

# **BANDING OF THE SOUTHWESTERN WILLOW FLYCATCHER IN THE WHITE MOUNTAINS**

- 1997 Summary Report -

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## INTRODUCTION/BACKGROUND

The southwestern willow flycatcher (*Empidonax traillii extimus*) is one of several recognized subspecies of the willow flycatcher (Unitt 1987, Browning 1993), a neotropical migrant that breeds across much of North America. In the southwest, the species is a riparian obligate breeder, generally nesting in dense, mesic riparian habitats. The southwestern willow flycatcher has suffered serious declines as riparian habitats have been lost or modified (USFWS 1993), and has been listed as a federal endangered species (USFWS 1995). The states of Arizona, New Mexico, and California comprise most of the southwestern willow flycatcher's historic and current range. Each of these states lists the species as endangered (Arizona Game and Fish Department 1988, New Mexico Department of Game and Fish 1988, California Department of Fish and Game 1991).

The southwestern willow flycatcher was once distributed along most major river systems in Arizona (Phillips 1948, Unitt 1987). However, in the 10 years prior to 1993, only three areas within the state were known to support nesting flycatchers (Tibbitts et al. 1994). In 1993 and 1994, the Arizona Partners in Flight program (led by the Arizona Game and Fish Department) coordinated intensive state-wide inventories for breeding southwestern willow flycatchers. In 1993, 42-56 territorial flycatchers were found, as well as 10 active nests (Muiznieks et al. 1994). During 1994, surveyors found about 120 territorial males (77 of which were paired with one or more female), with breeding verified at 62 territories (Sferra et al. 1995). Unfortunately, confirmed breeding success was very low - only 10 documented successful nests statewide in 1994. Most breeding sites were widely scattered and included five or fewer breeding territories per site.

These intensive state-wide surveys provided much new information regarding the abundance and distribution of breeding willow flycatchers in Arizona. However, effective conservation and management of endangered birds requires specific information regarding population dynamics and breeding ecology that can not be inferred from other species or systems (Perrins et al. 1991). Therefore, in 1995, the Arizona Game and Fish Department focused its willow flycatcher efforts on eight sites, including the Apache-Sitgreaves National Forest (ASNF) sites in the White Mountains of eastern Arizona (see Figure 1), where they gathered detailed information on population size and nesting productivity. This same type and level of monitoring effort continued through 1997. The U.S.G.S. Colorado Plateau Field Station began research at one of the ASNF sites, Alpine Horse Pasture, in 1994. Since that time two more sites on the ASNF have been added, Greer River Reservoir in 1995 and Greer Town in 1997.

The distribution, abundance, and productivity information that is gathered by Arizona Game and Fish Department field crews is valuable in evaluating the current and future status of the willow flycatcher within Arizona. Additional demographic information was needed, though, to understand the population dynamics of the species with respect to between-year survivorship and mortality of adults and young, immigration and emigration, site fidelity, and possible movement between sites. Knowledge of these parameters (coupled with those already being measured by the Arizona Game and Fish Department) will make it possible to model the population dynamics of the species, providing an important tool for regional and site-specific conservation and management of the southwestern willow flycatcher. Determination of these parameters requires the capture and color-banding of individual birds (Clobert and Lebreton 1991, Ralph et al. 1993), something beyond the scope of Arizona Game and Fish Department field efforts. Mist-netting and banding can also help obtain better population estimates at the breeding sites (Bibby et al. 1992, Ralph et al. 1993).

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## HISTORY OF BANDING PROJECT:

Prior to 1996, a small number of flycatchers were color banded by CPFS staff at ASNF sites. In 1994, two individuals from ASNF were captured and banded, both from Alpine Horse Pasture. In 1995, CPFS staff spent one week banding ten flycatchers at ASNF sites, eight from Greer River Reservoir and two from Alpine Horse Pasture. Several of the flycatchers from 1994 and 1995 have been successfully monitored through the 1996 and 1997 seasons.

In 1996, CPFS joined with AGFD to conduct a long term and large scale demographic study of willow flycatchers in Arizona. AGFD continued its ongoing surveying and monitoring of new and known flycatcher breeding sites, while CPFS joined the efforts by color banding the flycatchers at most of the monitored sites. In 1996, two ASNF sites were included in our project, with six adults and four nestlings banded, and nine adults resighted/recaptured (88% of the adults detected at these sites, Paxton and Sogge 1996). The work conducted in 1996 and previous years set the groundwork for this year's resighting and movement data.

**Figure 1.** Southwestern Willow Flycatcher Banding Sites in the White Mountains - 1997.



## METHODS

We worked closely with AGFD focusing our banding efforts on specific breeding sites. When possible, we used AGFD territory designations to indicate where flycatchers were banded in their study areas.

