

CHAPTER 3

COLOR-BANDING AND RESIGHTING

INTRODUCTION

Long-term monitoring of willow flycatchers of known identity, sex, and age is the only effective way to determine demographic life history parameters such as annual survivorship and mortality of adults and young, between-year site fidelity, and seasonal and between-year movements, within and between sites. Thus, as an integral part of the life history studies, we captured and uniquely color-banded as many willow flycatchers as possible, allowing field personnel to resight individuals throughout the 2003 breeding season, as well as in subsequent years. Resighting consisted of using binoculars to determine the identity of a color-banded flycatcher by observing, from a distance, the unique color combination on its legs. This allowed field personnel to detect and monitor individuals without recapturing each bird.

METHODS

COLOR-BANDING

From approximately mid-May through the end of August 2003, we captured and uniquely color-banded adult, nestling, and fledged willow flycatchers, with banding efforts concentrated at the life history study areas and Bill Williams. In addition to these sites, we initiated color-banding studies from 10–30 June along the extreme southern stretches of the lower Colorado River from its confluence with the Gila River south to the Mexico border. In conjunction with subsequent resighting and monitoring through the end of July, these additional studies were conducted to better determine flycatcher residency, breeding status, and movement patterns in this area. Banding efforts at all sites were primarily dependent upon the presence of territorial individuals, as determined by survey, monitoring, and banding field personnel.

Adult and fledgling flycatchers were captured using mist-nets, which provide the most effective technique for live-capture of adult songbirds (Ralph et al. 1993). We used a targeted capture technique (per Sogge et al. 2001), whereby a variety of conspecific vocalizations are broadcast from a CD player and remote speakers to lure territorial flycatchers into the nets. In addition, we used “passive netting,” whereby several mist-nets are erected and periodically checked, with no broadcast of conspecific vocalizations.

Nestlings to be banded were gently removed from the nest at 7 to 10 days of age. At that age, they are large enough to retain the leg bands, yet young enough that they will not prematurely fledge from the nest (Whitfield 1990, Paxton et al. 1997). Nestlings were banded only when the location of the nest was such that nest access and removal/replacement of the nestlings would not endanger the nest, nest plant, or nestlings. We banded each adult and fledged willow flycatcher with a single anodized (colored), numbered U.S. federal aluminum band on one leg and one

colored metal band on the other. Nestlings were banded with a single anodized numbered federal band, uniquely identifying it as a returning nestling in the event it returns in a subsequent year. We coordinated all color combinations used at study locations with the Federal Bird Banding Laboratory and all other Southwestern Willow Flycatcher banding projects to minimize replication of color combinations. For each color-banded bird recaptured, we visually inspected the legs and noted any evidence of irritation or injury that may be related to the presence of leg bands. Color change and fading have been documented in Hughes's celluloid-plastic leg bands, making resighting difficult under field conditions (Lindsey et al. 1995, USGS unpublished data). For birds recaptured with faded and indistinguishable plastic bands, we replaced the bands with metal color-bands. All plastic bands removed were collected and the color-band combination, if recognizable, recorded along with the federal band number.

For each captured adult and fledged willow flycatcher, we recorded morphological measurements including culmen, tail, wing, mass, fat level, and molt onto standardized data forms (Appendix A). Sex was determined based on the presence of a cloacal protuberance in males or brood patch for females. Flycatchers with retained primary, secondary, and/or primary covert feathers (multiple aged remiges) were aged as second-year adults, and those without (uniformly aged remiges) were aged as after second year (per Kenwood and Paxton 2001 and Koronkiewicz et al. 2002).

RESIGHTING

We determined the identity of a color-banded flycatcher by observing with binoculars, from a distance, the unique color combination on its legs. Typically, territories and active nests were focal areas for resighting, but entire sites were surveyed. Field personnel typically spent the early part of each morning color-banding, and then redirected their efforts to resighting as daylight increased and flycatchers became more difficult to capture. All banding, monitoring, and survey field personnel coordinated resighting efforts and recorded observations of color-banded and unbanded flycatchers onto standardized data forms (Appendix A). For resighted flycatchers, we recorded color-band combinations, territory number, site, standardized confidence levels of the resight, and behavioral observations. Willow flycatchers exhibiting territorial behaviors for one week or greater, regardless of whether a possible mate was observed, were considered territorial at a site. All territories were assigned a unique alphanumeric code and were plotted onto high-resolution aerial photographs, thus producing a spatial representation of flycatcher population structure at each study location. Flycatchers were determined to be unpaired if none of the following breeding behaviors were observed: presence of another unchallenged flycatcher in the immediate vicinity, counter calling (*whitts*) with a nearby flycatcher, interaction twitter calls (*churr/kitters*) with a nearby flycatcher, a flycatcher in the immediate vicinity carrying nesting material, a flycatcher in the immediate vicinity carrying food or fecal sac, or adult flycatchers feeding young (per Sogge et al. 1997).

