entirely native, includes high-elevation willow); 2) mixed native and exotic plants (mostly native); 3) mixed native and exotic plants (mostly exotic); and 4) exotic/introduced plants (entirely or almost entirely exotic). General vegetation categories were to be determined in the field and recorded on data sheets for every site surveyed. Nesting substrates were also recorded for sites with nest monitoring. Additionally, AGFD personnel measured habitat variables (e.g., nest height, distance from nest to water) at Roosevelt Lake nest sites; descriptive statistics were calculated where applicable (see Appendix H).

RESULTS

SURVEYS, DETECTIONS, AND DISTRIBUTION

In 2006, 203 sites were surveyed covering approximately 388 linear km of riparian habitat throughout Arizona (Table 1; Appendices F, G). Sites ranged from 19 m to 2,539 m in elevation and 0.03 km to 11.4 km in length. Of the 203 sites, 51 were not surveyed according to protocol. This was generally due to time or funding limitations, habitat being determined unsuitable for flycatchers, or accessibility constraints. Fifteen new sites were surveyed in 2006. New survey sites were located along the Verde (5 sites), Colorado (4 sites), Santa Cruz (2 sites), Bill Williams (1 site), and Gila (1 site) rivers, and Kanab Creek (2 sites).

AGFD personnel and statewide cooperators detected 624 resident flycatchers occupying 351 territories at 53 sites (Table 1; Appendices F, G). We recorded 276 pairs at 39 sites. The male to female ratio of residents was not 1:1 since unpaired birds and polygynous territories were detected at some sites. At some sites, insufficient survey effort and other factors (e.g., inundation of habitat, landowner permission not granted) precluded documentation of pairs.

Resident flycatchers were documented along 12 drainages (Appendices F, G). The greatest proportion of flycatcher territories statewide were found at the Roosevelt Lake complex (31%), with slightly more territories found at the Tonto Creek study area (17%) than the Salt River study area (14%; Figure 7, Table 2). Other occupied sites where a relatively large proportion of flycatcher territories were documented include the San Pedro River/Gila River complex (20%) and the Gila-Safford area (19%). Within the San Pedro River/Gila River complex more territories were documented at the Gila River study area (12%) than the San Pedro River study area (8%; Figure 7, Table 2), though this was due to decreased survey effort at the San Pedro River study area (see Discussion: Surveys section). Resident flycatchers were detected for the

first time at 8 sites that were surveyed at least once in previous years: 4 on the Gila River (GRS005, GRN007, GRS008, and GRS009), 3 on the Colorado River (Martinez Lake, Raven's Nest Beach at Lake Mead, and Snake Beach at Lake Mead), and 1 on the Salt River (Meddler Point). Flycatchers were documented at the Chuckwalla Cove and Grand Wash Bay sites on the Colorado River (Lake Mead), which were surveyed for the first time in 2006.

There were 7 sites (or locations within sites) surveyed according to protocol that had at least 1 resident flycatcher in 2005, but no residents in 2006: Grapevine (Salt River), Hereford Bridge (San Pedro River), Indian Point and The Burbs (Tonto Creek), Ister Flat (Verde River), Waterwheel Cove (Colorado River), and Whitlow Dam (Queen Creek, within the Gila River drainage). One resident was detected at each of these locations in 2005, except for Indian Point (16 residents in 2005), The Burbs (4 residents in 2005), and Waterwheel Cove (2 residents in 2005). Some sites (and locations within sites) not surveyed to protocol in 2006 at the Roosevelt Lake complex were occupied in 2005, but not in 2006. Inundation in 2005 and subsequent die-off of vegetation over the following year resulted in vast losses of previously occupied habitat at Old Salt (16 residents in 2005) and School House Point South (4 residents in 2005) on the Salt River. Cowbirds were documented at 155 survey sites, including all but 3 flycatcher breeding sites: GRS008 (Gila River study area), and Catalina Wash and San Pedro/Aravaipa Confluence (San Pedro River study area; Table 1; Appendix G).

Migrant flycatchers were detected at 52 sites (Appendix G), 21 of which also had resident birds. Migrants were detected at 23 sites along the Colorado River, which accounted for 60% of all migrants detected. Migrants at sites along the Gila River accounted for an additional 25% of migrants detected. The remaining 15% of migrants were detected at 19 sites. There were 23 flycatchers of unknown status documented at 8 sites.

Nesting was documented at 35 low elevation (<1,115 m) sites; the lowest elevation where nesting was documented was at Topock Marsh (Colorado River; 140 m). Nesting was also documented at 1 high elevation (>2,400 m) site: River Reservoir (Lower Colorado River; 2,499 m). Evidence of breeding was not documented at mid-elevation (between 1,115 m and 2,400 m) sites.

Table 1. Willow flycatcher survey effort, detections, and nesting attempts in Arizona, 2006.	
Survey hours	2,590
Sites surveyed	203
Linear km of habitat covered	388
Sites with residents willow flycatchers	53
Sites with documented pairs	39
Sites with documented breeding	36
Resident willow flycatchers	624
Territories	351
Pairs	276
Nesting attempts	320
Sites with cowbirds detected	155
Breeding sites with cowbirds detected	33

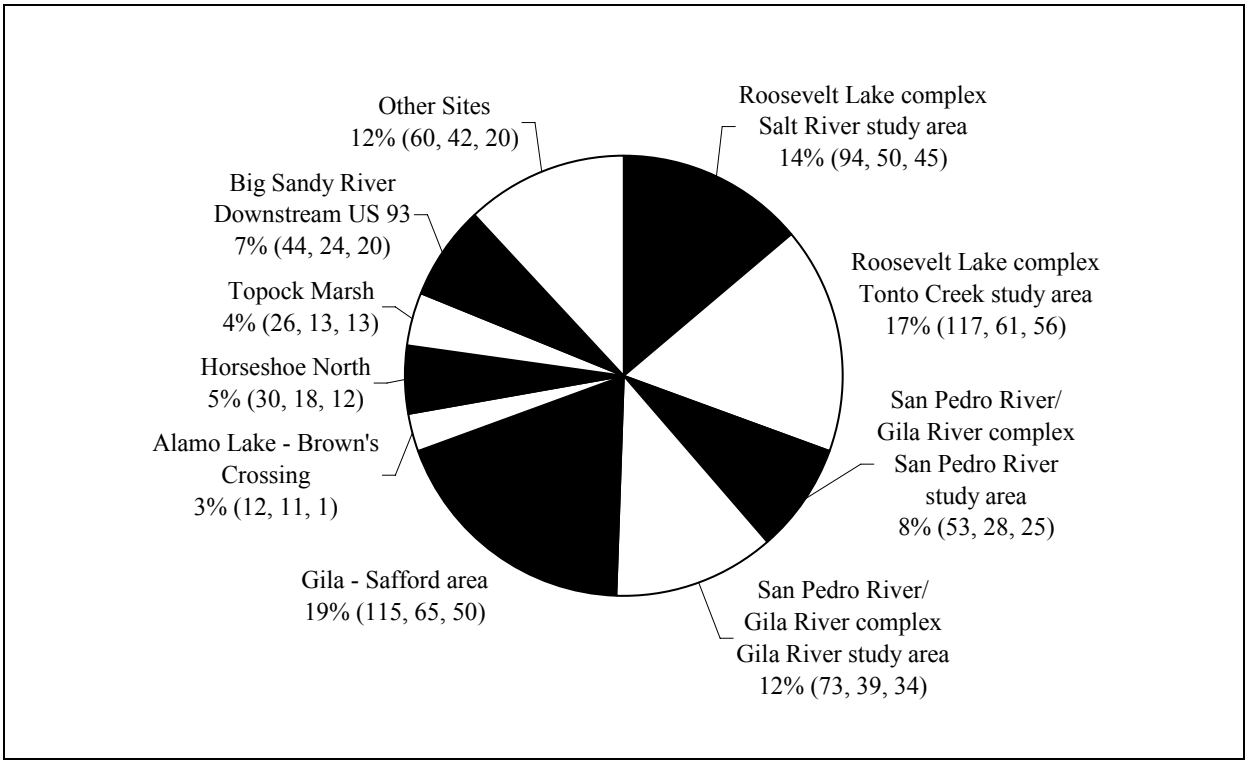

Figure 7. Southwestern willow flycatcher distribution in Arizona, 2006. Depicts survey location and percent of flycatcher territories detected in 2006 (number of resident flycatchers, number of territories, number of pairs). Number of territories plus number of pairs may not be equal to total number of residents due to polygynous males and non-territorial floaters. Table 2 lists individual sites that are part of a larger study area or location.

Table 2. Sites with resident willow flycatchers grouped by study area in Arizona, 2006.[a]

Roosevelt Lake Complex		San Pedro River/ Gila River Complex		Gila-Safford Area[e]	Other Sites
Salt River Study Area	Tonto Creek Study Area	Gila River Study Area[b, c]	San Pedro River Study Area[d]		
►Cottonwood Acres I ►Cottonwood Acres II ►Salt River Inflow ►Meddler Point	►A-Cross Road North ►A-Cross Road South ►Bar-X Road ►Orange Peel Campground ►Tonto Creek Inflow	►Dripping Springs Campground ►Dripping Springs Wash ►GRN004 ►GRN007 ►GRN008 ►GRN009 ►GRN018 ►GRN020 ►GRS005 ►GRS007 ►GRS008 ►GRS009 ►GRS010 ►GRS016 ►GRS018 ►Kearny	►Catalina Wash ►Cook's Lake Cienega ►Dudleyville Crossing ►San Pedro - Aravaipa Confluence	►Fort Thomas - Geronimo ►Porter Wash Ponds ►Teague ►Watson Wash	►Waddell Dam ►Monkey's Head ►Chuckwalla Cove ►Clear Lake ►Ehrenberg ►Grand Wash Bay ►Martinez Lake ►Miles 277.0 to 274.0 ►Raven's Nest Beach - Lake Mead ►Snake Beach - Lake Mead ►Hassayampa River Preserve ►Greer Townsite ►River Reservoir ►Pinal Creek ►Alpine Horse Pasture ►Three Links

[a] Alamo Lake-Brown's Crossing, Big Sandy River Downstream US 93, Horseshoe North (Verde River), and Topock Marsh (Colorado River) (represented in Figure 7) are not included as separate columns in the table because they are individual sites (i.e., they are geographically separated from other sites and are not part of a larger study area or location).
[b] GRN# and GRS# are abbreviations for the Gila River North and Gila River South sites.
[c] Located within the Middle Gila River watershed.
[d] Lower San Pedro River near the confluence with the Gila River.
[e] Located within the Upper Gila River watershed.

NEST MONITORING

Statewide Effort

We documented 320 nesting attempts statewide at 36 sites (Table 1, Appendix G). Of these, 218 nests were documented to contain eggs and were monitored. Of the 218 monitored nests, young fledged from 96 (44%), 114 (52%) failed, and 8 (4%) had unknown outcomes (Table 3). Of nests with known outcomes, 46% fledged at least 1 young and 54% failed. Predation was the predominant cause of nest failure (65%; Table 4). Cooper's hawks (*Accipiter cooperii*) and common kingsnakes (*Lampropeltis getula*) have been documented as the most common predators of flycatcher nests at the Roosevelt Lake and San Pedro River/Gila River complexes (AGFD, unpublished data).

Statewide, the earliest occurrence of egg laying in 2006 was on 23 May at Big Sandy River Downstream US 93. The first hatching events occurred on 8 June at Big Sandy River Downstream US 93 and Horseshoe North (Horseshoe Lake) and the first fledging event occurred on 20 June at Big Sandy River Downstream US 93. The last fledging event occurred on 19 August at Big Sandy River Downstream US 93.

At AGFD sites, the earliest occurrence of egg laying in 2006 was on 27 May at Kearny (Gila River study area). The first hatching event occurred on 13 June at GRS018 (Gila River study area) and the first fledging events occurred on 27 June at Kearny, GRS018, and Cottonwood Acres 1 (Salt River study area). The last fledging event occurred on 9 August at Kearny. This is the earliest documented last fledging date at AGFD study areas; prior to 2006, 22 August was the average last fledging date (range: 12 August to 28 August).

Table 3. Willow flycatcher nest monitoring results in Arizona, 2006.

Site		Pairs[a]	Nests[b]	Successful nests[b]	Failed nests	Unknown outcome[c]	Parasitized nests[d]
Roosevelt Lake Complex	Tonto Creek Study Area	44	55	18	36	1	11
	Salt River Study Area	35	41	22	18	1	0
	Total	79	96	40	54	2	11
Gila River Study Area		32	50	23	21	6	0
Grand Wash Bay		2	2	0	2	0	0
Big Sandy River Downstream US 93		18	27	13	14	0	11[f]
Topock Marsh[e]		13	17	7	10	0	6
Monkey's Head		3	5	1	4	0	0
Horseshoe North		12	21	12	9	0	0
All sites		161	218	96	114	8	28

[a] Number of pairs contributing to the number of monitored nests.
[b] Includes 5 territories with fledges but no nest found.
[c] Nests monitored only for a portion of nesting cycle or insufficient evidence for determining outcome.
[d] Includes all parasitized nests, those that both fledged willow flycatcher young or failed.
[e] Cowbird trapping occurred in the area during the breeding season.
[f] Does not include 1 nest that was abandoned with a confirmed cowbird egg but no flycatcher egg.

Parasitism. Brown-headed cowbird parasitism was documented at 28 (13%) of the 218 monitored nests (Table 3). Parasitism led directly to failure of 6 (21%) of those nests (Table 4) because the nest was deserted directly following the parasitism event or the nest fledged only cowbird young. The assigned fate of the other parasitized nests include: predation (25%), desertion (7%), infertility (11%), fledged only flycatcher (4%), fledged both flycatcher and cowbird (18%), and unknown (14%; Table 5). Parasitism was documented at 1 nest post-flycatcher abandonment (prior to egg-laying); this nest is not included in Table 3 because the table only includes nests with flycatcher eggs that were monitored. Cowbirds may have caused or contributed to abandonment or desertion of other nests but direct evidence was not found. Nest parasitism was recorded at Big Sandy River Downstream US 93 (40%), Topock Marsh (35%), and the Tonto Creek study area (20%).

Table 4. Causes of nest failure for willow flycatchers at monitoring areas in Arizona, 2006.

Site		Depredated[a]	Deserted	Parasitized[b]	Infertile clutches	Other[c]
Roosevelt Lake Complex	Tonto Creek Study Area	23	3	1	3	6
	Salt River Study Area	10	2	0	0	6
	Total	33	5	1	3	12
Gila River Study Area		14	0	0	0	7
Grand Wash Bay		1	1	0	0	0
Big Sandy River Downstream US 93		9	0	5[e]	0	0
Topock Marsh[d]		6	2	0	2	0
Monkey's Head		3	1	0	0	0
Horseshoe North		8	0	0	0	1
All sites		74	9	6	5	20

[a] Includes parasitized nests that were later depredated.
[b] Includes only those nests that failed directly due to cowbird parasitism: nest deserted with eggs directly after parasitism event or nest fledged only cowbird young. Two deserted nests were not considered failed due to parasitism and were not included in this column.
[c] The category "Other" includes nests that failed due to weather or unknown causes.
[d] Cowbird trapping occurred in the area during the breeding season.
[e] Does not include 1 nest that was abandoned with a confirmed cowbird egg but no flycatcher egg.

Table 5. Fate of parasitized willow flycatcher nests at monitoring areas in Arizona, 2006.

Outcome	Number of nests
Depredated	7
Nest abandoned[a]	1
Nest deserted directly after parasitism event[b]	1
Nest deserted[c]	2
Infertile	3
Fledged only flycatcher	1
Fledged only cowbird[b]	5
Fledged flycatcher and cowbird	5
Failure of nest due to unknown cause	4
Total parasitized nests	29

[a] Nest abandoned prior to egg-laying; number not reflected in the parasitized nest columns of Tables 3 and 4.
[b] Nest considered failed due to parasitism.
[c] Nest deserted but not considered failed due to parasitism because flycatchers continued to tend to the nest post-parasitism event.

Intensive Nest Monitoring Areas

Nest Success. We were able to calculate Mayfield (1961, 1975) estimates of nest success for 186 of the 320 nests found in Arizona (Table 6); some nests of unknown outcome had enough observations to be included in the analysis. Mayfield nest success for all nests combined was 47%. Mayfield nest success for Tonto Creek, Salt River, and Gila River study areas was 33%, 55%, and 54%, respectively (overall Mayfield nest success at the Roosevelt Lake complex was 42%).

Table 6. Willow flycatcher nest success and productivity of monitored nests at study areas in Arizona, 2006.