### BANDING:

All adult willow flycatchers were captured using mist nets in a standard method. The mist nets were typically set up in a known breeding territory, and recordings of willow flycatcher vocalizations were broadcast from a compact disc player to attract territorial flycatchers. Often, an Empidonax flycatcher decoy was used to compliment the vocalizations. Each adult received a numbered USFWS aluminum band and a unique combination of plastic color bands. The color bands consisted of two colors, with the bottom color band a common color shared by all flycatchers from that drainage (dark blue for Greer sites and yellow for Alpine Horse Pasture). This allowed each individual to be identified without need for recapture if seen again in the field (see Resighting section below). For each flycatcher, we looked for the presence/absence of retained flight feathers, and measured wing cord, tail length, culmen length, bill width, weight, and fat level in a standard method (see Pyle et al 1987). Gender of adult flycatchers in the field was determined when possible by the presence of a cloacal protuberance (male) or a brood patch (female).

Nestlings were banded only when they could be taken from nests that were safely accessible, and only when 7-10 days of age (Whitfield 1990). Unfortunately, most nests are not accessible without potentially damaging the nest or nest plant. Also, accessible nests often fail before the young can be banded, and thus few nestlings are banded each year. Nestlings that were banded received a numbered USFWS aluminum band on one leg, and one plastic color band, indicative of the drainage (dark blue for Greer sites and yellow for Alpine Horse Pasture), on the other leg. Nestlings received only one color because of an expected low return rate and a limited number of color combinations for each site. In addition, their weight was recorded.

### RESIGHTING:

We identified banded flycatchers by determining their unique color band combination from a distance, enabling us to detect and monitor individual flycatchers without recapturing them. We focused resighting efforts on establishing which individuals belonged to which territories and were attending what nests. With this information we will be able to investigate movement, productivity, and gender based behavior patterns. We did not broadcast flycatcher vocalizations to resight individuals in order to establish territory placement, since vocalizations can bring in flycatchers from neighboring territories.

All banders and other researchers recorded incidental observations of color banded flycatchers. For every resighted flycatcher we recorded the color band combination, site, specific location at the site (using either a designated territory number or aerial maps), the level of confidence in the resight, and any behavioral observations. Because resighting is difficult, and misidentification of the color combination a possibility, all information based on resighting in this report is either from more than one resight of the color band combination in the same area, or an exceptionally good resight from an experienced observer.

## STUDY SITES

There are three small breeding sites in the White Mountains, the only high elevation sites known in Arizona. These sites exist along small rivers in relatively broad valleys in patches of primarily Geyer willow (*Salix geyeriana*). Two of the three sites where banding occurred, Greer River Reservoir and Greer Town, are separated by approximately two kilometers on the Little Colorado River. The third site, Alpine Horse Pasture, is on a different drainage, approximately 47 km from the Greer sites. The Greer River Reservoir, Greer Town and Alpine Horse Pasture sites were surveyed and monitored by the Arizona Game and Fish Department (AGFD) in 1997.

### GREER - RIVER RESERVOIR:

The Greer River Reservoir site is characterized by a large patch of Geyer willows (14 ha) interlaced with the Little Colorado River in a wide valley at 2500 m in elevation. Beaver ponds create large pools of standing water among the willows. The willows average five meters high, and form a mosaic of dense patches and open areas within the overall patch. In past years flycatchers have been found throughout this site, but in 1997 they were detected only in the west end of the patch.

### GREER - TOWN:

The Greer Town site consists of a linear patch of Geyer willow interspersed with thin-leaf alder (*Alnus tenuifolia*) running approximately 500 m along the Little Colorado River at an elevation of about 2500 meters. The patch varies from 50-200 m wide with the willows and alders averaging four meters high. Several beaver dams create small ponds of water and open areas within the habitat. The flycatcher nest sites for the three territories at this site were widely spaced within the habitat, occurring approximately 300 meters apart. The site is adjacent to the town of Greer, and receives considerable use by fisherman; in addition, a domestic/feral cat (*Felis gatus*) was observed in one of the flycatcher territories, approximately ten meters from a singing flycatcher.

### ALPINE HORSE PASTURE:

The Alpine Horse Pasture site is a remnant stand of Geyer willow in the San Francisco River valley approximately one kilometer east of Alpine at 2400 m in elevation. The site once supported a larger thicket of willows with interspersed beaver ponds (much like the Greer sites), but the site is drier and the willows are now limited to a small area (0.5 ha). The flycatchers bred in the largest continuous thicket left within this site in 1997, the two nests approximately 150 meters apart on opposite ends of the thicket. The flycatcher nests average about a 100 meters from the river, which was dry for most of the 1997 breeding season.