RESULTS

LIFE HISTORY STUDY AREAS AND BILL WILLIAMS

Color-Banding and Resighting – Field personnel color-banded 26 new adult flycatchers, recaptured 20 adults banded in previous years, and resighted 17 additional adults banded in previous years. Of the resighted adults, nine could be identified to individual. Seventeen of the previously banded individuals were originally banded as nestlings or hatch-year birds, with 11 recaptured to determine identity. Field personnel banded 63 nestlings from 23 nests and recaptured and color-banded 3 fledglings. Overall, 55% of the adult flycatchers detected at the study areas were banded by the end of the 2003 breeding season (Table 3.1). For 17 adult flycatchers detected, we were unable to determine if these individuals were color-banded (that is, we could not confirm banding status). Thus, the percentage of color-banded adult flycatchers at sites is a conservative estimate.

SITE-BY-SITE COLOR-BANDING AND RESIGHTING

Pahrnagat – We detected 20 resident, adult willow flycatchers (color-banded and unbanded) from 14 territories at Pahrnagat. Field personnel captured and color-banded six new adults, recaptured four adult flycatchers, resighted two other returning banded individuals, and banded 22 nestlings (Tables 3.2 and 3.3). Six resident flycatchers remained unbanded, and banding status could not be confirmed for two resident individuals. Of the 14 territories recorded at Pahrnagat, 8 consisted of breeding individuals and 6 consisted of unpaired individuals. Of the breeding individuals, two males were polygynous. In addition to resident individuals, we detected one individual for one day in a previously unoccupied area; banding status of this bird could not be confirmed (Table 3.3).

Mesquite – We detected 30 resident, adult willow flycatchers (color-banded and unbanded) from 19 territories at Mesquite. Of the resident birds, field personnel captured and color-banded 3 new adults, recaptured 10 adults, resighted 5 other returning banded individuals, banded 18 nestlings, and recaptured and color-banded 3 fledglings (Table 3.4). Six resident adults remained unbanded, three wore bands but band combinations could not be determined, and the banding status of three individuals could not be confirmed. Of the 19 territories recorded at Mesquite, 13 consisted of breeding individuals (Table 3.4) and 6 consisted of unpaired individuals (Table 3.5). Of the breeding individuals, two males were polygynous. In addition to known resident individuals, we color-banded two new adults and recaptured four adults that were not detected again after capture, and detected an additional two individuals that were observed at the site for less than six days (Table 3.5).

Mormon Mesa – We detected 17 resident, adult willow flycatchers (color-banded and unbanded) from 10 territories at Mormon Mesa. Field personnel captured and color-banded two new adults, recaptured one adult flycatcher, resighted three other returning banded individuals, and banded one nestling (Table 3.6). Seven resident adults remained unbanded, and banding status could not be confirmed for three individuals. Of the 10 territories recorded at Mormon Mesa, 8 consisted of breeding individuals and 2 consisted of unpaired individuals, one of which was later captured at Mesquite during the 2003 season. After a failed nesting attempt, one breeding female moved

to a location 8.8 km south of the initial nest and nested a second time. In addition to resident adults, we detected two individuals that were observed at the site for less than three days (Table 3.7).

Topock – We detected 20 resident willow flycatchers (color-banded and unbanded) from 11 territories at Topock. Field personnel captured and color-banded seven new adults, recaptured one adult flycatcher, resighted four other returning banded individuals, and banded 16 nestlings (Table 3.8). Six resident adults remained unbanded, and two wore bands but color-band combinations could not be determined. Of the 11 territories recorded at Topock, 9 consisted of breeding individuals and 2 consisted of unpaired individuals (Table 3.9). In addition to resident adults, we detected five individuals that were observed at the site for one day (Table 3.9).