Study Area		Mayfield nest success, % (observation days)	Number of young fledged	Mean number of young fledged per nest (*n*)	Mean number of young fledged per successful nest (*n*)
Roosevelt Lake Complex	Tonto Creek Study Area	33 (758)	40	0.85 (47)	2.35 (17)
	Salt River Study Area	55 (653)	48	1.37 (35)	2.40 (20)
	Total	42 (1411)	88	1.07 (82)	2.38 (37)
Gila River Study Area		54 (683)	52	1.33 (39)	2.36 (22)
Big Sandy River Downstream US 93		53 (532)	30	1.20 (25)	2.31 (13)
Monkey's Head		15 (45)	3	0.75 (4)	3.00 (1)
Topock Marsh[b]		23 (191)	10	0.63 (16)	1.67 (6)
Grand Wash Bay		13 (14)	0	0.00 (1)	0.00 (0)
Horseshoe North		67 (477)	25	1.32 (19)	2.08 (12)
All Sites		47 (3353)	208	1.12 (186)	2.29 (91)

[a] *n* = number of nests.
[b] Cowbird trapping occurred in the area during the breeding season.

Nest Productivity. Two hundred and eight young fledged from 91 of the 186 nests where Mayfield estimates were calculated (Table 6). This fledgling total does not include 8 additional fledglings (in 5 territories) that could not be associated with a nest: Salt River (3), Tonto Creek (2), Gila River (2), and Colorado River (1). Of the young presumed to have fledged, we were able to confirm 58% left the nest (i.e., confirmed fledglings were either seen leaving the nest, seen in the area directly around the nest, or seen associating with adults from the nest). The remaining reported fledglings (42%) were presumed fledged based on activities at the nest (i.e., defensive or feeding behavior by adults) or confirmed fledging of siblings. Mean clutch size for all monitored nests was 2.51 eggs.

Female Productivity. We followed 74 females through all nesting attempts (n = 107) to determine female productivity at AGFD study areas. Average seasonal fecundity (mean fledges per female) and average seasonal productivity (mean fledges per nesting attempt per female) were 1.39 and 1.11, respectively (Table 7).

There were 37 females with 1 nesting attempt, 28 with 2 nesting attempts, 7 with 3 nesting attempts, and 2 with 4 nesting attempts (Table 8). There were 8 females (all at the Gila River study area) that attempted a double brood (nesting attempt following a successful nest). Only 2 of these 8 attempts were successful and 1 of those females then attempted a triple brood that failed. There were 28 (52%) females at the Roosevelt Lake complex and 2 (10%) at the Gila River study area that failed to successfully fledge any young.

Table 7: Female productivity at AGFD study areas, 2006[a].

Study Area		No. of Females	Nests	Average Seasonal Fecundity[b]	Average Seasonal Productivity[c]
Roosevelt Lake Complex	Tonto Creek Study Area	28	39	0.75	0.64
	Salt River Study Area	26	31	1.46	1.44
	Total	54	70	1.09	1.03
Gila River Study Area		20	37	2.20	1.33
All Sites		74	107	1.39	1.11

[a] Includes only monitored (not abandoned prior to egg laying) nests.
[b] Mean fledges per female per breeding season.
[c] Mean fledges per nesting attempt per breeding season.

Table 8: Renesting attempts at AGFD study areas, 2006.

Study Area		No. of Females	Percent of females with 1 nest (n)[a]	Percent of females with 2 nests (n)[a]	Percent of females with 3 nests (n)[a]	Percent of females with 4 nests (n)[a]
Roosevelt Lake Complex	Tonto Creek Study Area	28	42.9 (12)	46.4 (13)	7.1 (2)	3.6 (1)
	Salt River Study Area	26	76.9 (20)	15.4 (4)	7.7 (2)	0.0 (0)
	Total	54	59.3 (32)	31.5 (17)	7.4 (4)	1.9 (1)
Gila River Study Area		20	25.0 (5)	55.0 (11)	15.0 (3)	5.0 (1)
All Sites		74	50.0 (37)	37.8 (28)	9.5 (7)	2.7 (2)

[a] n = number of females.

ADULT MOVEMENT

In 2006, we documented 18 total movements of flycatchers between study areas between years and within study areas between years (Table 9). The greatest distance a flycatcher moved was 143.8 km from the San Pedro River study area (San Manuel Crossing) in 2005 to the Tonto Creek study area (Tonto Creek Inflow) in 2006. The most common type of movement detected was within a study area between years. Ten individuals moved from the site where they were last detected (in 2004 or 2005) to a different site within the same study area in 2006. The average distance moved within a study area between years was 3.6 km (range: 0.5 to 6.2 km). Eight individuals moved from the study area in which they were last detected (in 2004 or 2005) to a different study area in 2006. The average distance moved between study areas between years was 57.4 km (range: 30.6 to 143.8 km). Six of the 8 between-study area movements were between drainages at the Roosevelt Lake complex: 4 individuals moved from the Tonto Creek study area to the Salt River study area and 2 moved from the Salt River study area to the Tonto Creek study area. Additionally, 2 individuals moved from the San Pedro River study area to the Roosevelt Lake complex.

EcoPlan Associates and Reclamation detected 2 additional movements, at Horseshoe North (Verde River) and Three Links (San Pedro River) respectively. The flycatcher detected at Horseshoe North (Dockens and Ashbeck 2006) was a male that was detected (but not confirmed to a territory) by AGFD at Tonto Creek Inflow (Indian Point location) in 2005. This male moved 51.1 km between 2005 and 2006, based on where it was last detected on 2 July 2005. The flycatcher detected at Three Links was a female that nested at Wheatfields South (San Pedro River) in 2005 and moved 78.2 km upstream to nest in 2006.

Table 9. Willow flycatcher movements detected at the Roosevelt Lake complex in 2006.

Last Detected in		Site Detected in 2006	Distance Moved (km)	Federal Bird Band Number	Color Band[a]		Age[b] 2006	Sex[c]
Site	Year				Left Leg	Right Leg		
Between year movement – between San Pedro River study area and Tonto Creek or Salt River study areas								
San Manuel Crossing	2005	Tonto Creek Inflow	143.8	2240-84075	DD	DYD	A5Y	F
San Manuel Crossing	2005	Cottonwood Acres I	119.6	2360-07124	YD	DX	ATY	F
Between year movement – between Tonto Creek and Salt River study areas, Roosevelt Lake complex								
A-Cross Road North	2005	Cottonwood Acres I	32.8	2290-24360	XX	OW	ATY	F
A-Cross Road North	2005	Cottonwood Acres I	32.5	2280-96683	GG	VV	ATY	F
A-Cross Road South	2005	Cottonwood Acres I	31.7	1490-89724	RG	VV	ATY	F
Tonto Creek Inflow	2005	Cottonwood Acres I	30.6	1490-89732	VV	YV	ATY	F
Lake Shore	2004	Bar-X Road	32	2280-96685	WRW	GG	ATY	F
Cottonwood Acres I	2005	Bar-X Road	36.5	1490-89926	VV	ZZ	ASY	F
Between year movement – within Tonto Creek study area								
Bar-X Road	2005	A-Cross Road North	4.7	1740-51619	KOK	VV	ASY	F
A-Cross Road South	2005	Bar-X Road	4.8	2350-24436	NN	WV	ASY	F
A-Cross Road South	2005	Bar-X Road	4	1710-20288	VV	RYR	A7Y	M
A-Cross Road South	2005	Tonto Creek Inflow	2	1710-46173	KK	WKW	ASY	F
A-Cross Road South	2005	Tonto Creek Inflow	2.2	2290-24290	VY	GG	ATY	M
Tonto Creek Inflow	2005	Bar-X Road	6.2	2350-24193	RY	GG	ATY	F
Orange Peel Campground	2004	A-Cross Road South	3.2	2280-96665	GG	KK	A5Y	M
Between year movement – within Salt River study area								
School House North	2004	Cottonwood Acres I	5.2	1710-20462	DY	ZZ	A6Y	M
Salt River Inflow	2005	Cottonwood Acres I	2.7	1490-89954	YKY	ZZ	A5Y	M
Cottonwood Acres I	2005	Cottonwood Acres II	0.5	2290-24208	GW	GG	ASY	F

[a] D = Blue, G = Green, K = Black, N = Bronze, O = Orange, R = Red, V = Violet, W = White, X = Silver, Y = Yellow, Z = Gold
[b] ASY = 3rd year or older, ATY = 4th year or older, A5Y = 6th year or older, A6Y = 7th year or older, A7Y = 8th year or older
[c] F = Female, M = Male

HABITAT CHARACTERISTICS

Although vegetation composition varied, most sites where flycatchers were documented shared certain landscape characteristics. Occupied sites were commonly in broad floodplains with dense riparian habitat where water or saturated soil was present sometime during the breeding season.

Resident flycatchers were not detected at 15 mid-elevation (between 1,115 m and 2,400 m) sites (see Appendices F, G). Riparian vegetation at these intermediate elevations was often in narrow bands along high-gradient streams prone to frequent scouring by floods and dominated by native vegetation including Arizona sycamore, Fremont cottonwood, Goodding's willow, coyote willow (*Salix exigua*), and velvet mesquite (*Prosopis velutina*).

General vegetation characteristics were reported for 34 of the 36 breeding sites. Most (28 of 34) breeding sites were characterized as mixed native/exotic associations, however, the amount of tamarisk varied within and among sites. Five breeding sites (GRS007, GRN018, Cottonwood Acres I and II, and Topock Marsh) were composed of dense monotypic stands of tamarisk, forming a nearly continuous closed canopy.

Statewide, nesting substrate was documented for 266 of the 320 nesting attempts (Table 10). Of the 266 attempts, 176 were located at the Roosevelt Lake and San Pedro/Gila River complexes; therefore, reported data may not be representative of flycatcher use statewide. Tamarisk and Goodding's willow were the primary nesting substrates in Arizona. In 2006, the second record in Arizona of use of velvet ash (*Fraxinus velutina*) was documented as a nesting substrate (GRS010, Gila River study area in 2006 and Cook's Lake Cienega, San Pedro River study area in 2004). This was the third breeding season with records of snags as nesting substrate. In 2006, 4 nests were placed in snags (3 at Tonto Creek Inflow and 1 at Three Links). Prior to 2006, snags were only documented as nesting substrate in 4 instances along the San Pedro River (in 2004 and 2005). Flycatchers nested in mesquite at Cook's Lake Cienega for the third consecutive year. Mean nest height at the Roosevelt Lake complex was 3.80 m ($s = \pm 1.40$; $n = 68$; Appendix H).

Table 10. Tree species used for willow flycatcher nesting in Arizona, 2006.

Substrate	No. of nests
Velvet ash (*Fraxinus velutina*)	1
Fremont cottonwood (*Populus fremontii*)	6
Mesquite (*Prosopis* spp.)	4
Coyote willow (*Salix exigua*)	2
Goodding's willow (*Salix gooddingii*)	68
Tamarisk (*Tamarix* spp.)	181
Snag (*Salix exigua, Salix gooddingii, and Tamarix* spp.)	4
Total	266

DISCUSSION

SURVEYS

Annual statewide surveys provide critical information concerning distribution and abundance of flycatchers in Arizona. These data allow agency resource managers and private organizations to make decisions regarding research, management, and conservation efforts. It is important to realize when comparing flycatcher populations between years that survey effort can differ considerably. Not all sites are surveyed each year and among those surveyed in consecutive years, effort may not be equivalent. Here, we make the distinction between fluctuations in flycatcher population sizes based on 1) *all* documented flycatcher territories statewide (for comparison with previous AGFD reports) which is largely a function of survey effort and 2) *only* those territories documented at sites and/or locations within sites surveyed in both 2005 and 2006 which provides a more accurate measure of changes in population size. We focus on flycatcher territories rather than total number of adults because confidently documenting breeding pairs often requires additional site visits not required by the survey protocol (Sogge et al. 1997).

During the 2006 survey effort, 70% of *all* documented flycatcher territories were concentrated in 3 areas of the state: the Roosevelt Lake complex (31%), the San Pedro River/Gila River complex (20%), and the Gila-Safford area (19%). In 2006, based on *all* statewide flycatcher detections, 27% fewer flycatcher territories were detected statewide than in 2005, following a 7% decrease from 2004 to 2005 (351 territories in 2006; 483 in 2005; 522 in 2004; English et al. 2006, Munzer et al. 2005). Likewise, the number of flycatcher adults detected in 2006 declined by 29% from 2005, following a 6% decline from 2004 to 2005 (624 adults in 2006, 883 in 2005, 940 in 2004; English et al. 2006, Munzer et al. 2005). The largest decline in flycatcher territories between 2005 and 2006 was at the San Pedro River study area (28 territories in 2006, 157 in 2005; English et al. 2006). However, this apparent decline is an artifact of fewer sites being surveyed along the study area in 2006.

In previous years, AGFD surveyed 16 sites at the San Pedro River study area (Figure 2). In 2006, we did not conduct surveys along the San Pedro River because our funding agency, Reclamation, had met Section 7 commitments related to the 1996 Biological Opinion (USFWS 1996). However, Reclamation, SRP, and The Nature Conservancy (TNC) personnel conducted surveys at select sites (4 of the 16 sites) along the San Pedro River. Sites surveyed were Dudleyville Crossing (5 territories in 2006, 15 in 2005), Cook's Lake Cienega and Seep (10 territories in 2006, 11 in 2005), Aravaipa Confluence (10 territories in 2006, 10 in 2005), and Catalina Wash (3 territories in 2006, 4 in 2005; English et al. 2006). The decline in flycatcher territories at Dudleyville Crossing may be due to a combination of decreased site visits and a reduction in suitable habitat due to a fire on the San Pedro River Preserve late in the breeding season in 2005 (see Habitat section). The remaining sites surveyed along the San Pedro River in 2006 show stable territory numbers relative to 2005. As additional evidence of stability, Three Links, a site on the San Pedro River south of the San Pedro River study area, supported 12 territories in 2006 and 7 in 2005. Sufficient data do not exist to speculate whether the San Pedro River population

increased or declined in 2006, however, based on data from these select sites, a considerable population change was not apparent.

In order to factor out changes in survey effort and more accurately assess statewide population changes between 2005 and 2006, we excluded sites *only* surveyed during one of the years (i.e., some sites at the San Pedro River study area only surveyed in 2005, a portion of the Teague site [Gila-Safford area; discussed below] only surveyed in 2006, and all other sites statewide not surveyed in both years). Based on these sites *only* surveyed in both years, the 2006 survey effort documented an 11% statewide decline in territories; the largest *actual* decline in flycatcher territories was once again at the Roosevelt Lake complex. The number of flycatcher territories at the Roosevelt Lake complex decreased by 27% for the second consecutive year (111 territories in 2006, 153 in 2005, 209 in 2004; English et al. 2006, Munzer et al. 2005); territories have decreased by a total of 47% since 2004 (Munzer et al. 2005). This decline can be attributed to the 2005 inundation (Figures 3, 8, and 9) and subsequent reduction in suitable habitat due to die off of inundated vegetation (see Habitat section). In 2006, flycatchers were found in nearly all the same areas as those occupied in 2005 (Figures 8 and 9). Exceptions include Grapevine (1 territory in 2005, 0 in 2006), School House Point South (2 territories in 2005, 0 in 2006), Old Salt (9 territories in 2005, 0 in 2006) and Meddler Point (0 territories in 2005, 1 in 2006) on the Salt River, and The Burbs (2 territories in 2005, 0 in 2006) and Indian Point (9 territories in 2005, 0 in 2006) at Tonto Creek.

Following inundation in 2005, flycatchers at the Salt River study area tended to move upstream relative to areas occupied prior to inundation (Figure 8; English et al. 2006). In 2005, the farthest upstream site where residents were detected, Cottonwood Acres II, was occupied for the first time. Another site occupied in 2005, Cottonwood Acres I, had only been occupied in 1999 and 2000 (only 1 territory in both years; Paradzick et al. 2000, 2001). This year, 1 flycatcher resided even farther upstream at a previously unoccupied site, Meddler Point, where the habitat along the river's edge is maturing to suitable flycatcher habitat.

In general, Salt River study area sites closest to the lake declined in flycatcher abundance in 2006 and sites upstream remained stable. More specifically, 2 sites, School House Point North and Lake Shore (84 and 15 territories in 2004, respectively; Munzer et al. 2005) did not support flycatchers in 2005 or 2006 (see Habitat section). School House Point South (5 territories in 2004, 2 in 2005) was not occupied in 2006 after an initial decline in 2005. The Salt River Inflow site has experienced a dramatic decline since 2004 (36 territories in 2004, 22 in 2005, 4 in 2006; see Habitat section). Farther upstream, Cottonwood Acres I (38 territories in 2005, 38 in 2006) and Cottonwood Acres II (6 territories in 2005, 7 in 2006) had virtually the same number of flycatchers in 2006 as 2005 (English et al. 2006).