## RESULTS

### BANDING/RESIGHTING

The following section describes the three sites where banding occurred in 1997. For each site there is an estimate of effort (bander days) expended on that site. Bander day is defined as the effort of one bander per day and is not meant as an exact measure of effort, but merely an estimate of it. Returning flycatchers are indicated in the status column, where they are reported as either new (1997), or as a resight or recapture (banded before 1997). Listed in the tables below are the date originally banded, unique USFWS band number, color band combination, age in 1997, and sex. Because of banding efforts prior to 1997, date originally banded could be previous to this year. Gender of adult flycatchers was determined genetically unless otherwise noted. We also indicate whether each flycatcher was confirmed at a territory, which was determined by the resight or capture of a flycatcher at least twice in the same territory.

#### GREER - RIVER RESERVOIR:

In 1997, AGFD detected two pairs of willow flycatchers, and one unpaired individual. CPFS also detected one banded flycatchers without an AGFD territory on the perimeter of the patch. The CPFS banding crew spent eight bander days to resight/recapture four adults (66% of the flycatchers detected) and band five nestlings from two nests. Three of the four resighted flycatchers were banded in 1995, and the fourth was banded in 1996; all were originally banded at this site.

**Table 1:** Willow flycatchers banded, recaptured, and/or resighted at **Greer River Reservoir**, including date originally banded, USFWS band number, color band combination, age, sex, the AGFD territory it was caught in or near, status (new, recapture, resight, or nestling), and whether it was a confirmed resident of the territory where it was captured.

Date Banded	USFWS Band Number	Color Band LEFT	Color Band RIGHT	AGE 1997	SEX	AGFD Territory	Confirmed Resident of Territory?	Status
02-Jul-96	1740-91735	RW/D	X	ASY	M	3	Yes	Resight
18-Jul-95	1870-58353	G/D	X	ATY	M*	1	Yes	Recapture
20-Jul-95	1870-58360	D/D	X	ATY	F*	---	No	Resight
26-Jul-95	1870-58363	K/D	X	ATY	F	1	Yes	Recapture
14-Jul-97	1590-97376	X	D	N	U	3	Yes	Nestling
14-Jul-97	1590-97377	X	D	N	U		Yes	Nestling
15-Jul-97	1590-97378	X	D	N	U	1	Yes	Nestling
15-Jul-97	1590-97379	X	D	N	U		Yes	Nestling
15-Jul-97	1590-97380	X	D	N	U		Yes	Nestling

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where K=black, G=green, D=dark blue, RW=red over white split, and X=USFWS aluminum band // **Age:** AHY, ASY, ATY=adult and N=nestling // **Sex:** F=female, M=male, and U=unknown (\* field sexing only)

GREER TOWN:

In 1997, AGFD detected three pairs of willow flycatchers. This was the first year that CPFS banded at this site, spending four bander days to band six adults (100% of the birds detected). No nestlings were banded. One flycatcher (X:Y/D) captured at this site had a deformed bill, with the mandibles crossed laterally by 1-2 mm.

**Table 2:** Willow flycatchers banded, recaptured, and/or resighted at Greer Town, including date originally banded, USFWS band number, color band combination, age, sex, the AGFD territory it was caught in or near, status (new, recapture, resight, or nestling), and whether it was a confirmed resident of the territory where it was captured.

Date Banded	USFWS Band Number	Color Band LEFT	Color Band RIGHT	AGE	SEX	AGFD Territory Banded	Confirmed Resident of Territory?	Status
14-Jun-97	1590-97224	X	P/D	AHY	M*	2	Yes	New
14-Jun-97	1590-97225	X	D/D	AHY	U	2	Yes	New
17-Jun-97	1590-97232	X	WK/D	AHY	M*	3	Yes	New
20-Jul-97	1590-97260	X	Y/D	AHY	F*	3	Yes	New
20-Jul-97	1590-97261	X	O/D	AHY	F*	1	No	New
20-Jul-97	1590-97262	X	RW/D	AHY	M*	1	No	New

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where Y=yellow, O=orange, P=pink, D=dark blue, RW=red over white split, WK=white over black split, and X=USFWS aluminum band // **Age:** AHY=adult // **Sex:** F=female, M=male, and U=unknown (\* field sexing only)

ALPINE HORSE PASTURE:

In 1997, AGFD detected two breeding pairs of flycatchers at Alpine Horse Pasture. The CPFS banding crew spent five bander days to band two new adults and resight/recapture two others (100% of the adults detected). In addition, three nestlings from one nest were banded. Of the two flycatchers resighted/recaptured, one was banded in 1995 and detected again in 1996, and the other was banded in 1994, and detected again in 1996. The flycatcher that was banded in 1994 (X:PD/Y) was polygynous with three females in 1996. In 1997, this male was captured next to the other flycatcher nest, but the two flycatchers at that nest appeared to be interacting as a pair. Furthermore, we did not observe the female from that nest (B/Y:X) interacting with the polygynous male; therefore, we believe the male was monogamous in 1997.