Bill Williams – We detected 10 resident willow flycatchers (color-banded and unbanded) from seven territories at Bill Williams. Field personnel captured and color-banded six new adults and banded six nestlings (Tables 3.10 and 3.11). No flycatchers banded in previous years were detected. Three resident adults remained unbanded, and banding status of one individual could not be determined. Of the seven territories recorded at Bill Williams, two consisted of breeding individuals, one consisted of a pair that did not nest, and four consisted of unpaired individuals. In addition to resident adults, we detected three individuals that were observed at the site for one day (Table 3.11).

GILA RIVER AND COLORADO/GILA RIVER CONFLUENCE SOUTH TO MEXICO

From 10 to 17 June 2003, we recorded 59 willow flycatcher detections at the nine sites along the Gila River and the lower Colorado River from its confluence with the Gila River south to the Mexico border. Field personnel captured and color-banded four new adults at three sites (Table 3.12). All four individuals were second-year birds with one individual exhibiting heavy body molt and another exhibiting active growth of the primary coverts. These color-banded individuals were never detected post-capture, and no flycatcher detections were recorded at any of the nine sites after 17 June, suggesting these individuals were northbound migrants.

ADULT AND NESTLING BETWEEN-YEAR RETURN AND DISPERSAL

Through resighting and banding, we detected 37 previously color-banded willow flycatchers that returned to the life history study areas and Bill Williams from previous years. Of these, original banding locations were available for 27 (color combinations could not be confirmed for 8 birds, including one for which a leg injury obstructed the color-band; no previous banding location information was available for two). Of these 27 returning individuals, 17 (63%) returned to the same site at which they were banded and 10 (37%) returned to a different site. Of the 10 returning individuals detected at a different site from where originally banded, 9 moved to Mesquite West. Eight of the nine were originally banded as nestlings. Overall, 60% of the between-year movements detected in 2003 were from Mormon Mesa to Mesquite (Table 3.13). The median dispersal distance for all flycatchers exhibiting between-year movements in 2003 was 43.0 km (min=40.0 km, max=234.0 km).

Table 3.1. Summary of willow flycatchers detected during the 2003 breeding season at the four life history study areas and Bill Williams. Individuals are identified as new captures (previously unbanded), recaptures of previously banded birds, resightings of previously banded birds, birds known to be unbanded, and birds for which band status could not be determined. Included are total numbers of adults detected and percent of all adults banded.

Study area	Site	# new adults captured	# adults recaptured	# adults resighted	# unbanded adults	# adults with unknown band status	Total # adults detected	# nestlings banded (#nests)	# fledglings captured	% of all adults banded
Pahranagat	North	5	4	1	6	2	18	18 (6)	0	56%
	South	1	0	1	0	1	3	4 (1)	0	67%
Mesquite	West	5	14 ^A	8	7	4	38	18 (7)	3	71%
Mormon Mesa	North	0	1	1	3	2	7	0	0	33%
	South	0	0	0	1	0	1	**	0	0%
	Virgin River #1	1 ^B	0	2 ^A	4	0	7	0	0	43%
	Virgin River Delta #4	1	0	1 ^B	2	1	5	1 (1)	0	40%
Topock	Pipes	0	0	0	0	1	1	**	0	0%
	In Between	6	0	2	4	0	12	9 (3)	0	67%
	800M	1	1	0	2	0	4	6 (2)	0	50%
	Platform	0	0	0	1	0	1	**	0	0%
	250M	0	0	0	0	2	2	**	0	0%
	Glory Hole	0	0	3	0	0	3	1 (1)	0	100%
	Hell Bird	0	0	0	1	1	2	**	0	0%
Bill Williams	Site 1	0	0	0	1	0	1	**	0	0%
	Site 11	0	0	0	1	0	1	**	0	0%
	Site 3	4	0	0	0	1	5	6 (2)	0	80%
	Site 4	2	0	0	2	0	4	**	0	50%
	Beaver Pond	0	0	0	0	1	1	**	0	0%
	Site 8	0	0	0	0	1	1	**	0	0%
TOTALS		26	20	19	35	17	115^C	63	3	55%

**No nesting occurred within site.

^AOne bird resighted at Mormon Mesa, Virgin River #1 and then recaptured at Mesquite.