Similar to the Salt River study area, flycatchers at the Tonto Creek study area tended to move upstream in 2005 relative to areas occupied pre-inundation (Figure 9; English et al. 2006). A-Cross Road North was occupied for the first time in 2005. Other sites occupied in 2005, Tonto Creek Inflow and A-Cross Road South, had not been occupied since 2003 and 2001, respectively (Smith et al. 2002, 2004). In 2006, the number of flycatcher territories generally declined at all

sites at the Tonto Creek study area. The exception was Bar-X Road (the site farthest upstream from the lake not inundated in 2005 or 2006; 10 territories in 2004, 12 in 2005, 20 in 2006). One site, Bermuda Flats (40 territories in 2004) did not support flycatchers in either 2005 or 2006. This site was completely inundated in 2005 and tops of dead trees were exposed in 2006 as lake levels dropped. Another site, Orange Peel, has steadily declined since 2004 (19 territories in 2004, 5 in 2005, 2 in 2006) due to loss of habitat resulting from inundation. The 3 sites that flycatchers moved to in large numbers in 2005 all experienced decreases in flycatchers in 2006 (Tonto Creek Inflow: 0 territories in 2004, 37 in 2005, 20 in 2006; A-Cross Road South: 0 territories in 2004, 20 in 2005, 11 in 2006; A-Cross Road North: 0 territories in 2004, 10 in 2005, 8 in 2006).

Flycatchers may have moved to areas on private property even farther upstream from Bar-X Road; however, we were not able to obtain access to these sites to conduct surveys. Different factors may have influenced the observed decrease of flycatchers at some sites at the lake. For example, A-Cross Road South may have supported fewer flycatchers in 2006 because water conditions (i.e., presence of saturated soil) were less suitable than in 2005 due to receding lake levels, while the decline in flycatchers at Salt River Inflow may be attributed to vegetation die-off (see Habitat section).

At the Gila River study area, flycatcher territories increased 39% in 2006 (28 territories in 2005, 39 in 2006); following a 100% increase in flycatcher territories from 2004 to 2005 (English et al. 2006, Munzer et al. 2005). Resident flycatchers were documented for the first time at 4 sites: GRS005, GRN007, GRS008, and GRS009 (each supported 1 territory in 2006). Four other sites, each supporting 1 territory in 2006, did not support residents in 2005: GRN004 (last occupied in 2003), GRN008 (last occupied in 2002), GRN009 (last occupied in 2002), and GRN020 (last occupied in 1999). Dripping Springs Campground, which supported 1 territory for the first time in 2005, increased to 5 territories. Dripping Springs Wash, which supported 1 territory in 1999 and 1 in 2005, increased to 3 territories in 2006. Kearny also increased from 3 territories in 2005 to 5 territories in 2006. Three sites at the Gila River study area decreased from the number of territories they supported in 2005: GRS007 (6 to 4), GRS018 (9 to 7), and GRN018 (6 to 5). The observed increases in territories at the Gila River study area in 2005 and 2006 coincide with consistent and greater water releases from Coolidge Dam throughout the breeding seasons compared to 2002, 2003, and 2004 (Figure 5; see Habitat section).

For the second consecutive year, increased survey effort at the Gila-Safford area resulted in a greater number of flycatcher territories detected (31 territories in 2005, 65 in 2006). This area includes Teague (59 territories), Fort Thomas-Geronimo (2 territories), Porter Wash Ponds (2 territories), and Watson Wash (2 territories). Porter Wash Ponds and Watson Wash supported the same number of territories in 2005 and 2006, Fort Thomas-Geronimo decreased by 3 territories, and Teague increased by 37 territories. Flycatchers were documented at Teague for the first time in 2005 (only a portion of the site had previously been surveyed from 1997 to 1999). The area surveyed increased greatly in both 2005 and 2006. From 1997 to 1999, approximately 0.5 km of habitat was surveyed at Teague compared to approximately 3.6 km in 2005 and 5.7 km in 2006.

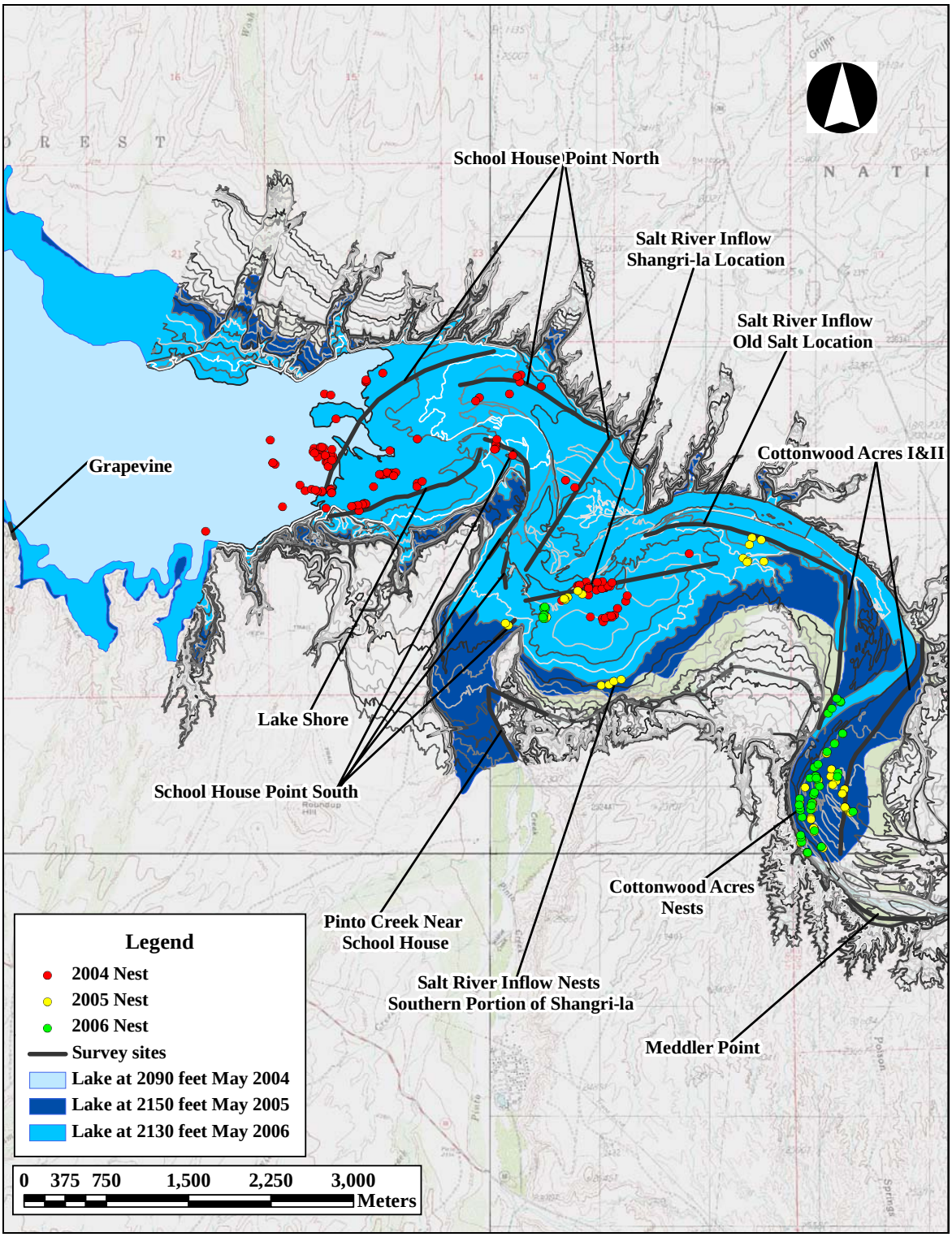

Figure 8. Map of the Salt River study area at the Roosevelt Lake complex depicting approximate lake levels and nesting locations during the 2004, 2005, and 2006 breeding seasons. "Survey sites" indicate the general location of sites and locations within sites.

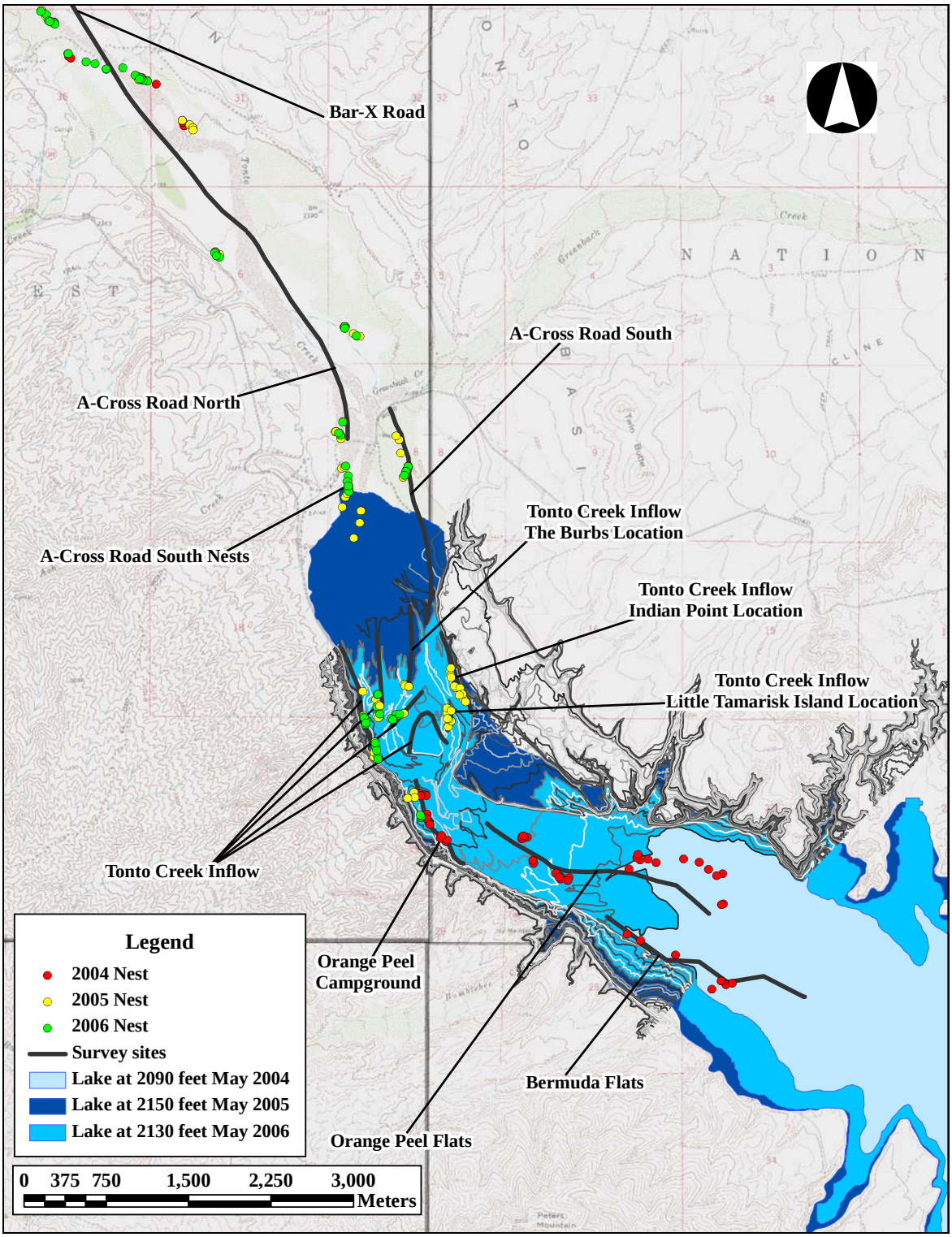

Figure 9. Map of the Tonto Creek study area at the Roosevelt Lake complex depicting approximate lake levels and nesting locations during the 2004, 2005, and 2006 breeding seasons. "Survey sites" indicate the general location of sites and locations within sites.

In 2006, survey effort increased compared to 2005 in the southern portion of the site and 18 territories were detected in this newly surveyed area (Dockens et al. 2006). The area covered from 1997 to 1999 did not support flycatchers in 2005 or 2006.

In addition to the sites mentioned above (Meddler Point, GRS005, GRN007, GRS008, and GRS009), flycatchers were documented for the first time at 5 Colorado River sites (Martinez Lake and 4 sites at Lake Mead). Flycatchers were also documented at 9 sites that were not occupied in 2005 but had been occupied in previous years. These sites were on the Gila (GRN004, GRN008, GRN009, GRN020), Colorado (Clear Lake, Ehrenberg, Miles 277.0 to 274.0 R GC), Little Colorado (Greer Townsite), and Agua Fria (Waddell Dam) rivers. In addition to the sites mentioned at the Roosevelt Lake complex, Topock Marsh (Colorado River; 21 territories in 2005, 13 in 2006) and Big Sandy River Downstream US 93 (33 territories in 2005, 24 in 2006) had notable decreases in territories. In addition to Grapevine and School House Point South on the Salt River, 4 sites were not occupied in 2006 after supporting flycatchers in 2005: on the Colorado (Waterwheel Cove), San Pedro (Hereford Bridge), and Verde (Ister Flat) rivers and on Queen Creek (Whitlow Dam, Gila River drainage). Of the 15 new survey sites in 2006, only 2 (Chuckwalla Cove and Grand Wash Bay at Lake Mead) supported flycatchers.

NEST MONITORING

Complementing the statewide survey effort, AGFD and cooperating agencies have searched for and monitored nests since 1996 to identify breeding areas, evaluate nesting success, and better understand demographic parameters that may drive changes in local, statewide, and regional populations. This monitoring effort has yielded annual estimates of nest success statewide and estimates of productivity at AGFD study areas. In 2006, overall Mayfield nest success in Arizona decreased slightly compared to 2005 (55% in 2005, 47% in 2006).

Over the past 10 years, the San Pedro River/Gila River complex has averaged slightly higher Mayfield nest success compared to the Roosevelt Lake complex (Gila River study area: 58%; San Pedro River study area: 53%; Salt River study area: 50%; and Tonto Creek study area: 47%). This year, direct comparison between the 2 complexes is no longer possible because the San Pedro River study area was not monitored. Mayfield nest success at the Gila River study area was slightly higher (54%) than the Roosevelt Lake complex as a whole (42%). However, Mayfield nest success at the Salt River study area was 55%, up from 46% in 2005, while Mayfield nest success at the Tonto Creek study area was 33%, down from 46% in 2005. At both Roosevelt Lake study areas, Mayfield nest success has fluctuated greatly since the documented lows in 2002 (Salt River study area: 16% in 2002, 63% in 2003, and 39% in 2004; Tonto Creek study area: 12% in 2002, 53% in 2003, and 17% in 2004; Figure 10; Smith et al. 2003). At 3 sites at the Roosevelt Lake complex, all of the nests with known outcomes failed: A-Cross Road South (13 nests), Salt River Inflow (8 nests), and Orange Peel Campground (3 nests). At the Gila River study area, Mayfield nest success decreased from 78% in 2005, but was similar to the area's 10-year average. This decrease was greatly influenced by a high failure rate (73%) at

Kearny. Nesting was documented for the first time at 4 sites at the Gila River study area: Dripping Springs Campground, Dripping Springs Wash, GRN007, and GRS008.

At cooperator sites, nesting was documented at high elevation sites for the first time since 2001 (River Reservoir on the Little Colorado River; 2 nests in 2006). Flycatchers may have been nesting at River Reservoir since 2001, but decreased survey effort in the past few years may have precluded documentation of breeding. Survey effort was reduced at Alamo Lake, where nesting was not documented for the first time since surveys began at the site in 1996 (9 nests in 2005). It is probable that nesting occurred at Alamo Lake in 2006, but priority was not given to locating nests. Mayfield nest success was similar compared to 2005 at Big Sandy River Downstream US 93 (53% in 2006, 55% in 2005) and increased at Topock Marsh (23% in 2006, 15% in 2005) and Horseshoe North (67% in 2006, 52% in 2005). Monkey's Head experienced a substantial decline from 2005 (15% in 2006, 100% in 2005) though this was likely exaggerated by small sample sizes (5 monitored nests in 2006, 2 in 2005).