**Table 3:** Willow flycatchers banded, recaptured, and/or resighted at Alpine Horse Pasture, including date originally banded, USFWS band number, color band combination, age, sex, the AGFD territory it was caught in or near, status (new, recapture, resight, or nestling), and whether it was a confirmed resident of the territory where it was captured.

Date Banded	USFWS Band Number	Color Band LEFT	Color Band RIGHT	AGE in 1997	SEX	AGFD Territory Banded	Confirmed Resident of Territory?	Status
18-Jun-97	2070-92902	W/Y	X	AHY	U	2	No	New
18-Jun-97	2070-92903	B/Y	X	AHY	F	2	Yes	New
24-Jul-94	1520-93444	X	PD/Y	AFY	M	1	Yes	Resight
27-Jul-97	1870-58364	Y/Y	X	ATY	F	1	Yes	Recapture
9-Jul-97	1590-97369	Y	X	N	U	1	Yes	Nestling
9-Jul-97	1590-97370	Y	X	N	U		Yes	Nestling
9-Jul-97	1590-97371	Y	X	N	U		Yes	Nestling

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where B=blue, Y=yellow, W=white, PD=pink over blue split, and X=USFWS aluminum band // **Age:** AHY, ATY, AFY=adult and N=nestling // **Sex:** F=female, M=male, and U=unknown (\* field sexing only)

## SITE FIDELITY

In 1996, we detected eight returning banded adults at the two high elevation sites, a return rate of 89% of the 1995 banded adults. In 1997, we detected six returning flycatchers at the high elevation sites, a return rate of 40% of the 1996 banded adults. Although the sample size was small, this represents a distinct drop in percentage of returning adults. This has been reflected in the number of territories and nests detected since 1995, which have been steadily decreasing. This return rate does not take into account those flycatchers that may have moved to alternative breeding sites. No such sites are known in the ASNF and it is unlikely that other sites exist since all suitable habitat has been surveyed (AGFD pers. comm.).

Gender ratios of returning flycatchers have also had fluctuations in the last three years of banding research. Of nine banded adult flycatchers in 1995, 78% were female. Returning banded flycatchers in 1996 were 75% female. In 1996, of the 15 banded adult flycatchers, 66% were female. Returning banded flycatchers in 1997 were 50% female.

**Table 4:** Return rates of willow flycatchers to the same breeding site, grouped by drainage, including site, USFWS band number, color band combination, age and sex.

Drainage	Site Banded	USFWS Band Number	Color Band LEFT	Color Band RIGHT	Age	Sex
<b>1996 TO 1997 RETURNS</b>						
Little Colorado River	Greer River Reservoir	1740-91735	RW/D	X	ASY	M
	Greer River Reservoir	1870-58353	G/D	X	ATY	M*
	Greer River Reservoir	1870-58360	D/D	X	ATY	F*
	Greer River Reservoir	1870-58363	K/D	X	ATY	F
San Francisco River	Alpine	1520-93444	X	PD/Y	AFY	M
	Alpine	1870-58364	Y/Y	X	ATY	F
<b>1995 TO 1996 RETURNS</b>						
Little Colorado River	Greer River Reservoir	1870-58351	DP/D	X	ASY	M*
	Greer River Reservoir	1870-58353	G/D	X	ASY	M*
	Greer River Reservoir	1870-58355	R/D	X	ASY	F
	Greer River Reservoir	1870-58359	W/D	X	ASY	F*
	Greer River Reservoir	1870-58360	D/D	X	ASY	F
	Greer River Reservoir	1870-58363	K/D	X	ASY	F
San Francisco River	Alpine	1870-58364	D/Y	X	ASY	F
	Alpine	1870-58365	Y/R	X	ASY	F*
<p><b>Color bands</b> are read from top/bottom and LEFT leg to RIGHT leg where R=red, K=black, G=green, Y=yellow, W=white, D=dark blue, RW=white over red split, PD=pink over blue split DP=blue over pink split, and X=USFWS aluminum band  <b>Age:</b> ASY, ATY, AFY=adult // <b>Sex:</b> F=female, M=male (* field sexing only)</p>						