^BThis female moved from Virgin River #1 to Virgin River Delta #4.

^CTotal number does not include two individuals detected in multiple sites.

Table 3.2. Breeding and nestling willow flycatchers banded and resighted at Pahrnagat, NV in 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Territory	Observation status ⁵
North	1997	1590-97338	BEs:XX	N/A	A8Y	M	13	R 27 May
North	4-JUL-02	2140-66564	RR(P):Zs	N/A	SY	F	11	RS
North	18-JUL-00	2140-66621	Rs:KG(M)	Rs:DD(P)	A5Y	F	13	R 18 June
North	14-JUL-01	2190-76604	KK(M):XX	UB:XX	A3Y	M	15	R 27 May
North	1-JUL-03	2320-31430	EE:UB	N/A	L	U	12	N
North	1-JUL-03	2320-31432	EE:UB	N/A	L	U	12	N
North	3-JUL-03	2320-31435	EE:UB	N/A	L	U	6	N
North	3-JUL-03	2320-31436	UB:EE	N/A	L	U	6	N
North	3-JUL-03	2320-31437	UB:EE	N/A	L	U	6	N
South	17-MAY-03	2320-31451	EE:KK(M)	N/A	AHY	M	16	N
North	28-MAY-03	2320-31453	EE:WW(M)	N/A	AHY	M	5, 19	N
North	1-JUN-03	2320-31454	EE:KR(M)	N/A	AHY	M	11,12	N
North	25-JUN-03	2320-31456	EE:UB	N/A	L	U	13	N
North	25-JUN-03	2320-31457	EE:UB	N/A	L	U	13	N
South	25-JUN-03	2320-31458	EE:UB	N/A	L	U	16	N
South	25-JUN-03	2320-31459	EE:UB	N/A	L	U	16	N
South	25-JUN-03	2320-31460	EE:UB	N/A	L	U	16	N
South	25-JUN-03	2320-31461	EE:UB	N/A	L	U	16	N
North	26-JUN-03	2320-31462	EE:UB	N/A	L	U	5	N
North	26-JUN-03	2320-31463	EE:UB	N/A	L	U	5	N
North	26-JUN-03	2320-31464	EE:UB	N/A	L	U	5	N
North	26-JUN-03	2320-31465	EE:UB	N/A	L	U	5	N
North	26-JUN-03	2320-31466	EE:KW	N/A	AHY	F	12	N
North	27-JUN-03	2320-31467	EE:UB	N/A	L	U	15	N
North	27-JUN-03	2320-31468	EE:UB	N/A	L	U	15	N
North	27-JUN-03	2320-31469	EE:UB	N/A	L	U	15	N
North	27-JUN-03	2320-31470	EE:UB	N/A	L	U	15	N
North	1-JUL-03	2320-31475	EE:UB	N/A	L	U	12	N
North	30-JUL-03	2320-31481	UB:EE	N/A	L	U	13	N
North	30-JUL-03	2320-31482	UB:EE	N/A	L	U	13	N
South	INA	INA	Rs:UB	N/A	AHY	F	16	RS
North	N/A	N/A	unbanded	N/A	AHY	F	15	RS
North	N/A	N/A	unbanded	N/A	AHY	F	19	RS
North	N/A	N/A	unbanded	N/A	AHY	F	5	RS
North	N/A	N/A	unbanded	N/A	AHY	F	6	RS
North	N/A	N/A	unbanded	N/A	AHY	M	6	RS

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, XX=silver federal band, BEs=berry federal band, Bs=blue federal band, Zs=gold federal band, Rs=red federal band, R=red, D=dark/navy blue, B=light blue, K=black, V=violet, Z=gold, Y=yellow, G=green, W=white, O=orange, UB = unbanded, (M)=metal pin striped band, (P)=full plastic band, (HP)=half plastic bands/bands cut to half the height of a full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** L=nestling, SY=2 years, AHY=2 years or older, 3Y=3 years, A3Y=3 years or older, +A5Y=5 years or older, A8Y=8 years or older.

⁴**Sex codes:** F=female, M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight.