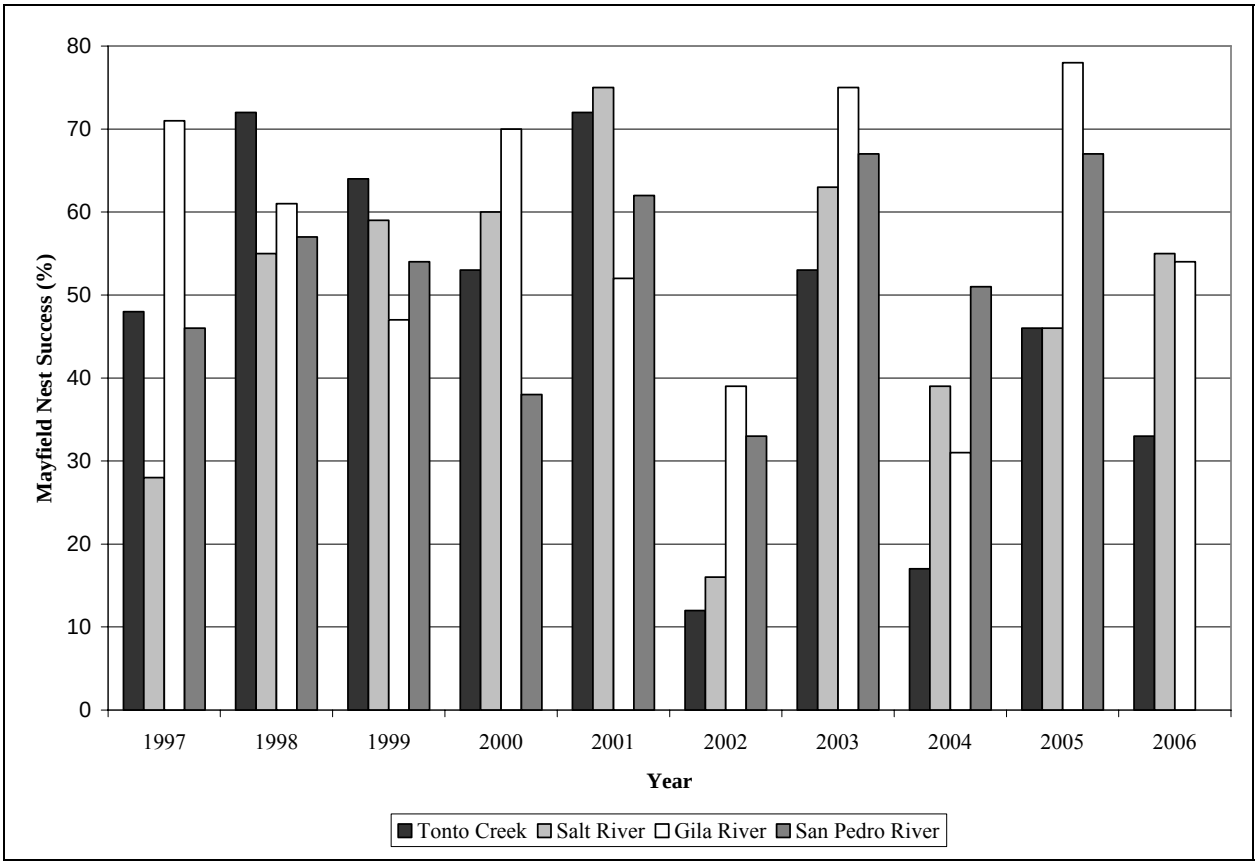

Figure 10. Mayfield nest success at AGFD study areas (Tonto Creek, Salt River, Gila River, and San Pedro River), 1997 to 2006.

The average seasonal fecundity (fledges per female) for AGFD study areas was 2.11 fledges in 2005 and 1.39 fledges in 2006. These numbers are not comparable because they include data

from some sites not monitored in both years. To make a direct comparison, we calculated average seasonal fecundity for 2005 and 2006 excluding the San Pedro River data from 2005 and all other sites where females were not monitored in both years. This resulted in an average seasonal fecundity of 2.01 in 2005 which decreased to 1.31 in 2006.

At the study area level (including all sites monitored in both years), the Salt River study area decreased for the third consecutive year from 1.57 fledges in 2005 to 1.46 fledges (1.64 fledges in 2004; English et al. 2006, Munzer et al. 2005). Both the Tonto Creek study area and the Gila River study area decreased in 2006 following an increase in 2005 (Tonto Creek study area: 0.60 in 2004, 1.56 in 2005, and 0.75 in 2006; Gila River study area: 1.08 in 2004, 3.15 in 2005, and 2.20 in 2006). In 2006, 50% of AGFD monitored females attempted to renest. Documented renest attempts at AGFD sites have been increasing in recent years (39% renested in 2005 and 2004, 23% renested in 2003, and 4% renested in 2002) and are now similar to renest rates in 2001 (48%). Variation in a number of factors (e.g., observer ability to find renests, environmental variables, success rate of first attempts) among years may be influencing this trend.

At the Roosevelt Lake complex, 13% (12 of 96) of monitored nests were considered partially inundated at the time of nest-site selection in 2006, compared to an estimated 65% in 2005 (English et al. 2006). The percentage of nests located in trees that were partially inundated decreased from 95% in 2005 to 17% in 2006 at the Salt River and from 43% to 9% at Tonto Creek. The 12 monitored nests in trees that were partially inundated in 2006 were located at Salt River Inflow (7), Tonto Creek Inflow (4), and Orange Peel Campground (1). Of these nests, only 2 were successful.

Cowbird parasitism rates on flycatcher nests are site specific and can vary significantly throughout the flycatcher's range. The mere presence of cowbirds at a site does not mean parasitism will occur; factors such as density of cowbirds, density of flycatchers, density of alternative hosts, degree of habitat fragmentation, and winter rainfall likely interact to determine parasitism rate. Therefore, trapping may be beneficial to flycatchers at some sites, but may be unnecessary at other sites (USFWS 2002). For the third consecutive year, there was no trapping at the Gila River study area. Though cowbirds were detected at 16 of 22 sites at the Gila River study area, no cases of parasitism were documented. For the fifth consecutive year, there was no cowbird trapping at the Roosevelt Lake complex. Parasitism at Roosevelt Lake increased from 3% in 2005 to 11% in 2006, above the 10-year mean of 6% (mean includes 6 years, 1996 to 2001, in which cowbird trapping was conducted at the lake). In 2006, all of the parasitized nests (11) at the Roosevelt Lake complex were located at the Tonto Creek study area. It is unclear what factors (e.g., habitat fragmentation following inundation, low winter rainfall) may have influenced the increase in parasitism. Prior to 2006, cowbird parasitism was documented above the 10-year mean at the Roosevelt Lake complex in 2 years, 1996 and 2002 (12% and 35% of nests were parasitized, respectively). In 2002, low winter rainfall was the suggested cause of low reproductive success, fewer nesting attempts, and increased cowbird parasitism (Smith et al. 2003). Winter rainfall in the Salt/Verde watershed prior to the 2006 breeding season was among the driest on record (SRP 2006), perhaps influencing lower nest success and increased parasitism

documented at Tonto Creek. This is contradictory, however, to the documented higher nest success and lack of parasitism at the Salt River study area in the same watershed. The Tonto Creek study area may be more susceptible than the Salt River study area to parasitism because of its closer proximity to human development.

At 2 cooperator sites, parasitism remained high, increasing from 29% in 2005 to 41% in 2006 at Big Sandy River Downstream US 93, but decreasing from 47% in 2005 to 35% in 2006 at Topock Marsh. In 2006, SWCA conducted cowbird trapping at Topock Marsh, but trapping seems to be insufficient at controlling cowbird parasitism there (see McLeod et al. 2006).

ADULT MOVEMENT

Flycatcher movements can provide important information for resource managers regarding site fidelity and the response of flycatchers to significant disturbance events (e.g., Roosevelt Lake habitat inundation). Here we report detected flycatcher movements in 2006; CPRS reported movements detected at the Roosevelt Lake complex in previous years (1996 to 2005; see Causey et al. 2006). AGFD and CPRS did not capture and color-band flycatchers this year; therefore, banded adults detected at AGFD study areas were banded prior to 2006. This lack of banding effort combined with less resighting effort (no CPRS crew at the lake and fewer sites surveyed along the San Pedro River) contributed to fewer movements detected.

In 2006, AGFD documented 18 flycatcher movements. The 18 movements were all detected at the Roosevelt Lake complex. Of these movements, 10 were between years (either 2004 or 2005 to 2006) and within a study area. The other 8 movements were between years and between study areas. Of these 8 movements, 4 individuals moved from the Tonto Creek study area to the Salt River study area, 2 moved from the Salt River study area to the Tonto Creek study area, and 2 moved from the San Pedro River study area to the Roosevelt Lake complex. Both of the flycatchers that moved from the San Pedro River study area to the Roosevelt Lake complex were females that nested successfully at San Manuel Crossing in both 2004 and 2005. One of these females moved to the Tonto Creek study area and the other moved to the Salt River study area in 2006. This year is the first year since 2003 that flycatchers have been documented moving from the San Pedro River study area to the Roosevelt Lake complex (Causey et al. 2006).

In 2006, cooperators (EcoPlan Associates and Reclamation) detected 2 flycatcher movements. EcoPlan Associates detected a between-year between drainage movement: a male that moved from the Roosevelt Lake complex (Tonto Creek) in 2005 to Horseshoe Lake (Verde River) in 2006 (Dockens and Ashbeck 2006). Reclamation detected a between-year within drainage (San Pedro River) movement: a female that moved upstream from Wheatfields South in 2005 to Three Links in 2006.

Following habitat inundation, AGFD and CPRS documented 4 flycatcher movements from the main study areas of the Roosevelt Lake complex (detected in 2004) to Pinal Creek (detected in 2005), a periphery site of the complex (Causey et al. 2006). We have also documented 2 flycatcher movements from the Roosevelt Lake complex to drainages away from the lake

following habitat inundation (Causey et al. 2006, Dockens and Ashbeck 2006, English et al. 2006). One of these movements was made by a female that was banded as an adult at the Roosevelt Lake complex (Bar-X Road) in 2004 and moved 150 km to the San Pedro River (San Manuel Crossing) in 2005 (Causey et al. 2006, English et al. 2006). The second movement was made by a male that was banded as an adult at the Roosevelt Lake complex (Orange Peel Campground) in 2004, recaptured the same year (Bermuda Flats), detected (but not confirmed to a territory) in 2005 at Tonto Creek Inflow, and moved 51 km to Horseshoe Lake in 2006 (Dockens and Ashbeck 2006). In addition to these 6 movements away from the main study areas of the Roosevelt Lake complex, another 6 flycatchers detected at the complex moved to the Verde (4) and Lower Colorado (1) rivers and Pinal Creek (1), though it is unclear whether these movements occurred in years prior to habitat inundation (i.e., they were not detected in 2004; Causey et al. 2006, Dockens and Ashbeck 2006). The 6 (possibly 12) movements mentioned here do not explain the decrease of 163 flycatcher adults detected at the Roosevelt Lake complex from 2004 to 2006.

After 2 years of surveys following the drastic change to the habitat caused by inundation, it is not well documented that flycatchers have dispersed from the lake to alternate breeding sites. More non-territorial floaters, which may increase when habitat is limited, were detected by CPRS in 2005 compared to typical previous years (5 to 9 in typical years, 25 in 2005; Causey et al. 2006). It is possible that the large floater population in 2005 experienced higher mortality (perhaps during fall migration due to low food resources) than territorial birds (Causey et al. 2006). However, it seems likely that a large portion of flycatchers unaccounted for following inundation have dispersed in order to find habitat appropriate for breeding and have gone undetected, either because they are in areas not being surveyed or cooperating surveyors are not focused on resighting.

HABITAT

The flycatcher occupies a wide variety of riparian habitats across its range (McCarthey et al. 1998, Skaggs 1996, Whitfield and Enos 1996). The majority of occupied sites in Arizona are mixed native/exotic vegetation, with tamarisk being an important component. Importance of riparian vegetation for this species has continuously been at the forefront of recovery discussions (USFWS 2002). Diversity in species composition of occupied habitats suggests that flycatchers may rely on structure of vegetation as much as, or more than, specific species of vegetation. Recent studies of flycatcher physiology, immunology, site fidelity, productivity, and survivorship suggest native and exotic habitats do not differ in quality for flycatchers (Owen et al. 2005, Sogge et al. 2006).

Over the years, we have documented the ephemeral nature of flycatcher habitat and the corresponding fluctuation of flycatcher numbers at AGFD study sites. In 2005 and 2006, major habitat changes occurred at Roosevelt Lake. Because winter precipitation within the Salt/Verde watershed in 2006 was among the lowest on record (SRP 2006), lake levels dropped slowly at Roosevelt Lake throughout the winter (Figure 3). Lake levels continued to drop through the breeding season and reached a low of 59% capacity in August, following a high of 96% in May

2005. In 2005, when the lake increased to near capacity from increased winter rainfall and runoff, the majority of recently occupied flycatcher sites at the lake were either completely submerged or partially inundated resulting in dramatic changes to available habitat and a decline of 27% in flycatcher territories (English et al. 2006). Vegetation at several sites that had survived inundation in 2005 died in 2006; tamarisk seemed more susceptible to post-inundation die-off compared to native vegetation. Other studies (e.g., Gladwin and Roelle 1998, Stromberg et al. 1993, Stromberg 1997) seem to support this observation (but see Sprenger et al. 2001, Warren and Turner 1975). Stromberg et al. 1993 found native trees were favored following inundation because they were larger and were situated on slightly higher floodplains (possible explanations for our observation at the Roosevelt Lake complex). The continued loss of suitable habitat between 2005 and 2006 likely contributed to another decline of 27% in flycatcher territories at the Roosevelt Lake complex in 2006.

As lake levels dropped in 2006, dead trees were exposed at School House Point North and Lake Shore on the Salt River and Bermuda Flats and Orange Peel Flats on Tonto Creek. These sites were completely inundated in 2005 and most of 2006, and did not support flycatchers for the second consecutive year. Vegetation die-off occurred at 5 sites (or locations within sites) that supported flycatchers in 2005 but were not occupied in 2006: Old Salt, the southernmost portion of Shangri-la, and School House Point South at the Salt River study area (9, 4, and 2 territories in 2005, respectively); and Indian Point and The Burbs (9 and 2 territories in 2005, respectively) within Tonto Creek Inflow at the Tonto Creek study area. At Orange Peel Campground (5 territories in 2005, 2 in 2006), the tamarisk understory died while Goodding's willow overstory survived. A substantial portion of this site was lost due to erosion when lake levels rose in 2005. Finally, A-Cross Road South (20 territories in 2005, 11 in 2006) did not appear to decline in vegetation quality; rather, the decrease in flycatchers observed at this site may have been due to more attractive site conditions (i.e., increased saturated soil) in 2005 when lake levels were higher.

Regeneration of vegetation was observed in some areas at Roosevelt Lake in 2006. At the Salt River study area, tamarisk began to regenerate at some sites that were partially inundated in 2005 (e.g., Cottonwood Acres I and II) when water levels dropped at these sites in the summer and fall of 2005. By the end of the 2006 breeding season, tamarisk had grown to approximately 1.5 m in height at these sites. At the southernmost portion of Shangri-la, native vegetation began to regenerate after water levels dropped at this location in the spring of 2006. At the Tonto Creek study area, water levels also continued to drop at some sites (e.g., Tonto Creek Inflow) in the spring of 2006 and Goodding's willow started to regenerate (approximately 0.5 m in height by the end of the breeding season). It seems that spring drawdown may be more conducive to native species regeneration. Stromberg et al. (1993) and Levine and Stromberg (2001) suggest that native vegetation are favored over tamarisk if germination sites are moistened only during spring and become dry during summer. However, it was observed that some of the new willow growth at Tonto Creek Inflow died as drying occurred in late summer.

For the second consecutive year, sites at the Gila River study area experienced greater and more consistent water flow throughout the breeding season due to releases associated with downstream

demands and increased storage at Coolidge Dam at the San Carlos Reservoir. From 2002 to 2004, the Gila River dried completely by mid-season (Munzer et al. 2005). Average stream flow at the Kelvin Bridge during the breeding season (April through August) from 2002 to 2004 was 83 cfs, compared to 657 cfs in 2005 and 671 cfs in 2006 (Appendix D; USGS 2007). From 2002 to 2004, the number of flycatcher territories declined by nearly half each year (44% decline from 2002 to 2003, 46% from 2003 to 2004). Territories doubled (14 to 28 territories) from 2004 to 2005 and continued to increase from 2005 to 2006 (39% increase; 28 to 39 territories). Based on this pattern, it can be speculated that the return in constant flows to the Gila River has positively influenced flycatcher recruitment at the Gila River study area.

Near the end of the 2006 breeding season (29 July to 2 August), a major flooding event occurred at the Gila River study area due to increased precipitation along the San Pedro River drainage. This event damaged flycatcher habitat and adversely affected some of the remaining nests downstream on the Gila River. Prior to the flood event, the Gila River stream flow (at the Kelvin Bridge) during the breeding season averaged 434 cfs. From 29 July to 2 August, average stream flow was 6,406 cfs (flows peaked at 20,100 cfs on 1 August). The flood deposited debris, cobble, and small boulders onto banks, caused erosion (exposing tree roots), and destroyed or altered several flycatcher nest sites. Overall, habitat damage was variable. In general, regenerating vegetation on islands and banks adjacent to the river was adversely affected. Thirteen nests along the Gila River were active at the time of the flood, 3 of which failed due to the flood. The nests that did not fail were either upstream from the confluence of the San Pedro and Gila rivers (3 nests), or were in areas where habitat structure was not affected and the nest itself was higher than the maximum flood height (7 nests). Two nests that were destroyed during the flood may have been deserted with eggs just prior to the flood (the females were not defending these nests when checked on 24 July). In all, we estimate that in addition to the 3 nests that failed due to the flood, 15 inactive nests (active in 2006 prior to the flood) were in areas that suffered great impact from the flood that would have likely caused failure if the nests were active.