## MOVEMENT WITHIN SITES

We observed local movements within sites between the 1995 and 1996 breeding season. Of the eight 1995 banded birds that returned to the White Mountains in 1996, seven moved to new territories and one stayed in the same territory. All eight flycatchers were successful in the previous year's nesting attempt. The one banded adult from 1995 that did not return to the site in 1996 was also successful in its 1995 nesting attempt. Between 1996 and 1997 we also observed local movements. Of the six returning flycatchers, one moved to a new territory. This flycatcher was successful in the previous year's nesting attempt. Three other flycatchers stayed in the same territory, all three having failed in their nesting attempts in 1996. The male that was polygynous in 1996 appeared to be monogamous in 1997 at one of its successful 1996 territories. There was one returning adult at the Greer River Reservoir site in 1997 that did not have a designated territory, although it was observed adjacent to its 1996 territory. This adult had an unsuccessful nesting attempt in 1996. Of the nine flycatchers that did not return in 1997, two had successful nesting attempts in 1996 and five had unsuccessful nesting attempts in 1996. Results correlating productivity with individual flycatchers should be considered approximations since resighting did not always occur at nests. Although the territories within the White Mountain sites are widely spaced, it is possible that some flycatchers were captured/resighted outside of their assigned territory. Below are summaries of local movements within each site.

### GREER RIVER RESERVOIR:

#### 1995-1996:

Flycatcher territories were spread throughout the Greer River Reservoir site in 1995 and 1996. Six flycatchers originally banded at Greer River Reservoir returned to that site in 1996 (85% return rate). Every returning adult had a successful nesting attempt in 1995. Five of the six flycatchers moved out of their 1995 territory to a new area in 1996. Only one flycatcher stayed in approximately the same territory (see Figure 2). Two pairs of flycatchers that both had a successful nesting attempt in 1995 all found different mates in 1996.

**Table 5: Movement within Greer River Reservoir site, 1995-1996.** Includes USFWS band number, color band combination, age in 1996, sex, AGFD territory in 1995, AGFD territory in 1996, and distance moved within the site.

USFWS Band Number	Color Band LEFT	Color Band RIGHT	Age 1996	Sex	AGFD Territory 1995	AGFD Territory 1996	Distance moved
1870-58351	BP/D	X	ASY	M*	2	3	~150 m
1870-58353	G/D	X	ASY	M*	3	2	~130 m
1870-58355	R/D	X	ASY	F	7	3	~100 m
1870-58359	W/D	X	ASY	F*	3	6	~30 m
1870-58360	D/D	X	ASY	F	6	2	~50 m
1870-58363	K/D	X	ASY	F	7	2	same territory

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where R=red, K=black, G=green, W=white, D=dark blue, BP=blue over pink split, and X=USFWS aluminum band // **Age:** ASY=adult // **Sex:** F=female, M=male (\* field sexing only)

**1996-1997:**

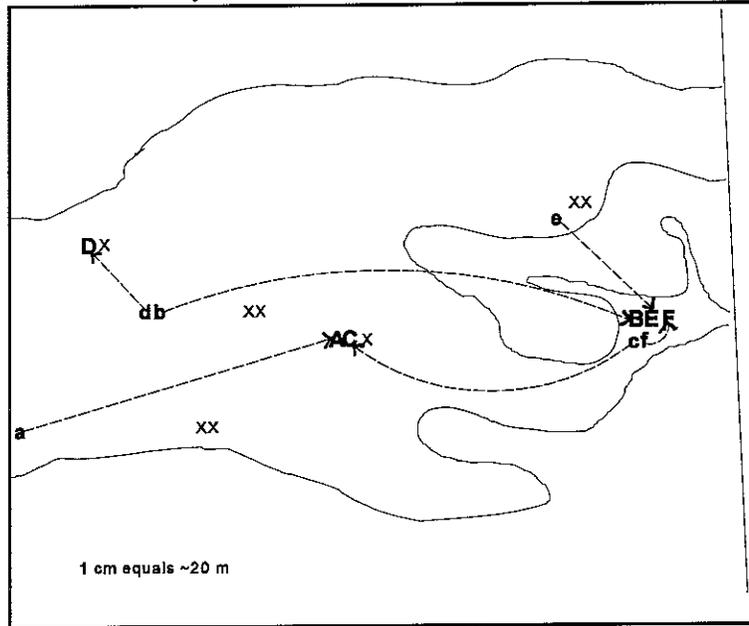
Paired flycatchers were spread out throughout the Greer River Reservoir site in 1996 and 1997. Four flycatchers banded at Greer River Reservoir returned to that site in 1997 (30% return rate). Of these four adults, three had known territories within 20 m of their 1996 territories. The fourth bird did not have a known territory, although it was sited approximately 20 m from its 1996 territory (see Figure 3). All four adults had unsuccessful breeding attempts in 1996. Two flycatchers that were paired in 1996 and had an unsuccessful nesting attempt, returned to the same territory as a pair in 1997.