Table 3.3. Summary of unpaired, resident willow flycatchers and individuals for which residency and/or breeding status could not be confirmed, Pahranaagat, 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Age ³	Sex ⁴	Observation status ⁵
North	INA	INA	undetermined ⁶	AHY	U	Unpaired; detected 28 May–4 June
North	20-MAY-03	2320-31452	EE:KO(M)	AHY	M	N; unpaired; detected 17 May–9 July
North	3-JUN-03	2320-31455	EE:KV(M)	SY	M	N; unpaired; detected 3–30 June
North	N/A	N/A	unbanded	AHY	U	RS; unpaired; detected 4–26 June
North	23-JUL-02	2140-66568	BR(P):Zs	A3Y	M	R 7 July; unpaired; detected 4 June–23 July
North	INA	INA	undetermined ⁶	AHY	U	Unpaired; detected 29 July–6 August
South	INA	INA	undetermined ⁶	AHY	U	Detected 6 August

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, Zs=gold federal band, R=red, B=light blue, K=black, V=violet, O=orange, (M)=metal pin striped band, (P)=full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** SY=2 years, AHY=2 years or older, A3Y=3 years or older.

⁴**Sex codes:** M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight.

⁶Presence of bands could not be determined.

Table 3.4. Breeding and nestling willow flycatchers banded and resighted at Mesquite, NV in 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Territory	Observation status ⁵
West	1-JUL-98	2090-42022	GG(P):XX	N/A	6Y	F	12	RS
West	31-JUL-02	2110-78842	OB(HP):BEs	N/A	A3Y	M	9	R 29 May
West	24-JUL-02	2140-66517	OY(HP):Zs	N/A	A3Y	F	9	RS
West	17-JUL-98	2140-66606	KY(M):Rs	VP(P):Rs	6Y	M	6	R 31 July
West	2-AUG-01	2140-66693	Rs:OK(M)	Rs:GW(HP)	3Y	M	5	R 26 June
West	3-AUG-01	2140-66696	Rs:RO(HP)	N/A	3Y	F	8	RS
West	22-JUL-02	2140-66709	Bs:GW(M)	Bs:VO(HP)	A3Y	M	4	R 16 June
West	4-AUG-00	2140-66775	VG(M):Bs	VW(HP):Bs	4Y	M	8, 21	R 4 June
West	12-JUN-03	2320-31428	UB:EE	N/A	L	U	6	N
West	12-JUN-03	2320-31429	UB:EE	N/A	L	U	6	N
West	26-JUL-03	2320-31431	EE:UB	N/A	L	U	6	N
West	26-JUL-03	2320-31433	EE:UB	N/A	L	U	6	N
West	26-JUL-03	2320-31434	EE:UB	N/A	L	U	6	N
West	5-JUL-03	2320-31438	RK(M):EE	N/A	L	U	2	N; R 7 July, 1 Aug
West	5-JUL-03	2320-31439	RO(M):EE	N/A	L	U	2	N; R 30 July
West	5-JUL-03	2320-31440	OY(M):EE	N/A	L	U	2	N; R 2 Aug

Table 3.4, continued.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Territory	Observation status ⁵
West	29-JUL-03	2320-31443	EE:UB	N/A	L	U	1	N
West	1-AUG-03	2320-31445	EE:WK(M)	N/A	AHY	F	1	N
West	29-JUN-03	2320-31471	EE:UB	N/A	L	U	12	N
West	29-JUN-03	2320-31472	EE:UB	N/A	L	U	12	N
West	29-JUN-03	2320-31473	EE:UB	N/A	L	U	12	N
West	29-JUN-03	2320-31474	EE:UB	N/A	L	U	12	N
West	17-JUN-03	2320-31476	DD(M):EE	N/A	SY	F	14	N
West	25-JUN-03	2320-31477	EE:UB	N/A	L	U	1	N
West	25-JUL-02	2320-31478	DW(M):EE	OG(HP):Zs	A3Y	M	1, 22	R 25 June, 10 July
West	26-JUN-03	2320-31479	GG(M):EE	N/A	SY	F	5	N
West	27-JUN-03	2320-31480	UB:EE	N/A	L	U	6	N
West	23-JUL-03	2320-31486	UB:EE	N/A	L	U	22	N
West	23-JUL-03	2320-31487	EE:UB	N/A	L	U	22	N
West	23-JUL-03	2320-31488	EE:UB	N/A	L	U	22	N
West	17-MAY-00	2390-92350	XX:YR(P)	N/A	A5Y	M	12, 22	RS
West	7-JUL-00	2390-92365	RG(M):XX	BR(P):XX	4Y	M	7	R 28,29 July
West	27-JUN-01	2390-92421	XX:WR(M)	XX:OD(HP)	3Y	M	14	R 17 June
West	29-JUN-01	2390-92427	XX:OW(HP)	N/A	3Y	F	19	RS
West	INA	INA	undetermined ⁶	INA	AHY	F	7	N/A
West	N/A	N/A	unbanded	N/A	AHY	F	6	RS
West	N/A	N/A	unbanded	N/A	AHY	F	4	RS
West	N/A	N/A	unbanded	N/A	AHY	M	2	RS
West	INA	INA	banded ⁷	INA	AHY	F	2	RS
West	N/A	N/A	unbanded	N/A	AHY	F	22	RS
West	N/A	N/A	unbanded	N/A	AHY	F	21	RS
West	INA	INA	undetermined ⁶	INA	AHY	M	19	N/A