While hydrological events (e.g., scouring floods, sediment deposition, periodic inundation) are important for flycatcher riparian habitat development and recycling (USFWS 2002), the Gila River flood event seemed to damage younger regenerating vegetation rather than unsuitable mature vegetation. Nevertheless, this flood event will likely enhance flycatcher habitat in the long-term by encouraging new growth, and thus, age-class diversity. Future surveys at the Gila River study area will determine if the flood event resulted in short-term flycatcher decline or shifts in distribution.

In previous years, we have documented fires altering suitable habitat and flycatcher occupancy at some AGFD sites. For example, the PZ Ranch site (San Pedro River study area) experienced continued declines in flycatchers following a fire that burned three-quarters of the site during the breeding season in 1996 (8 territories in 1996, 5 in 1997, 1 in 1998, 1 in 1999, 0 territories from 2000 to 2005; English et al. 2006). Suitable habitat never regenerated in the area of the fire at PZ Ranch largely due to the cessation of agricultural runoff that was maintaining the riparian vegetation at the site. Because of the compounding factor of reduced water at the site, it is not known if flycatchers would have persisted at the site if the fire did not occur. Perhaps, other fires

at our sites may allow more insight into short and long-term responses of flycatchers and flycatcher habitat to such disturbance events. Fires have occurred more recently at 2 AGFD sites: Kearny (Gila River study area) and Dudleyville Crossing (San Pedro River study area) in 2004 and 2005, respectively.

At the Kearny site, a fire burned approximately two-thirds of the suitable habitat late in the 2004 breeding season (Munzer et al. 2005). In 2006, we documented 5 territories, the same number of territories detected prior to the fire (in 2004). This is an increase from 3 territories documented in 2005 (English et al. 2006). Kearny historically supported many more flycatchers than those detected in recent years (e.g., 25 territories in 1998); however, steady declines had been documented in years prior to the fire (19 territories in 2000, 14 in 2001, 14 in 2002, 9 in 2003). In 2006, flycatchers occupied the same area occupied in 2005, an area that was not affected by the fire. This occupied patch in maintained by standing water or well saturated soil throughout the breeding season (as mandated by the Kearny Biological Opinion; USFWS 1998). Tamarisk (sprouting from the roots of burned and partially burned trees) and tree tobacco (*Nicotiana glauca*) have continued to regenerate in the burned area. By the end of the breeding season, tamarisk was approximately 3 m in height, but still lacked vertical and horizontal structural complexity compared to typical nearby flycatcher habitat. The Gila River flood event increased the area of standing water, felled some of the remaining dead trees, and encouraged Russian thistle (*Salsola kali*) to sprout in exposed sandy areas. The flooding event likely encouraged continued regeneration of flycatcher habitat (tamarisk) at the site. Native plant regeneration at this site has not been documented.

In 2005, a fire late in the breeding season at the Dudleyville Crossing site burned approximately two-thirds of the suitable habitat on the San Pedro River Preserve portion of the site. It destroyed habitat at 5 of the 7 territories on the preserve; habitat at the 2 southernmost preserve territories was not impacted. In 2006, TNC personnel documented 2 resident territories located south of the burned area where flycatchers had not been documented in previous years. It is unclear if the fire caused an overall decline at the preserve portion of the site since 5 territories of unknown status were also documented in 2006. Tamarisk and native vegetation (cottonwood and willows) has regenerated at the base of burned trees (by the end of the breeding season, some of the tamarisk was approximately 2 to 3 m, while native vegetation was shorter, approximately 1 m). The 2006 flood event encouraged additional regeneration of tamarisk; this newer growth was <0.5 m in the fall of 2006 (Charlie Allen, TNC, pers. comm.). Future surveys at both the Kearny and Dudleyville Crossing sites will document the long-term response of the habitat and flycatchers to the fires at these sites.

As in previous years, the 2 largest known concentrations of flycatchers in Arizona were located at the Roosevelt Lake and San Pedro River/Gila River complexes. The importance of monitoring and management was demonstrated this year as occupied areas are susceptible to long-term and short-term effects from disturbance events. Although the Roosevelt Lake complex has experienced drastic habitat changes and concurrent decrease in flycatcher numbers over the past 2 years, the majority of flycatchers previously detected at the lake have not been accounted for at nearby breeding sites or elsewhere in the state. We have not surveyed some areas where

landowner permission was not granted that may now support some of these displaced flycatchers. Future surveys, though expected to be less intensive compared to those conducted during our long-term study, would determine if flycatchers continue to return to Roosevelt Lake or seek other breeding areas, as well as other long-term effects of inundation on the population and habitat. Future surveys could also determine long-term response of flycatchers to habitat damage from the Gila River flooding event and the Kearny and San Pedro River Preserve fires. These disturbance events demonstrate the susceptibility of flycatcher habitat to catastrophic events and the need to conserve areas and drainages with extant flycatcher populations.

During the past 11 years, in cooperation with Reclamation, AGFD and CPRS have collaborated to conduct surveys, monitoring, resighting, banding, and research. These activities have contributed directly to goals outlined by the flycatcher's Recovery Plan (USFWS 2002) and have supported Section 7 commitments associated with the Roosevelt Lake Biological Opinion (USFWS 1996). Our long-term study has been a unique opportunity to closely examine and estimate demographic parameters that are primary components of successful conservation and management towards recovery. We have gained knowledge of habitat requirements, productivity, survivorship, and movement patterns. This information has and will affect management decisions on both the local and range-wide level. Conservation and recovery success of the flycatcher are not only dependent on federal and state agency direction, but also must include cooperation and support of non-governmental organizations, private landowners, and Native American nations.

RECOMMENDATIONS

SURVEYS

1. Conduct statewide surveys in support of the Southwestern Willow Flycatcher Recovery Plan downlisting and delisting criteria (USFWS 2002). Specifically, downlisting can occur if: 1) the total known population of flycatchers increases to a minimum of 1,950 territories over an appropriate geographic distribution (as specified in Criteria set A) and this level is maintained for a 5-year period, or 2) the total known population increases to a minimum of 1,500 territories over an appropriate geographic distribution (as specified in Criteria set B) and this level is maintained for a 3-year period, given assurances of habitat protection through conservation management agreements (USFWS 2002). These criteria for downlisting and delisting will not be met without extensive surveys. The recent trend in decreased surveys is contrary to meeting these recovery goals. Therefore, an increase in surveys is needed in areas that:
   a. have not been surveyed but appear to have suitable habitat,
   b. contain previously occupied habitat,
   c. are adjacent to occupied habitat, and
   d. were previously unsuitable but have developed into potentially suitable habitat.

2. Survey priority areas where suitable habitat and landowner permission allow. Priority areas for more intensive or continued survey effort include:
   a. Tier 1 – River stretches with known relatively large resident populations:
      1. Big Sandy River downstream from US 93 downstream to Alamo Dam (includes Big Sandy River Downstream US 93 and Alamo Lake - Brown's Crossing),
      2. Colorado River at Topock Marsh,
      3. Gila River from Safford downstream to San Carlos Reservoir (includes Gila-Safford area),
      4. Salt River and Tonto Creek upstream from Roosevelt Lake (Roosevelt Lake complex) and tributaries (e.g., Pinal Creek),
      5. San Pedro River from Benson downstream to its confluence with the Gila River and the Gila River from San Carlos Reservoir downstream to the Kelvin Bridge (includes San Pedro River/Gila River complex and Three Links),
      6. Verde River from Sheep Bridge downstream to Horseshoe Dam (includes Horseshoe North).
   b. Tier 2 – River stretches with known relatively small resident populations that may support larger populations in the future:
      1. Bill Williams River (includes Monkey's Head),
      2. Colorado River from river mile 259 downstream to Topock Marsh (includes Lake Mead sites) and Topock Marsh downstream to Yuma,
      3. Little Colorado River and tributaries (includes high-elevation sites: Greer Townsite and River Reservoir) with suitable habitat,
      4. San Francisco River from the New Mexico border to Clifton (includes high-elevation site: Alpine Horse Pasture),
   c. Tier 3 – Other river stretches with current or historical suitable habitat or potentially suitable habitat to consider (several of these stretches have had inconsistent resident populations in recent years):
      1. Agua Fria River downstream from Lake Pleasant (Waddell Dam),
      2. Big Sandy River upstream from US 93,
      3. Hassayampa River downstream from Wickenburg (Hassayampa River Preserve),
      4. Gila River from the New Mexico border downstream to Safford, from the Kelvin Bridge downstream to the Ashurst-Hayden Diversion Dam, and from the confluence with the Salt River to Gillespie Dam,
      5. Colorado River between river mile 246 and 259,
      6. Santa Cruz River from Rio Rico to Tubac and tributaries (e.g., Cienega Creek),
      7. Lower Santa Maria River,
      8. Queen Creek (Whitlow Dam, Gila River drainage),
      9. San Pedro River upstream from Benson,
      10. Verde River from Cottonwood downstream to Sheep Bridge and downstream from Horseshoe Dam to the confluence with the Salt River,
      11. Virgin River,
      12. White River and tributaries.

3. Conduct multiple years of surveys to adequately assess population trends.
4. Encourage federal, state, tribal, and private partners to maintain or increase funding for statewide surveys and develop partnerships with private landowners to survey suitable habitat. Develop educational programs and resources to encourage private landowner partnerships.
5. Maintain statewide willow flycatcher database tracking all surveys conducted in Arizona in order to properly evaluate recovery.
6. Continue training workshops to improve surveyor knowledge of survey techniques and to standardize data reporting, protocol adherence, and interagency communication. Develop refresher course for surveyors who have previously attended survey training workshops.

NEST MONITORING

1. We currently have an extensive data set on reproductive success, productivity, cowbird parasitism, and predation. Nest monitoring efforts should focus on areas with high potential of impacts from human-caused habitat changes and other disturbances. These areas include reservoirs (with altered flood regimes and high recreation use; e.g., Roosevelt Lake, Horseshoe Lake, Alamo Lake), river stretches downstream from reservoirs (with regulated stream flows; e.g., Gila River downstream from Coolidge Dam), sites with potential development (e.g., San Manuel Crossing, San Pedro River), and sites with potential recreation impacts (e.g., Salt River upstream from Roosevelt Lake).

MANAGEMENT

1. Promote healthy watersheds and water conservation throughout the flycatcher's range. Identify opportunities to retire water rights and establish in-stream flow rights.
2. Protect areas with extant flycatcher populations through conservation management agreements (e.g., Conservation Easements, Safe Harbor Agreements (SHA), Landowner Incentive Program [LIP]) to support Recovery Plan downlisting and delisting criteria (USFWS 2002). Focus on areas and drainages in the state that are lacking protected southwestern willow flycatcher areas.
3. Monitor and protect areas where regeneration of riparian vegetation is occurring.
4. Create and enforce exclosures on flycatcher breeding areas where feasible to eliminate or minimize impacts of land uses (e.g., grazing, water diversion and inundation, and off-highway vehicle use) on flycatcher breeding habitat.
5. Work with the Arizona Bird Conservation Initiative (a multi-agency association dedicated to the conservation of all birds in Arizona) to encourage and create private/public partnerships for fencing and habitat restoration through federal, state, and non-government programs (for example USFWS Partners for Wildlife, the AGFD Stewardship Program, and the Federal LIP).
6. Develop educational programs and resources highlighting the importance of tamarisk habitat for flycatcher recovery in the absence of restored natural habitats. In areas where tamarisk is removed, pre-action plans for immediate native replacement should be developed, and pre-

and post-action monitoring conducted to determine if goals are being met (USFWS 2002). Removal of tamarisk in current flycatcher breeding sites is not recommended.

7. Consider cowbird control via habitat improvement, cowbird attractant removal (e.g., bird feeding, livestock grazing), or cowbird removal at breeding areas with evidence of high rates of flycatcher nest parasitism (20 to 30%) for 2 or more successive years (USFWS 2002).
8. Continue and increase communication with federal and state agencies, Native American tribes, and private organizations conducting flycatcher surveys, monitoring, and research to develop region-wide conservation strategies.

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Appendix A. Survey and detection form for Arizona willow flycatcher surveys, 2006.

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name_____ State_____ County _____
USGS Quad Name _____ Elevation _____ feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☐ *Yes* ☐ *No*

Site Coordinates: Start: N_____ E_____ UTM Datum _____(NAD27 preferred)
Stop: N_____ E_____ UTM Zone _____

***** Fill in additional site information on back of this page *****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found ? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1_____	Date Start Stop Total hrs ____							
2_____	Date Start Stop Total hrs ____							
3_____	Date Start Stop Total hrs ____							
4_____	Date Start Stop Total hrs ____							
5_____	Date Start Stop Total hrs ____							
Overall Site Summary (Total **resident** WIFLs only) Total survey hrs_____		Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No If yes, report color combination(s) in the comments section on back of form		

Reporting Individual _____ Date Report Completed _____
US Fish and Wildlife Service Permit #_____ AZ Game and Fish Department (or other state) Permit # _____

Submit original form by August 1st. Retain a copy for your records.

Appendix A (continued). Survey and detection form for Arizona willow flycatcher surveys, 2006.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual _____ Phone # _____
Affiliation _____ E-mail _____
Site Name _____ Date Report Completed _____

Did you verify that this site name is consistent with that used in previous years? Yes / No (circle one)
If name is different, what name(s) was used in the past? _____
If site was surveyed last year, did you survey the same general area this year? Yes / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? Yes / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) _____

Length of area surveyed: _____ (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

☐ Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)

☐ Mixed native and exotic plants (mostly native)

☐ Mixed native and exotic plants (mostly exotic)

☐ Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: _____

Average height of canopy (Do not put a range): _____ (specify units)

Was surface water or saturated soil present at or adjacent to site? Yes / No (circle one)
Distance from the site to surface water or saturated soil: _____ (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / No (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)

_____
_____
_____
_____
_____
_____
_____

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Appendix B. Roosevelt Lake elevation in feet (with percent capacity) for 2004, 2005, 2006, and monthly averages from 1996 to 2003.

Month	1996 to 2003	2004	2005	2006
January	2071.66 (26%)	2077.01 (30%)	2081.40 (33%)	2134.24 (80%)
February	2072.82 (27%)	2077.87 (30%)	2101.55 (48%)	2133.69 (79%)
March	2075.60 (29%)	2077.66 (30%)	2136.87 (83%)	2133.69 (79%)
April	2082.74 (34%)	2084.56 (35%)	2144.48 (92%)	2132.33 (77%)
May	2086.02 (36%)	2088.62 (38%)	2147.99 (96%)	2129.18 (74%)
June	2083.47 (34%)	2087.50 (37%)	2147.55 (96%)	2124.50 (69%)
July	2077.63 (30%)	2082.71 (33%)	2145.04 (92%)	2117.92 (62%)
August	2071.29 (26%)	2077.44 (30%)	2141.46 (88%)	2114.11 (59%)
September	2066.17 (23%)	2073.95 (28%)	2139.95 (86%)	2118.27 (63%)
October	2064.65 (23%)	2074.15 (28%)	2136.54 (82%)	2118.85 (63%)
November	2065.59 (23%)	2074.58 (28%)	2135.26 (81%)	2119.56 (65%)
December	2066.44 (24%)	2076.01 (29%)	2134.65 (80%)	2119.95 (65%)
Annual Average	2073.67 (28%)	2079.34 (31%)	2132.73 (80%)	2124.69 (70%)
Breeding Season Average[a]	2080.23 (32%)	2084.17 (35%)	2145.30 (93%)	2123.61 (68%)

Data provided by Salt River Project (Dallas Reigle and Tim Skarupa, SRP, pers. comm.).
[a] Breeding season averages include data from April to August.

Appendix C. Roosevelt Lake area total monthly precipitation (in inches) for 2004, 2005, 2006, and historical average from 1983 to 2003.

Month	1983 to 2003	2004	2005	2006
January	2.02	1.05	4.67	0.03
February	1.88	0.62	7.21	0.00
March	2.11	2.59	1.41	3.80
April	0.61	1.22	0.41	0.20
May	0.30	0.00	0.00	0.00
June	0.09	0.00	0.12	0.05
July	1.38	0.40	1.21	3.08
August	2.05	1.30	2.68	2.48
September	1.37	1.94	0.04	1.09
October	1.24	0.61	0.54	1.40
November	1.48	0.86	0.00	0.00
December	1.72	3.17	0.00	0.36
Total	16.30	13.76	18.29	12.49

Data gathered from Western Regional Climate Center website (WRCC 2007 and Jim Ashby, WRCC, pers. comm.).