**Table 6:** Movement within **Greer River Reservoir** site, **1996-1997**. Includes USFWS band number, color band combination, age in 1997, sex, AGFD territory in 1996, AGFD territory in 1997, and distance moved within the site.

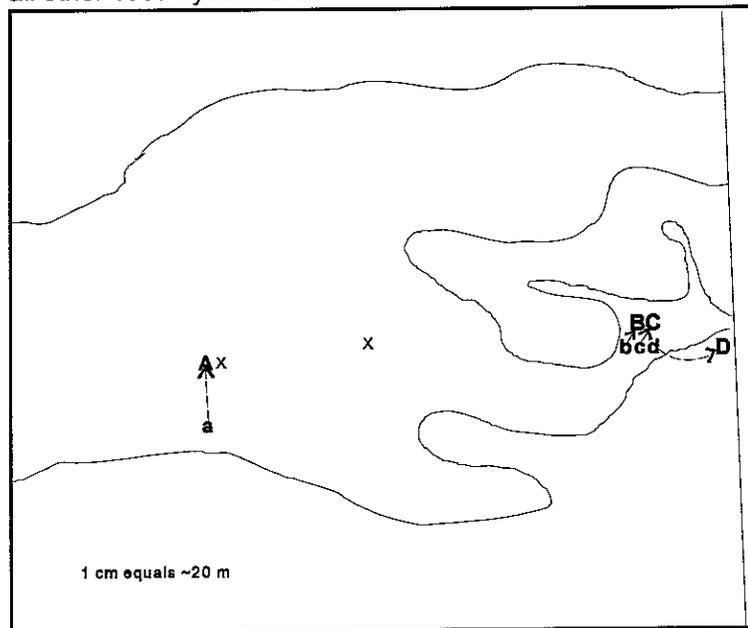
USFWS Band Number	Color Band LEFT	Color Band RIGHT	Age 1997	Sex	AGFD Territory 1996	AGFD Territory 1997	Distance moved
1740-91735	RW/D	X	ASY	M	4	3	~20 m
1870-58353	G/D	X	ATY	M*	2	1	Same territory
1870-58360	D/D	X	ATY	F*	2	Unknown	Unknown
1870-58363	K/D	X	ATY	F	2	1	Same territory

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where K=black, G=green, D=dark blue, RW=red over white split, and X=USFWS aluminum band // **Age:** ASY=adult // **Sex:** F=female, M=male (\* field sexing only)

**Figure 2: Greer River Reservoir within-site movement from 1995 to 1996.** Between year movements of individuals are represented by the ----- lines running from 1995 territories (small letters) to 1996 territories (capital letters). X's represent all other 1996 flycatchers.



**Figure 3: Greer River Reservoir within-site movement from 1996 to 1997.** Between year movements of individuals are represented by the ----- lines running from 1996 territories (small letters) to 1997 territories (capital letters). X's represent all other 1997 flycatchers.



ALPINE HORSE PASTURE:

1995-1996:

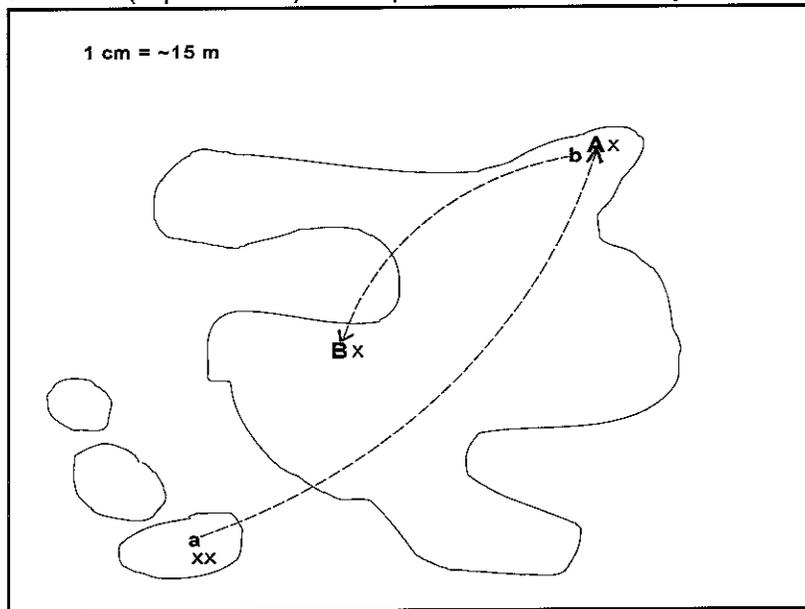
In 1995 and 1996, Alpine Horse Pasture consisted of a half hectare patch of willows. Two flycatchers returned to Alpine Horse Pasture in 1996 (100% return rate), each moving one to two territories from their 1995 nest sites (see Figure 4). Both returning adults were successful in their 1995 breeding attempts.