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, XX=silver federal band, BEs=berry federal band, Bs=blue federal band, Zs=gold federal band, Rs=red federal band, R=red, D=dark/navy blue, B=light blue, K=black, V=violet, Y=yellow, G=green, W=white, O=orange, UB = unbanded, (M)=metal pin striped band, (P)=full plastic band, (HP)=half plastic bands/bands cut to half the height of a full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** L=nestling, SY=2 years, AHY=2 years or older, 3Y=3 years, A3Y=3 years or older, 4Y=4 years, A5Y=5 years or older, 6Y=6 years.

⁴**Sex codes:** F=female, M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight, N/A=not applicable.

⁶Presence of bands could not be determined.

⁷Bird has color-bands; combination undetermined.

Table 3.5. Summary of unpaired, resident willow flycatchers and individuals for which residency and/or breeding status could not be confirmed, Mesquite, NV, 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Observation status ⁵
West	6-JUL-02	2110-78861	BEs:VK(M) ⁶	BEs:VV(P)	SY	M	R 28 July and 1 Aug;
West	5-AUG-03	2320-31413	EE:RY(M)	N/A	SY	U	N; not detected post-capture
West	19-JUL-02	2320-31442	EE:WD(M)	Zs:RB(P)	SY	M	R 28 July; not detected post-capture
West	31-JUL-03	2320-31444	RW(M):EE ⁷	N/A	AHY	F	N; not detected post-capture
West	29-MAY-01	2390-92410	XX:DD(P)	N/A	A4Y	M	R 10 June; captured in Territory 4, not detected post-capture
West	31-JUL-02	2390-92420	XX:ZK(M)	XX:RV(HP)	A3Y	M	Unpaired; R 29 May; detected 17 May–23 July
West	4-JUL-01	2390-92433	XX:ZR(M)	XX:YO(HP)	3Y	M	Unpaired; R 18 June; detected 25 May–9 July
West	26-JUL-01	2390-92475	XX:WY(M)	XX:VG(P)	3Y	U	R 31 July; not detected post capture
West	INA	INA	banded ⁸	N/A	AHY	U	RS; unpaired; detected 17 May–27 June
West	N/A	N/A	unbanded	N/A	AHY	U	RS; unpaired; detected 13 May–29 July
West	INA	INA	undetermined ⁹	N/A	AHY	U	Unpaired; detected 29 May–11 June
West	INA	INA	banded ⁸	N/A	AHY	U	RS; unpaired; detected 6–17 June
West	INA	INA	undetermined ⁹	N/A	AHY	U	Detected 22 May
West	INA	N/A	unbanded	N/A	AHY	U	RS; detected 29 May–3 June

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, XX=silver federal band, BEs=berry federal band, Zs=gold federal band, R=red, D=dark/navy blue, B=light blue, K=black, V=violet, Z=gold, Y=yellow, G=green, W=white, O=orange, (M)=metal pin striped band, (P)=full plastic band, (HP)=half plastic bands/bands cut to half the height of a full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** SY=2 years, AHY=2 years or older, 3Y=3 years, A3Y=3 years or older, A4Y=4 years or older.

⁴**Sex codes:** F=female, M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight.

⁶Held territory at Mormon Mesa from 12 – 28 June 2003 prior to capture at Mesquite.

⁷This was a female with a brood patch; could be one of unbanded resident females from Mesquite.

⁸Bird has color-bands; combination undetermined.