Appendix D. Gila River average stream flows (in cubic feet per second) recorded at the Below Coolidge Dam and Kelvin gauges, 2002 to 2004, 2005, and 2006.

	Coolidge (cfs)			Kelvin (cfs)		
Month	2002 to 2004	2005	2006	2002 to 2004	2005	2006
January	89	107	176	84	310	177
February	147	69	228	149	679	239
March	282	380	218	303	383	229
April	215	641	399	201	577	407
May	119	564	492	102	505	466
June	3	721	507	8	669	460
July	12	817	388	27	818	916
August	58	519	337	75	717	1107
September	46	471	294	50	529	404
October	51	226	231	46	232	257
November	11	1	1	2	16	22
December	104	300	307	69	265	287
Annual Avg	95	401	298	93	475	414
Breeding Season Avg[a]	81	653	425	83	657	671

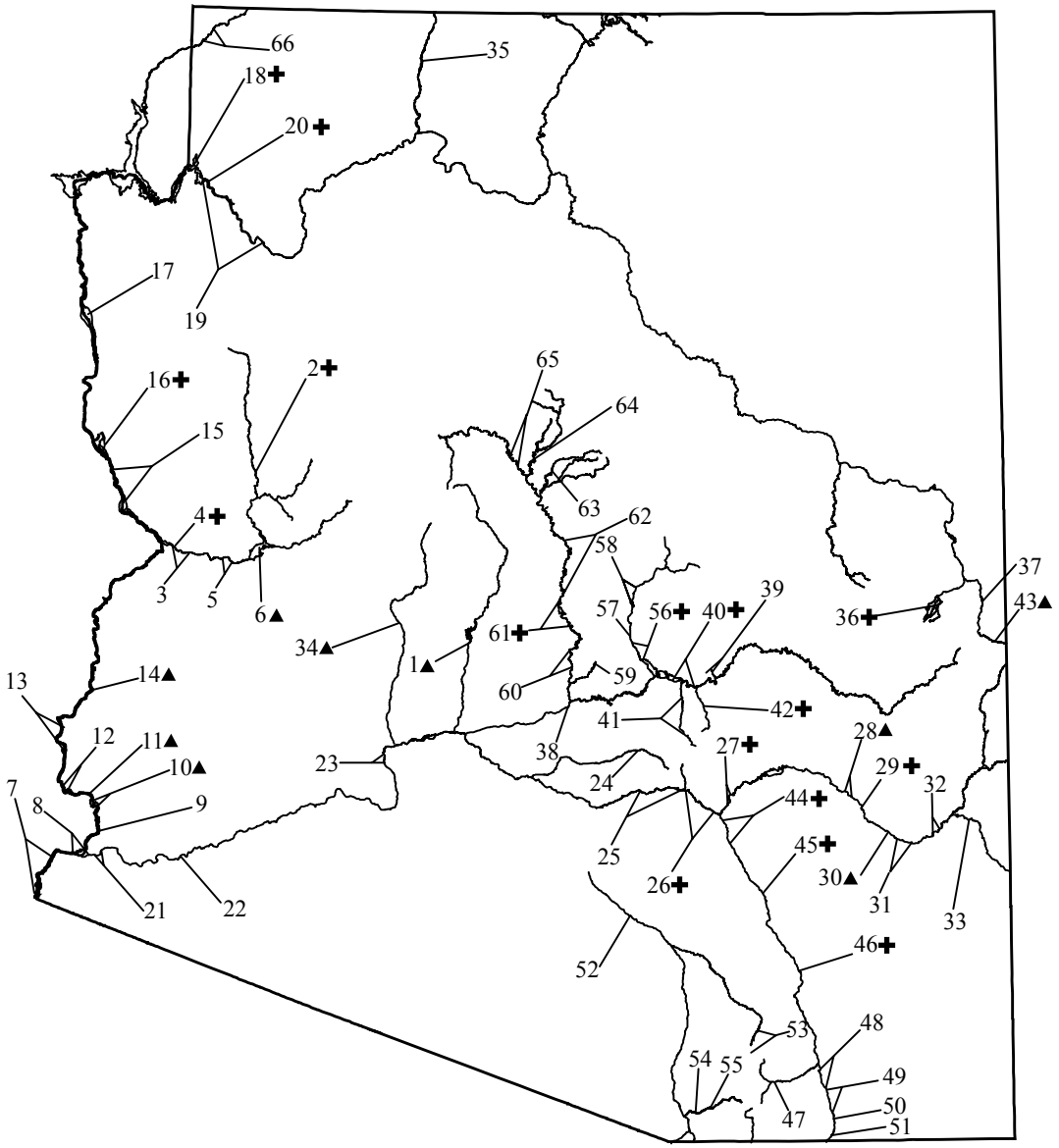
Data gathered from U.S. Geological Survey National Water Information System website (USGS 2007).
[a] Breeding season averages include data from April to August.

Appendix E. Gila River maximum and mean daily stream flows (in cubic feet per second) recorded at the Below Coolidge Dam and Kelvin gauges, 15 July to 15 August 2006.

Date	Kelvin (Max cfs)	Kelvin (Mean cfs)	Coolidge (Max cfs)	Coolidge (Mean cfs)
15 July	372	362	432	429
16 July	367	360	429	429
17 July	367	356	429	429
18 July	367	357	429	429
19 July	367	357	468	454
20 July	396	375	468	468
21 July	391	377	468	466
22 July	381	373	468	465
23 July	381	374	468	465
24 July	381	372	465	465
25 July	381	369	465	465
26 July	381	369	465	464
27 July	650	552	471	231
28 July	754	524	101	101
29 July	8,300	2,770	101	42
30 July	15,100	9,350	0.81	0.81
31 July	10,600	5,050	0.81	0.81
1 August	20,100	7,960	0.81	0.81
2 August	20,000	6,900	0.81	0.61
3 August	2,730	1,890	0.59	0.59
4 August	1,090	874	0.59	0.59
5 August	2,060	1,100	0.59	0.59
6 August	2,940	1,620	0.59	0.53
7 August	580	386	465	278
8 August	595	381	496	483
9 August	661	578	499	494
10 August	845	618	496	495
11 August	976	817	496	496
12 August	716	632	506	496
13 August	845	699	499	496
14 August	938	803	499	496
15 August	1,040	823	499	497

Data gathered from U.S. Geological Survey National Water Information System website (USGS 2007 and Shirley Francisco, USGS, pers. comm.).

Appendix F. Map of willow flycatcher survey sites in Arizona, 2006. (see Appendix G for site names);
✚ = Resident willow flycatchers detected and breeding documented,
▲ = Resident willow flycatchers detected (no breeding documented).



Drainage	Map Number	Drainage	Map Number	Drainage	Map Number
Agua Fria	1	Hassayampa River	34	San Pedro River	44-51
Big Sandy River	2	Kanab Creek	35	Santa Cruz River	52-55
Bill Williams River	3-6	Little Colorado River	36-37	Tonto Creek	56-58
Colorado River	7-20	Salt River	38-42	Verde River	59-65
Gila River	21-33	San Francisco River	43	Virgin River	66