**Table 7:** Movement within **Alpine Horse Pasture** site, 1995-1996. Includes USFWS band number, color band combination, age in 1996, sex, AGFD territory in 1995, AGFD territory in 1996, distance moved within the site, and the nesting productivity in 1995.

USFWS Band Number	Color Band LEFT	Color Band RIGHT	Age 1996	Sex	AGFD Territory 1995	AGFD Territory 1996	Distance moved	Productivity 1995
1870-58364	DB/Y	X	ASY	F	2	2	~150 m	Successful
1870-58365	Y/R	X	ASY	F*	1	3	~80 m	Successful

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where R=red, K=black, G=green, W=white, D=dark blue, BP=blue over pink split, and X=USFWS aluminum band // **Age:** ASY=adult // **Sex:** F=female, M=male (\* field sexing only)

**Figure 4. Alpine Horse Pasture** within-site movement from 1995 to 1996. Between year movements of individuals are represented by the ----- lines running from 1995 territories (small letters) to 1996 territories (capital letters). X's represent all other 1996 flycatchers.



**1996-1997:**

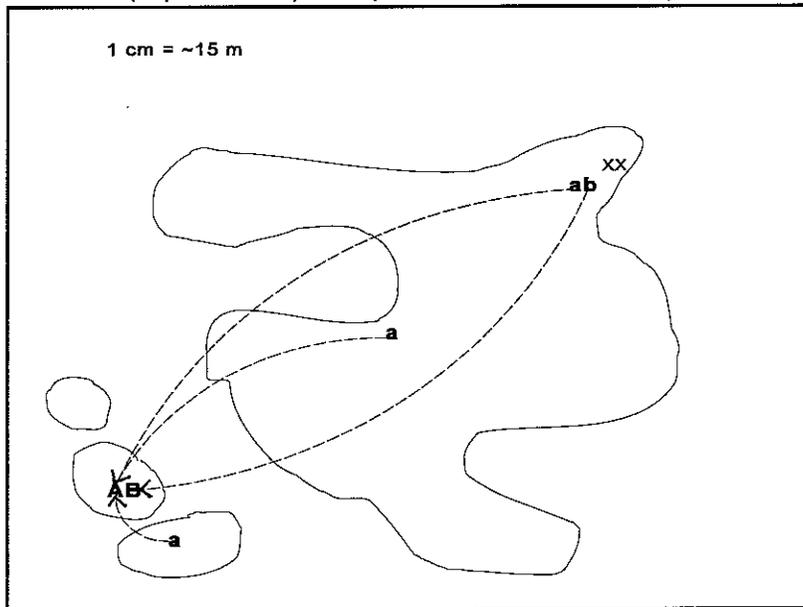
Two flycatchers returned to the Alpine Horse Pasture site in 1997 (40% return rate). One of these adults was a polygynous male in 1996 that moved between nests one, two and three. All three of these nests had suspected nesting success, although fledglings were not observed at two of the nests. The second adult moved from the west end of the habitat patch to east end (~150 m) and had successfully fledged young in 1996 (see Figure 5). This second adult has moved alternately to the east and west sides of the habitat patch the last three years (1995-1997), with successful nesting attempts in all three years.

**Table 8:** Movement within **Alpine Horse Pasture** site, 1996-1997. Includes USFWS band number, color band combination, age in 1997, sex, AGFD territory in 1996, AGFD territory in 1997 and whether it was confirmed at that territory, distance moved within the site.

USFWS Band Number	Color Band LEFT	Color Band RIGHT	Age 1997	Sex	AGFD Territory 1996	AGFD Territory 1997	Distance Moved
1520-93444	X	PD/Y	AFY	M	1-3	1	same territory
1870-58364	Y/Y	X	ATY	F	2	1	~150 m

**Color bands** are read from top/bottom and LEFT leg to RIGHT leg where Y=yellow, BP=blue over pink split, and X=USFWS aluminum band // **Age:** ASY, ATY=adult // **Sex:** F=female, M=male (\* field sexing only)

**Figure 5. Alpine Horse Pasture** within-site movement from **1996** to **1997**. Between year movements of individuals are represented by the ---- lines running from 1996 territories (small letters) to 1997 territories (capital letters). X represents all other 1997 flycatchers.



## DISCUSSION

In 1997, we captured and banded 93% of the detected flycatchers at the White Mountain sites, and banded nestlings at all three of the successful nests. Cooperation with AGFD continued this year with their assistance in resighting returning individuals and the information we collected assisting AGFD in making better population estimates. Continued monitoring of banded birds at these sites will provide more data on movements between and within sites, site fidelity, survivorship and mortality. Several topics from our research through 1997 are discussed below, including site fidelity, physical deformities, predation and management recommendations.