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Agua Fria River										
Waddell Dam Agua Fria River Maricopa, 439, 12.25	1 ▲	5/23/2006 6/16/2006 7/3/2006	1 1 0	1	1	0	0	0	0	Y
Big Sandy River										
Big Sandy River Downstream US 93 Big Sandy River Mohave, 555, 8.8	2 +	Monitored 5/06 to 8/06	N/A	40	22	18	30	0	6	Y
Big Sandy River Upstream US 93 Big Sandy River Mohave, 548, 4.0	2	5/15/2006 6/3/2006 6/26/2006	1 1 0	0	0	0	0	0	1	Y
Bill Williams River										
Bill Williams River Delta - Marsh Edge Bill Williams River La Paz, 163, 18.37	3	5/13/2006 5/22/2006 6/2/2006 6/20/2006 6/28/2006 7/4/2006 7/8/2006	0 2 0 0 0 0 0	0	0	0	0	0	2	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Monkey's Head [i] Bill Williams River La Paz, 143, 22.37	4 +	5/18/2006 5/20/2006 5/25/2006 6/2/2006 6/10/2006 6/18/2006 6/20/2006 6/25/2006 7/5/2006 7/10/200	0 0 0 2 0 0 4 4 0 0	4	3	3	5	0	1	Y
Gemini Bill Williams River La Paz, 152, 6.87	3	5/16/2006 5/21/2006 6/4/2006 6/16/2006 6/29/2006 7/3/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Cave Wash 1 Bill Williams River La Paz, 152, 13.5	3	5/16/2006 5/24/2006 6/5/2006 6/27/2006 7/13/2006 7/14/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Cave Wash 2 [e] Bill Williams River La Paz, 152, 1.25	3	5/24/2006 6/5/2006	0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Buckskin Bill Williams River La Paz, 174, 68.9	3	5/16/2006 5/24/2006 5/27/2006 6/5/2006 6/16/2006 6/27/2006 7/2/2006 7/10/2006 7/13/2006 7/17/2006	0 0 1 0 0 0 0 0 0 0	0	0	0	0	0	1	Y
Bill Williams Pipeline Bill Williams River La Paz, 238, 12.5	5	5/26/2006 6/15/2006 7/1/2006 7/9/2006 7/16/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Lincoln Ranch Bill Williams River La Paz, 201, 9.0	5	5/26/2006 6/15/2006 7/1/2006 7/8/2006 7/15/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Alamo Lake - Brown's Crossing Bill Williams River Mohave, 347, 54.0	6 ▲	5/23/2006 6/13/2006 6/30/2006 7/7/2006 7/14/2006	17 11 11 0 0	12	11	1	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Colorado River										
Hunter's Hole Colorado River Yuma, 31, 28.58	7	5/19/2006 5/26/2006 5/30/2006 6/7/2006 6/8/2006 6/15/2006 6/27/2006 7/1/2006 7/15/2006	11 1 26 5 5 1 0 0 0	0	0	0	0	0	26	Y
Gadsden Pond Colorado River Yuma, 46, 38.75	7	5/15/2006 5/19/2006 5/26/2006 5/30/2006 6/8/2006 6/15/2006 6/17/2006 6/18/2006 6/20/2006 6/27/2006 7/1/2006 7/15/2006 7/19/2006	13 21 7 2 11 2 8 6 0 0 0 0 0	0	0	0	0	8	19	Y
Gadsden Bend[e] Colorado River Yuma, 30, 4.4	7	5/19/2006 5/26/2006 5/30/2006 6/15/2006	22 2 4 1	0	0	0	0	0	22	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Lower Yuma Division #2 Colorado River Yuma, 37, 13.96	7	5/25/2006 5/31/2006 6/12/2006 6/15/2006 6/22/2006 6/27/2006 7/3/2006 7/11/2006	0 0 0 0 0 0 0 0	0	0	0	0	0	0	Y
Fort Yuma 1 & 2 Colorado River Yuma, 38, 37.8	8	5/23/2006 5/25/2006 5/26/2006 6/6/2006 6/8/2006 7/1/2006 7/2/2006 7/3/2006 7/7/2006 7/8/2006 7/9/2006 7/13/2006 7/14/2006 7/15/2006	0 4 0 2 0 0 0 0 0 0 0 0 0 0	0	0	0	0	0	4	Y
Yuma Territorial Prison Colorado River Yuma, 38, 5.22	8	5/23/2006 5/25/2006 6/6/2006 6/8/2006 7/1/2006 7/3/2006 7/7/2006 7/9/2006 7/13/2006 7/15/2006	0 0 0 0 0 0 0 0 0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
2 East to Gila River Colorado River Yuma, 38, 55.48	8	5/13/2006 5/21/2006 5/23/2006 5/24/2006 5/25/2006 5/26/2006 5/30/2006 6/6/2006 6/7/2006 6/8/2006 6/14/2006 6/17/2006 7/1/2006 7/2/2006 7/3/2006 7/7/2006 7/8/2006 7/9/2006 7/13/2006 7/14/2006 7/15/2006	1 5 5 0 0 1 7 6 1 0 1 0 0 0 0 0 0 0 0 0 0	0	0	0	0	0	7	Y
Fort Yuma 3 Colorado River Yuma, 40, 5.83	8	5/23/2006 5/25/2006 6/6/2006 6/8/2006 7/1/2006 7/3/2006 7/7/2006 7/9/2006 7/13/2006 7/15/2006	1 0 0 0 0 0 0 0 0 0	0	0	0	0	0	1	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Gila/Colorado Confluence 1 Colorado River Yuma, 40, 16.73	8	5/18/2006 5/24/2006 5/30/2006 6/12/2006 6/17/2006 6/19/2006 6/28/2006 7/5/2006 7/15/2006 7/18/2006	4 0 3 2 1 1 0 0 0 0	0	0	0	0	2	4	Y
Gila/Colorado Confluence 2 Colorado River Yuma, 40, 10.1	8	5/16/2006 5/25/2006 6/2/2006 6/13/2006 6/16/2006 6/21/2006 6/28/2006 7/6/2006 7/11/2006 7/16/2006	0 1 1 0 1 0 0 0 0 0	0	0	0	0	0	1	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Mittry Lake Colorado River Yuma, 49, 19.65	9	5/16/2006 5/25/2006 5/31/2006 6/2/2006 6/8/2006 6/13/2006 6/16/2006 6/21/2006 6/28/2006 7/1/2006 7/6/2006 7/16/2006 7/19/2006	0 0 1 0 0 0 0 0 0 0 0 0 0	0	0	0	0	0	1	N
Martinez Lake Colorado River Yuma, 63, 47.44	10 ▲	5/15/2006 5/16/2006 5/20/2006 5/29/2006 6/3/2006 6/13/2006 6/17/2006 6/27/2006 6/30/2006 7/2/2006 7/4/2006 7/7/2006 7/17/2006	13 3 15 22 11 0 1 0 0 0 0 0 0	1	1	0	0	0	18	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Cottonwood Nursery Colorado River Yuma, 62, 11.14	10	05/14/2006 05/20/2006 05/29/2006 06/03/2006 06/13/2006 06/17/2006 06/27/2006 06/30/2006 07/04/2006 07/07/2006	1 4 0 0 0 0 0 0 0 0	0	0	0	0	0	4	Y
Triangle Colorado River Yuma, 19, 7.3	10	05/18/2006 05/24/2006 05/30/2006 06/04/2006 06/18/2006 06/30/2006 07/13/2006	0 0 0 4 0 0 0	0	0	0	0	0	4	Y
Clear Lake Colorado River La Paz, 61, 8.59	11 ▲	05/17/2006 05/24/2006 05/30/2006 06/04/2006 06/15/2006 06/21/2006 07/01/2006 07/03/2006 07/12/2006 07/17/2006	0 0 1 0 0 1 0 0 0 0	1	1	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Nortons Landing Colorado River La Paz, 61, 16.99	12	05/16/2006 05/22/2006 05/31/2006 06/06/2006 06/14/2006 06/19/2006 06/29/2006 07/03/2006 07/11/2006	0 2 3 0 0 0 0 0 0	0	0	0	0	0	3	Y
Adobe Lake Colorado River La Paz, 61, 4.65	12	05/16/2006 05/23/2006 06/01/2006 06/06/2006 06/15/2006 06/20/2006 06/28/2006 07/01/2006 07/11/2006	1 0 0 1 1 0 0 0 0	0	0	0	0	0	1	Y
Hoge Colorado River La Paz, 61, 21.72	12	05/16/2006 05/22/2006 05/31/2006 06/06/2006 06/15/2006 06/20/2006 06/29/2006 07/03/2006 07/11/2006	0 7 6 9 0 0 0 0 0	0	0	0	0	0	9	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Cibola Lake Colorado River La Paz, 65, 39.4	13	05/18/2006 05/19/2006 05/22/2006 05/24/2006 06/01/2006 06/02/2006 06/05/2006 06/14/2006 06/16/2006 06/18/2006 06/21/2006 06/29/2006 07/01/2006 07/03/2006 07/04/2006 07/16/2006 07/17/2006	3 0 1 0 2 1 2 0 0 0 0 0 0 0 0 0 0	0	0	0	0	0	3	Y
SW of Landing Strip - Cibola Colorado River La Paz, 64, 25.35	13	05/18/2006 05/19/2006 05/22/2006 05/24/2006 05/31/2006 06/02/2006 06/14/2006 06/16/2006 06/18/2006 06/21/2006 07/01/2006 07/04/2006 07/16/2006	0 1 2 1 1 1 1 0 0 0 0 0 0	0	0	0	0	0	2	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Arnet Ditch/Tieback Levee Colorado River La Paz, 66, 12.8	13	05/19/2006 05/24/2006 06/02/2006 06/14/2006 06/18/2006 07/01/2006 07/04/2006	0 0 0 0 0 0 0	0	0	0	0	0	0	Y
Cibola Restoration Colorado River La Paz, 70, 11.86	13	05/19/2006 05/24/2006 06/02/2006 06/04/2006 06/14/2006 06/18/2006 06/29/2006 07/03/2006 07/16/2006	4 1 0 0 0 0 0 0 0	0	0	0	0	0	4	Y
Ehrenberg Colorado River La Paz, 79, 8.16	14 ▲	05/17/2006 05/21/2006 06/01/2006 06/04/2006 06/15/2006 06/19/2006 06/29/2006 07/03/2006 07/17/2006	0 0 0 1 0 1 0 0 0	1	1	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Neptune - North Lake Havasu Colorado River Mohave, 137, 13.0	15	05/13/2006 05/19/2006 05/25/2006 05/30/2006 06/06/2006 06/13/2006 06/21/2006 07/06/2006 07/12/2006	0 0 0 0 0 0 0 0 0	0	0	0	0	0	0	Y
Blankenship Colorado River Mohave, 137, 17.46	15	05/12/2006 05/17/2006 05/23/2006 05/30/2006 06/08/2006 06/22/2006 06/29/2006 07/06/2006	0 0 0 0 0 0 0 0	0	0	0	0	0	0	Y
Pulpit Rock Colorado River Mohave, 183, 2.6	15	05/12/2006 05/17/2006 05/23/2006 05/30/2006 06/22/2006 06/29/2006 07/06/2006	0 0 1 1 0 0 0	0	0	0	0	0	1	Y
Topock Marsh Colorado River Mohave, 140, 129.54	16 +	Monitored 5/06 to 8/06	N/A	26	13	13	17[h]	3	2	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Waterwheel Cove [f] Colorado River Mohave, 195, 12.8	17	05/23/2006 06/12/2006 07/06/2006	2 0 0	0	0	0	0	0	2	Y
Chuckwalla Cove Colorado River Mohave, 357, 18.95	18 ▲	05/25/2006 06/08/2006 06/15/2006 06/16/2006 06/21/2006 06/29/2006 07/02/2006 07/03/2006 07/05/2006 07/07/2006 07/14/2006 07/17/2006	0 0 0 1 5 0 0 0 0 2 0 0	4	3	1	0	0	0	Y
Bradley Bay [e] Colorado River Mohave, 345, 9.5	18	06/15/2006 06/21/2006 07/05/2006 07/14/2006 07/17/2006 07/21/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Driftwood Island [e] Colorado River Mohave, 345, 6.08	18	06/15/2006 06/30/2006 07/03/2006 07/05/2006 07/14/2006 07/16/2006 07/17/2006	0 0 0 0 0 0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Raven's Nest Beach - Lake Mead Colorado River Mohave, 344, 9.05	18 ▲	05/11/2006 05/24/2006 06/07/2006 06/15/2006 06/22/2006 06/30/2006 07/05/2006 07/07/2006 07/13/2006 07/14/2006 07/16/2006	0 0 0 1 1 0 0 0 0 0 0	1	1	0	0	0	0	Y
Snake Beach - Lake Mead Colorado River Mohave, 344, 10.27	18 ▲	05/24/2006 06/07/2006 06/15/2006 06/19/2006 06/22/2006 06/30/2006 07/05/2006 07/06/2006 07/13/2006 07/16/2006	0 0 1 0 0 0 0 0 0 0	1	1	0	0	0	0	Y
Grand Wash Bay Colorado River Mohave, 345, 13.26	18 +	05/24/2006 06/02/2006 06/13/2006 06/19/2006 06/29/2006 07/03/2006 07/13/2006 07/16/2006	2 5 0 0 0 0 0 0	4	2	2	2	0	1	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Lake Mead Delta [e] Colorado River Mohave, 366, 1.0	19	07/02/2006 07/05/2006 07/13/2006 07/16/2006	0 0 0 0	0	0	0	0	0	0	N
Miles 277.0 to 274.0 R GC Colorado River Mohave, 366, 37.08	20 +	05/21/2006 06/01/2006 06/03/2006 06/14/2006 06/20/2006 07/01/2006 07/03/2006 07/12/2006 07/15/2006	0 0 0 1 0 2 2 3 2	2	1	1	1	0	1	Y
Miles 277.0 to 273.5 L GC Colorado River Mohave, 366, 18.0	19	05/09/2006 05/23/2006 05/27/2006 06/06/2006 06/20/2006 07/06/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Mile 260.0 L Quartermaster GC Colorado River Mohave, 384, 10.5	19	06/01/2006 06/15/2006 06/17/2006 06/29/2006 07/13/2006	0 0 0 0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Mile 259.5 R Waterfall Rapid GC Colorado River Mohave, 353, 10.9	19	05/18/2006 05/19/2006 06/01/2006 06/14/2006 06/20/2006 07/01/2006 07/12/2006 07/15/2006	0 0 0 0 0 0 0 0	0	0	0	0	0	0	Y
Mile 252.2 L GC Colorado River Mohave, 384, 5.0	19	05/17/2006 06/01/2006 06/15/2006 06/29/2006 07/13/2006	0 0 0 0 0	0	0	0	0	0	0	N
Mile 251 R GC [e] Colorado River Mohave, 372, 0.83	19	05/19/2006 06/01/2006	0 0	0	0	0	0	0	0	N
Mile 246.0 L GC Colorado River Mohave, 372, 10.2	19	05/16/2006 05/31/2006 06/13/2006 06/27/2006 07/06/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Mile 243.0 L GC Colorado River Mohave, 384, 6.0	19	05/16/2006 05/30/2006 06/13/2006 06/27/2006 07/11/2006	0 0 0 0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Separation Canyon R GC [e] Colorado River Mohave, 427, 2.0	19	05/19/2006 06/01/2006	0 0	0	0	0	0	0	0	N
Gila River										
North Gila Valley Site 1 Gila River Yuma, 41,9.8	21	5/17/2006 5/25/2006 6/4/2006 6/14/2006 6/21/2006 6/28/2006 7/3/2006 7/6/2006 7/11/2006 7/15/2006	0 2 1 1 0 0 0 0 0 0	0	0	0	0	0	2	Y
Fortuna Wash Gila River Yuma, 61, 15.9	21	5/16/2006 5/25/2006 5/27/2006 6/13/2006 6/16/2006 6/21/2006 6/29/2006 7/6/2006	0 0 19 0 0 0 0 0	0	0	0	0	0	19	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Fortuna North Gila River Yuma, 43, 16.63	21	5/17/2006 5/25/2006 6/4/2006 6/13/2006 6/16/2006 6/21/2006 6/29/2006 7/6/2006 7/15/2006	0 0 3 0 0 1 0 0 0	0	0	0	0	1	3	Y
Tacna Marsh - Quigley Wildlife Area Gila River Yuma, 78, 5.72	22	5/23/2006 6/20/2006 6/29/2006	22 0 0	0	0	0	0	0	22	Y
Gillespie Dam Gila River Maricopa, 229, 141.5	23	5/17/2006 5/22/2006 5/24/2006 5/31/2006 6/6/2006 6/14/2006 6/22/2006 6/27/2006 6/29/2006 7/5/2006 7/6/2006 7/12/2006 7/13/2006	0 0 0 0 0 1 0 0 0 0 0 0 0	0	0	0	0	0	1	Y
Arlington South Gila River Maricopa, 244, 10.2	23	5/25/2006 6/9/2006 7/15/2006	0 0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Whitlow Dam [j] Gila River Pinal, 634, 9.42	24	5/23/2006 6/19/2006 6/28/2006	0 0 0	0	0	0	0	0	0	Y
South Butte [e, f] Gila River Pinal, 485, 3.16	25	5/24/2006 6/21/2006	0 0	0	0	0	0	0	0	Y
North Butte [e, f] Gila River Pinal, 491, 3.16	25	5/24/2006 6/21/2006	0 0	0	0	0	0	0	0	Y
GRN033 [e, f] Gila River Pinal, 494, 1.7	25	5/23/2006 5/24/2006 6/21/2006	0 0 0	0	0	0	0	0	0	Y
Donnelly Wash [e, f] Gila River Pinal, 495, 0.77	25	5/23/2006 5/24/2006 6/21/2006	0 0 0	0	0	0	0	0	0	Y
GRS032 [e, f] Gila River Pinal, 494, 1.05	25	5/23/2006 6/21/2006	0 0	0	0	0	0	0	0	Y
GRSN031 [e, f] Gila River Pinal, 506, 2.22	25	5/23/2006 6/21/2006	0 0	0	0	0	0	0	0	Y
GRSN030 [e, f] Gila River Pinal, 506, 1.48	25	5/23/2006 6/21/2006	0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
GRN029[e, f] Gila River Pinal, 515, 0.91	25	5/23/2006 6/20/2006	0 0	0	0	0	0	0	0	Y
GRN028[e, f] Gila River Pinal, 518, 0.53	25	5/23/2006 6/20/2006	0 0	0	0	0	0	0	0	Y
GRN027[e, f] Gila River Pinal, 521, 0.91	25	5/23/2006 6/20/2006	0 0	0	0	0	0	0	0	Y
GRSN026[e, f] Gila River Pinal, 536, 0.88	25	5/23/2006 6/20/2006	0 0	0	0	0	0	0	0	Y
GRS025[e, f] Gila River Pinal, 536, 1.13	25	5/23/2006 6/20/2006	0 0	0	0	0	0	0	0	Y
GRSN023[e, f] Gila River Pinal, 536, 1.38	25	5/23/2006 6/20/2006	0 0	0	0	0	0	0	0	Y
GRSN022[f] Gila River Pinal, 540, 0.57	26	5/23/2006 6/20/2006 7/17/2006	0 0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
GRN020 Gila River Pinal, 549, 7.46	26 +	5/23/2006 5/25/2006 5/27/2006 6/10/2006 6/11/2006 6/25/2006 7/5/2006 7/12/2006 7/17/2006	1 0 0 1 0 1 0 2 2	2	1	1	1	0	0	Y
GRS019 [f] Gila River Pinal, 555, 1.9	26	5/25/2006 6/7/2006 6/11/2006 7/5/2006	0 1 0 0	0	0	0	0	0	1	N
GRN018 Gila River Pinal, 561, 37.87	26 +	Monitored 5/06 to 8/06	N/A	10	5	5	6	0	0	Y
GRS018 Gila River Pinal, 543, 15.7	26 +	Monitored 5/06 to 8/06	N/A	12	7	5	9	0	0	Y
GRS016 Gila River Pinal, 549, 13.56	26 +	Monitored 5/06 to 8/06	N/A	2	1	1	2	0	0	Y
Kearny Gila River Pinal, 555, 2.27	26 +	Monitored 5/06 to 8/06	N/A	10	5	5	13	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
GRS014 [f] Gila River Pinal, 555, 5.3	26	5/25/2006 6/11/2006 7/5/2006	0 0 1	0	0	0	0	1	0	N
GRS012 Gila River Pinal, 555, 6.66	26	5/24/2006 5/25/2006 6/8/2006 7/9/2006	0 0 0 0	0	0	0	0	0	0	N
GRS011 Gila River Pinal, 561, 1.9	26	5/24/2006 6/8/2006 7/9/2006	0 0 0	0	0	0	0	0	0	Y
GRN010 Gila River Pinal, 573, 3.92	26	5/24/2006 5/27/2006 6/8/2006 6/13/2006 7/8/2006 7/9/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
GRS010 Gila River Pinal, 561, 3.93	26 +	5/24/2006 6/8/2006 7/9/2006	1 2 2	2	1	1	2	0	0	Y
GRS009 [f g] Gila River Pinal, 567, 0.9	26 ▲	5/24/2006 6/8/2006 7/9/2006	0 1 0	1	1	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
GRN009[g] Gila River Pinal, 579, 4.77	26 +	5/24/2006 5/27/2006 6/8/2006 6/12/2006 7/8/2006 7/9/2006	0 0 1 0 2 0	2	1	1	1	0	0	Y
GRS008[f] Gila River Pinal, 567, 1.01	26 +	5/24/2006 6/8/2006 7/9/2006	2 2 2	2	1	1	1	0	0	N
GRN008 Gila River Pinal, 579, 5.4	26 +	5/24/2006 5/27/2006 6/8/2006 6/13/2006 7/6/2006 7/8/2006 7/9/2006	0 0 0 2 2 0 0	2	1	1	2	0	0	Y
GRS007 Gila River Pinal, 573, 16.48	26 +	Monitored 5/06 to 8/06	N/A	8	4	4	4	0	0	Y
GRN007[f] Gila River Pinal, 579, 0.43	26 +	5/24/2006 6/8/2006 7/9/2006	0 1 2	2	1	1	3	0	0	Y
GRS005[f] Gila River Pinal, 567, 0.26	26 ▲	5/24/2006 6/8/2006 7/9/2006	0 1 1	1	1	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
GRS003 [f] Gila River Pinal, 585, 1.46	26	5/24/2006 6/8/2006 7/9/2006	0 0 1	0	0	0	0	1	0	N
GRN004 Gila River Pinal, 585, 2.77	26 +	5/25/2006 6/8/2006 6/13/2006 7/9/2006	0 0 2 2	2	1	1	1	0	0	Y
Dripping Springs Campground [f, g] Gila River Pinal, 610, 12.8	27 +	5/23/2006 6/5/2006 6/23/2006	2 4 7	10	5	5	5[h]	0	0	Y
Dripping Springs Wash [f] Gila River Gila, 621, 1.18	27 +	Monitored 5/06 to 8/06	N/A	5	3	2	4	0	0	Y
Fort Thomas - Geronimo Gila River Graham, 810, 4.5	28 ▲	5/31/2006 6/12/2006 6/29/2006	3 3 2	2	2	0	0	0	1	Y
Porter Wash Ponds Gila River Graham, 823, 4.34	28 ▲	5/30/2006 6/8/2006 7/7/2006	4 4 3	3	2	1	0	0	1	Y
Teague [g] Gila River Graham, 823, 115.75	29 +	5/15/2006 6/4/2006 6/26/2006	52 85 82	108	59	49	38	0	7	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Watson Wash Gila River Graham, 869, 0.9	30 ▲	5/30/2006 6/8/2006 7/7/2006	2 2 2	2	2	0	0	0	0	Y
Safford Gila River Graham, 896, 11.21	31	5/26/2006 5/31/2006 6/15/2006 6/29/2006 7/6/2006 7/13/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Solomon Northwest Gila River Graham, 899, 11.21	31	5/26/2006 5/30/2006 6/15/2006 6/29/2006 7/6/2006 7/13/2006	1 0 0 0 0 0	0	0	0	0	0	1	Y
San Simon to Gila Gila River Graham, 905, 22.41	31	5/26/2006 5/31/2006 6/15/2006 6/29/2006 7/6/2006 7/13/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Spring Canyon Gila River Graham, 949, 1.5	32	5/31/2006 6/16/2006 7/8/2006	0 0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Bonita Creek Gila River Graham, 975, 14.05	32	5/16/2006 6/6/2006 6/23/2006 7/7/2006 7/14/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Gutherie Gila River Greenlee, 1029, 1.58	33	5/31/2006 6/16/2006 7/8/2006	0 0 0	0	0	0	0	0	0	Y
Hassayampa River										
Hassayampa River Preserve Hassayampa River Maricopa, 573, 30.0	34 ▲	5/27/2006 6/4/2006 6/24/2006	1 1 2	2	2	0	0	0	0	Y
Kanab Creek										
Clear Water Spring[e] Kanab Creek Coconino, 1219, 2.91	35	6/17/2006 6/24/2006	0 0	0	0	0	0	0	0	N
Rock Canyon Point[e] Kanab Creek Mohave, 1219, 2.3	35	6/29/2006	0	0	0	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Little Colorado River										
River Reservoir Little Colorado River Apache, 2499, 13.92	36 +	5/18/2006 6/8/2006 6/29/2006	7 7 4	5	4	1	2	0	2	Y
Greer Townsite Little Colorado River Apache, 2539, 12.0	36 ▲	5/18/2006 6/7/2006 6/27/2006	0 2 2	2	2	0	0	0	0	Y
Nelson Reservoir Little Colorado River Apache, 2256, 11.0	37	5/16/2006 6/6/2006 6/24/2006	0 0 0	0	0	0	0	0	0	Y
Salt River										
Granite Reef Salt River Maricopa, 402, 5.9	38	5/24/2006 6/12/2006 6/28/2006	0 0 0	0	0	0	0	0	0	Y
Coon Creek Salt River Gila, 610, 1.76	39	5/22/2006 6/13/2006 6/27/2006	0 0 0	0	0	0	0	0	0	Y
Grapevine Salt River Gila, 640, 0.95	40	5/17/2006 6/18/2006 7/4/2006	0 0 0	0	0	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Pinto Creek Salt River Gila, 732, 20.61	41	5/17/2006 5/26/2006 6/5/2006 6/8/2006 7/8/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Pinto Creek near School House Salt River Gila, 665, 4.3	40	5/26/2006 6/5/2006 7/7/2006	0 0 0	0	0	0	0	0	0	Y
School House Point South[e] Salt River Gila, 640, 1.7	40	5/15/2006 5/19/2006	0 0	0	0	0	0	0	0	Y
School House Point North[e] Salt River Gila, 640, 4.6	40	5/24/2006	0	0	0	0	0	0	0	N
Salt River Inflow Salt River Gila, 640, 42.3	40 +	Monitored 5/06 to 8/06	N/A	8	4	4	8	0	1	Y
Cottonwood Acres II Salt River Gila, 652, 18.54	40 +	Monitored 5/06 to 8/06	N/A	12	7	5	5	0	1	Y
Cottonwood Acres I[i] Salt River Gila, 652, 53.95	40 +	Monitored 5/06 to 8/06	N/A	73	38	36	36[h]	0	1	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Meddler Point Salt River Gila, 640, 6.92	40 ▲	5/16/2006 6/13/2006 7/4/2006	0 1 1	1	1	0	0	0	0	N
Eads Wash Salt River Gila, 661, 17.99	40	5/15/2006 5/16/2006 6/5/2006 6/17/2006 6/19/2006 7/3/2006 7/4/2006	0 0 0 0 0 0 0	0	0	0	0	0	0	N
Roosevelt Diversion Dam Salt River Gila, 664, 4.76	40	5/15/2006 6/14/2006 7/2/2006	1 0 0	0	0	0	0	0	1	N
Salt River at State Route 288 Bridge [e] Salt River Gila, 668, 1.35	40	5/15/2006 7/2/2006	0 0	0	0	0	0	0	0	N
Pinal Creek Salt River Gila, 853, 44.34	42 +	5/24/2006 6/14/2006 6/28/2006 7/5/2006 7/12/2006	7 11 10 7 5	10	6	4	6	0	1	Y
Cherry Creek South Salt River Gila, 793, 3.83	39	5/22/2006 6/13/2006 6/27/2006	0 0 0	0	0	0	0	0	0	N

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Cherry Creek North Salt River Gila, 793, 3.22	39	5/22/2006 6/13/2006 6/27/2006	0 0 0	0	0	0	0	0	0	N
San Francisco River										
Alpine Horse Pasture[e] San Francisco River Apache, 2414, 11.5	43 ▲	5/15/2006 6/6/2006 6/25/2006	0 0 1	1	1	0	0	0	0	Y
San Pedro River										
Dudleyville Crossing[g] San Pedro River Pinal, 604, 110	44 +	5/15/2006 5/17/2006 5/18/2006 5/19/2006 5/24/2006 5/31/2006 6/6/2006 6/7/2006 7/6/2006 7/7/2006 7/10/2006	1 0 2 5 3 2 11 2 3 2 3	10	5	5	4	6	3	Y
Cook's Lake Cienega/Seep[g] San Pedro River Pinal, 643, 40.5	44 +	5/16/2006 5/17/2006 6/7/2006 6/20/2006 6/27/2006 6/29/2006	0 9 0 20 0 13	19	10	9	3	1	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
San Pedro/Aravaipa Confluence [e] San Pedro River Pinal, 658, 6.0	44 +	5/24/2006 6/14/2006	8 19	19	10	9	8	0	0	N
Catalina Wash San Pedro River Pinal, 774, 7.25	45 +	5/16/2006 6/13/2006 6/23/2006	0 5 5	5	3	2	1	0	0	N
Three Links [g] San Pedro River Cochise, 991, 30.75	46 +	5/24/2006 6/9/2006 6/28/2006	10 21 17	20	12	8	7	0	2	Y
Babocomari San Pedro River Cochise, 1402, 9.4	47	5/25/2006 6/20/2006 6/28/2006	0 0 0	0	0	0	0	0	0	Y
SPRNCA - 9 San Pedro River Cochise, 1158, 9.0	48	5/18/2006 6/20/2006 6/27/2006	0 0 0	0	0	0	0	0	0	Y
Charleston Bridge North San Pedro River Cochise, 1189, 17.35	49	5/18/2006 5/22/2006 6/6/2006 6/20/2006 6/27/2006 7/12/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Escapula Wash North San Pedro River Cochise, 1219, 4.62	48	5/22/2006 6/5/2006 7/12/2006	0 0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Escapula Wash South San Pedro River Cochise, 1219, 4.13	48	5/22/2006 6/5/2006 7/12/2006	0 0 0	0	0	0	0	0	0	Y
State Route 90 Bridge San Pedro River Cochise, 1238, 18.5	49	5/24/2006 5/25/2006 6/12/2006 6/26/2006	0 0 0 0	0	0	0	0	0	0	Y
SPRNCA - Carr to Hunter San Pedro River Cochise, 1250, 13.5	49	5/24/2006 6/12/2006 6/26/2006	0 0 0	0	0	0	0	0	0	Y
Hereford Bridge San Pedro River Cochise, 1265, 20.99	50	5/23/2006 6/19/2006 7/10/2006	0 0 0	0	0	0	0	0	0	Y
SPRNCA - Palominas San Pedro River Cochise, 1280, 14.5	51	5/15/2006 5/16/2006 6/21/2006 7/14/2006	0 0 0 0	0	0	0	0	0	0	Y
Santa Cruz River										
Santa Cruz River, Upstream Trig Rd. Bridge Santa Cruz River Pima, 579, 11.62	52	5/22/2006 6/21/2006 6/26/2006 7/6/2006 7/13/2006	0 0 0 0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Cienega Creek - Narrows to Coldwater Santa Cruz River Pima, 1280, 21.6	53	5/23/2006 5/25/2006 5/31/2006 6/12/2006 6/13/2006 6/18/2006 7/10/2006 7/15/2006	0 0 0 0 0 0 0 0	0	0	0	0	0	0	Y
Cienega Creek Santa Cruz River Pima, 1311, 17.5	53	5/14/2006 5/17/2006 6/10/2006 6/14/2006 7/1/2006 7/9/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Cuates Buttes Santa Cruz River Santa Cruz, 1085, 13.23	54	5/25/2006 6/15/2006 7/13/2006	0 0 0	0	0	0	0	0	0	Y
Patagonia Lake - Sonoita Creek Santa Cruz River Santa Cruz, 1157, 27.7	55	5/26/2006 6/14/2006 7/12/2006	0 0 0	0	0	0	0	0	0	Y
Tonto Creek										
Orange Peel Tonto Creek Gila, 610, 2.27	56 +	Monitored 5/06 to 8/06	N/A	3	2	1	3	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Tonto Creek Inflow Tonto Creek Gila, 640, 21.5	56 +	Monitored 5/06 to 8/06	N/A	36	20	16	19	0	1	Y
A-Cross Road South Tonto Creek Gila, 677, 20.84	56 +	Monitored 5/06 to 8/06	N/A	22	11	11	13	0	1	Y
A-Cross Road North Tonto Creek Gila, 677, 29.59	56 +	Monitored 5/06 to 8/06	N/A	16	8	8	7	0	2	Y
Bar-X Road Tonto Creek Gila, 694, 18.02	56 +	Monitored 5/06 to 8/06	N/A	40	20	20	28	0	1	Y
Punkin Center Tonto Creek Gila, 732, 12.49	57	5/23/2006 6/13/2006 6/27/2006 7/4/2006 7/11/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Del Shay Tonto Creek Gila, 823, 2.74	58	5/22/2006 6/13/2006 6/28/2006	0 0 0	0	0	0	0	0	0	Y
Rye Creek Tonto Creek Gila, 853, 1.74	58	5/22/2006 6/9/2006 6/28/2006	0 0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Gisela South Tonto Creek Gila, 853, 12.5	58	5/23/2006 6/13/2006 6/27/2006 7/4/2006 7/11/2006	0 0 0 0 0	0	0	0	0	0	0	Y
Tonto Creek - Gisela Tonto Creek Gila, 914, 1.6	58	5/22/2006 6/13/2006 7/9/2006	0 0 0	0	0	0	0	0	0	Y
Verde River										
Rock Creek - Beeline Maricopa, 610, 2.08	59	5/17/2006 6/9/2006 6/27/2006	0 0 0	0	0	0	0	0	0	Y
Needle Rock Verde River Maricopa, 457, 5.86	60	5/31/2006 6/14/2006 7/4/2006	0 0 0	0	0	0	0	0	0	Y
Bartlett Dam Verde River Maricopa, 137, 5.86	60	5/31/2006 6/14/2006 7/4/2006	0 0 0	0	0	0	0	0	0	Y
Bartlett North Verde River Maricopa, 166, 11.55	61	5/30/2006 6/13/2006 7/11/2006	0 0 0	0	0	0	0	0	0	Y

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Davenport Verde River Maricopa, 576, 4.0	61	5/23/2006 6/4/2006 7/4/2006	0 0 0	0	0	0	0	0	0	Y
Horseshoe North Verde River Yavapai, 604, 32.07	61 +	Monitored 5/06 to 8/06	N/A	30	18	12	23	0	4	Y
Ister Flat Verde River Yavapai, 610, 9.0	61	5/24/2006 6/6/2006 6/25/2006	0 1 0	0	0	0	0	0	1	Y
Mile 9 R Verde River Yavapai, 634, 7.0	61	5/23/2006 6/5/2006 6/22/2006	0 0 0	0	0	0	0	0	0	Y
Junkyard to Sheep Bridge[e, f] Verde River Yavapai, 671, 3.53	62	5/26/2006	0	0	0	0	0	0	0	N
Junkyard[e, f] Verde River Yavapai, 646, 0.12	62	5/26/2006	0	0	0	0	0	0	0	N
Tangle Peak R[e, f] Verde River Yavapai, 652, 0.16	62	5/26/2006	0	0	0	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Mile 16.5 L [e, f] Verde River Yavapai, 671, 0.8	62	5/25/2006	0	0	0	0	0	0	0	N
Mile 16.5 R [e, f] Verde River Yavapai, 652, 0.19	62	5/26/2006	0	0	0	0	0	0	0	N
Mile 18.0 R [e, f] Verde River Yavapai, 665, 0.36	62	5/25/2006	0	0	0	0	0	0	0	N
Mile 18.5 L [e, f] Verde River Yavapai, 665, 0.25	62	5/25/2006	0	0	0	0	0	0	0	N
Mile 18.5 R [e, f] Verde River Yavapai, 665, 0.15	62	5/25/2006	0	0	0	0	0	0	0	N
Palo Verde Spring [e, f] Verde River Yavapai, 686, 0.97	62	5/25/2006	0	0	0	0	0	0	0	N
Red Creek [e, f] Verde River Yavapai, 640, 1.12	62	5/25/2006	0	0	0	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Pete's Cabin Mesa L [e, f] Verde River Yavapai, 707, 0.67	62	5/24/2006 5/25/2006	0 0	0	0	0	0	0	0	N
Pete's Cabin Mesa R [e, f] Verde River Yavapai, 713, 0.48	62	5/24/2006	0	0	0	0	0	0	0	N
Mile 29.5 R (ROG) [e, f] Verde River Yavapai, 716, 0.31	62	5/24/2006	0	0	0	0	0	0	0	N
Goat Camp [e, f] Verde River Yavapai, 707, 0.14	62	5/24/2006	0	0	0	0	0	0	0	N
Mile 31.75 R [e, f] Verde River Yavapai, 725, 0.23	62	5/24/2006	0	0	0	0	0	0	0	N
Mile 32.75 L [e, f] Verde River Gila, 732, 0.22	62	5/24/2006	0	0	0	0	0	0	0	N
Mile 33.25 R [e, f] Verde River Yavapai, 737, 0.21	62	5/24/2006	0	0	0	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Squaw Butte R [e, f] Verde River Yavapai, 732, 0.7	62	5/24/2006	0	0	0	0	0	0	0	N
Mile 34.75 L [e, f] Verde River Gila, 756, 0.36	62	5/24/2006	0	0	0	0	0	0	0	N
East Verde - Verde Confluence L [e, f] Verde River Gila, 610, 0.55	62	5/24/2006	0	0	0	0	0	0	0	N
East Verde - Verde Confluence R [e, f] Verde River Yavapai, 719, 0.21	62	5/24/2006	0	0	0	0	0	0	0	N
Lost Shirt Bend [e, f] Verde River Gila, 792, 0.27	62	5/24/2006	0	0	0	0	0	0	0	N
Childs to Lost Shirt [e, f] Verde River Yavapai, 792, 4.0	62	5/23/2006	0	0	0	0	0	0	0	N
Stage Stop - Dry Beaver Creek [e] Verde River Yavapai, 1103, 1.75	63	5/31/2006	0	0	0	0	0	0	0	N

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Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Sheepshead Canyon [e] Verde River Yavapai, 1052, 1.25	64	5/30/2006	0	0	0	0	0	0	0	N
Bridgeport Verde River Yavapai, 994, 5.5	65	5/19/2006 6/13/2006 7/13/2006	0 0 0	0	0	0	0	0	0	Y
Mingus Ave - Rocking Chair Road Verde River Yavapai, 994, 8.0	65	5/18/2006 6/13/2006 7/12/2006	0 0 0	0	0	0	0	0	0	Y
Cottonwood Verde River Yavapai, 1000, 13.5	65	5/17/2006 6/10/2006 6/28/2006 7/7/2006	0 0 0 0	0	0	0	0	0	0	Y
Upstream 10th St R and L Verde River Yavapai, 975, 14.5	65	5/15/2006 5/16/2006 6/6/2006 6/9/2006 7/3/2006 7/4/2006	0 0 0 0 0 0	0	0	0	0	0	0	Y
Tuzigoot Gallery Forest Verde River Yavapai, 1006, 6.0	65	5/15/2006 6/5/2006 7/2/2006	0 0 0	0	0	0	0	0	0	Y

Appendix G. Arizona willow flycatcher survey results by site, 2006 (map numbers and symbols correspond to Appendix F).

Site name Drainage County, Elevation (m), Survey Hours	Map Number	Individual Surveys		Site Summary						
		Survey Date	WIFL[a]	Resident Adult WIFL	Territories	Pairs	Nests	Unknown Status WIFL[b]	Migrant WIFL[c]	BHCO Present[d]
Tuzigoot Bridge Verde River Yavapai, 1006, 1.5	65	5/15/2006 6/5/2006 7/2/2006	0 0 0	0	0	0	0	0	0	Y
Virgin River										
Little Bend Virgin River Mohave, 518, 3.0	66	5/14/2006 6/4/2006 6/25/2006	0 0 0	0	0	0	0	0	0	Y
Littlefield Virgin River Mohave, 579, 1.78	66	5/14/2006 6/4/2006 6/25/2006	0 0 0	0	0	0	0	0	0	Y

[a] WIFL = adult willow flycatcher (*Empidonax trailii extimus*).
[b] Estimated number of willow flycatchers that could not be classified as resident or migrant due to brief appearance at the site during the breeding season or lack of survey data.
[c] Maximum number of migrant willow flycatchers detected during any single survey event.
[d] BHCO = brown-headed cowbirds (*Molothrus ater*).
[e] Survey did not meet 3-survey period USFWS protocol guidelines due to habitat determined to be unsuitable, habitat rendered unsuitable due to fire or other natural event, time, or accessibility constraints.
[f] Surveys were conducted from a kayak and hours are estimated.
[g] Discrepancies between number of WIFL found on individual surveys and number of WIFL in the site summary occur because not all resident WIFL were seen on the same day.
[h] Total nest number includes one or two instances where fledglings were found and confirmed to a territory but no actual nest was found before fledglings were discovered.
[i] Number of residents, territories and pairs may not be equal due to polygynous males and non-territorial floaters.
[j] Site is located within the Gila River watershed on Queen Creek.

Appendix H. Habitat measurements recorded at flycatcher nests at the Roosevelt Lake complex, 2006.

	Nest height (m)	Nest substrate height (m)	Diameter of nest substrate main stem (cm)	Distance from nest to water (m)
Tonto Creek Study Area				
Number of nests[a]	34	34	34	34
Mean ± s	3.48 ± 1.26	7.77 ± 4.7	18.81 ± 26.78	85.94 ± 164.48
Median	3.53	6.70	8.90	15.00
Minimum	1.40	1.80	1.00	0.00
Maximum	6.40	23.28	112.70	653.10
Salt River Study Area				
Number of nests[a]	34	34	33	34
Mean ± s	4.12 ± 1.46	7.4 ± 3.04	11.25 ± 9.40	104.87 ± 120.79
Median	3.70	7.33	8.80	52.25
Minimum	2.10	3.50	2.30	0.00
Maximum	7.60	20.00	43.00	446.00
Roosevelt Lake Complex Total				
Number of nests[a]	68	68	67	68
Mean ± s	3.80 ± 1.40	7.58 ± 3.94	15.09 ± 20.40	95.41 ± 143.54
Median	3.58	7.20	8.80	25.10
Minimum	1.40	1.80	1.00	0.00
Maximum	7.60	23.28	112.70	653.10