### SITE FIDELITY:

In the past four years since we began studying the southwestern willow flycatcher population in the White Mountains, there has been a downward trend in the number of nests and territories. In 1994 there were eight nest sites at Greer River Reservoir and five nest sites at Alpine Horse Pasture. In 1995, there were seven nest sites at Greer and three at Alpine Horse Pasture. In 1996, there were five nest sites at Greer and three at Alpine Horse Pasture. Finally, in 1997, there were two nest sites at Greer and two at Alpine Horse Pasture. This same trend is reflected in the return rate of the banded birds at the two sites, which dropped from 80% in 1996 to 38% in 1997. Certainly it is difficult to make conclusions based on two years of return rate data, but this downward trend does correspond to the trend in numbers of nests. It is also possible that the return rate for 1996 and 1997 corresponds to the productivity rate for the previous years, with all nests successful in 1995 (and a 80% return rate) and all nests unsuccessful in 1997 (and a 38% return rate). Furthermore, 70% of the banded adults at the unsuccessful nests in 1996 did not return in 1997. These sites should be monitored in future years to see if this trend continues.

Nest site fidelity appears to have no link to successful productivity, with 80% of the adults at successful nests moving to new territories the following year and all adults at unsuccessful nests staying in the same territory the following year. Pair bonds also did not appear to be connected with successful productivity from the previous year. Of the three pairs that have returned to the White Mountain sites over the past two years, two pairs that had successful nests together separated the following year and found new mates, and one pair that had an unsuccessful nest stayed together the following year (and was successful in 1997). The high elevation sites were the only flycatcher sites in Arizona where pairs nested together for more than one year (Paxton et. al. 1997).

### PHYSICAL DEFORMITIES:

In the past two years we observed bill deformities on seven different birds from Arizona, Colorado and New Mexico (Zuni Reservation), including one flycatcher captured at Greer Town site. All seven flycatchers with deformities were captured at different sites. The deformities include five crossed bills, with the lower mandible crossing the upper mandible by 1-2 mm, and two unaligned bills with the upper mandible shorter than the lower mandible. One of the seven flycatchers was a hatch year bird, having recently fledged from the nest when it was captured. Physical deformities, such as crossed mandibles have been reported in conjunction with environmental contaminants (Hays and Risebrough 1972). Southwestern willow flycatchers often nest in riparian areas that are adjacent to agriculture and mining operations, both of which use or produce potentially toxic chemicals. Little is known about the southwestern willow flycatcher wintering habitat, where they could also be exposed to potentially toxic chemicals. Although the habitat in the White Mountains is not adjacent to intensive agriculture, detrimental contaminants could be picked up from upstream, their wintering grounds or on their migration routes.

### PREDATION:

Between 1994-1996 predation appears to have occurred at 19% of the nests at the high elevation sites (Spencer et. al. 1997). Observation of a feral cat at the Greer Town site within a flycatcher territory

suggests that feral cats could be a possible predator. Feral animals associated with human activities have been recorded as predators on birds (Luoma 1997, Terborgh 1989), although during this past season CPFS also observed predation on flycatcher nestlings by a common king snake (*Lampropeltis getulus*) and a Cooper's hawk (*Accipiter cooperii*). In 1994 and 1995, CPFS staff also sighted long-tailed weasels (*Mustela frenata*) at the White Mountain sites, including one observed in a willow flycatcher nest bush. Predation and disturbance due to human activity should be monitored at this site to explore the possibility of human impacts.

#### MANAGEMENT RECOMMENDATIONS:

- 1) This population should be monitored in future years to determine if the downward trend in population numbers and nesting attempts continues.
- 2) If possible, monitoring should be supplemented with banding in order to gain a better understand movements, survival, and site/territory fidelity at the high elevation sites. Information from banding would also provide better population estimates in future years.
- 3) Continue habitat protection, including fences around the breeding sites and brown-headed cowbird trapping. Prevent horses from grazing at the Alpine Horse Pasture site in order to promote recruitment of new willows and regeneration of habitat.

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## **APPENDIX ONE**

Aerial photographs of the three study sites showing the locations  
where willow flycatchers were banded

### **NOTICE**

This information is confidential and sensitive due to the species' vulnerability to intentional or unintentional disturbance.

This appendix is not for general distribution , and will be distributed only to the Apache-Sitgreaves National Forest, the Arizona Game and Fish Department and the U.S. Fish and Wildlife Service. This information is for willow flycatcher research, conservation and management purposes only and the data will not be included in any documents or available to other entity except as noted.