⁹Presence of bands could not be determined.

Table 3.6. Breeding and nestling willow flycatchers banded and resighted at Mormon Mesa, NV in 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Territory	Observation status ⁵
North	1-JUL-98	1710-20638	YR(M):XX	WK(M):XX	A7Y	M	1	R 7 June
Virgin River #1 North	8-JUN-03	2320-31426	EE:VV(M)	N/A	AHY	F	21, 26	N
Virgin River Delta #4	22-JUN-03	2320-31427	VG(M):EE	N/A	AHY	M	24	N; R 24 June
Virgin River Delta #4	9-JUL-03	2320-31441	UB:EE	N/A	L	U	24	N
North	INA	INA	UB:XX	N/A	AHY	F	6	RS
Virgin River #1 North	INA	INA	KY(HP):XX	N/A	AHY	F	23	RS
Virgin River Delta #4	INA	INA	undetermined ⁶	N/A	AHY	M	26	N/A
North	INA	INA	undetermined ⁶	N/A	AHY	F	25	N/A
North	INA	INA	undetermined ⁶	N/A	AHY	M	6	N/A
North	N/A	N/A	unbanded	N/A	AHY	M	25	RS
Virgin River #1 North	N/A	N/A	unbanded	N/A	AHY	F	32	RS
Virgin River #1 North	N/A	N/A	unbanded	N/A	AHY	M	32	RS
Virgin River Delta #4	N/A	N/A	unbanded	N/A	AHY	F	24	RS
Virgin River #1 North	N/A	N/A	unbanded	N/A	AHY	M	23	RS
Virgin River #1 North	N/A	N/A	unbanded	N/A	AHY	M	21	RS
North	N/A	N/A	unbanded	N/A	AHY	F	1	RS

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, XX=silver federal band, R=red, K=black, V=violet, Y=yellow, G=green, W=white, UB = unbanded, (M)=metal pin striped band, (HP)=half plastic bands/bands cut to half the height of a full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** L=nestling, AHY=2 years or older, A7Y=7 years or older.

⁴**Sex codes:** F=female, M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight, N/A=not applicable.

⁶Presence of bands could not be determined.

Table 3.7. Summary of unpaired, resident willow flycatchers and individuals for which residency and/or breeding status could not be confirmed, Mormon Mesa, NV, 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Observation status ⁵
Virgin River #1 North	6-JUL-02	2110-78861	BEs:VK(M)	BEs:VV(P)	SY	M	Unpaired; RS; detected 12–28 June, later captured twice at Mesquite 28 July and 1 Aug
Virgin River Delta #4	N/A	N/A	unbanded	N/A	AHY	U	Unpaired; RS; detected 14–20 May
North	N/A	N/A	unbanded	N/A	AHY	U	RS; detected 11–13 June
South	N/A	N/A	unbanded	N/A	AHY	U	RS; detected 14 May

¹N/A=not applicable.

²**Color-band codes:** BEs=berry federal band, K=black, V=violet, (M)=metal pin striped band, (P)=full plastic band. Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** SY=2 years, AHY=2 years or older.

⁴**Sex codes:** M=male, U=sex unknown.

⁵**Observation status codes:** RS=resight.

Table 3.8. Breeding and nestling willow flycatchers banded and resighted at Topock, Havasu NWR, AZ in 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Territory	Observation status ⁵
In Between	8-JUL-02	2110-78841	BY(HP):BEs	N/A	SY	F	20	RS
800M	7-JUL-02	2110-78855	RK(M):BEs	DO(HP):BEs	SY	M	2	R 31 May
In Between	28-MAY-03	2320-31502	ZR(M):EE	N/A	AHY	F	21	N
800M	2-JUN-03	2320-31526	OD(M):EE	N/A	AHY	F	11	N
In Between	21-JUN-03	2320-31527	KZ(M):EE	N/A	AHY	F	42	N
In Between	24-JUN-03	2320-31528	EE:YV(M)	N/A	AHY	M	42	N
800M	26-JUN-03	2320-31529	UB:EE	N/A	L	U	11	N
800M	26-JUN-03	2320-31530	UB:EE	N/A	L	U	11	N
800M	26-JUN-03	2320-31531	UB:EE	N/A	L	U	11	N
In Between	27-JUN-03	2320-31532	UB:EE	N/A	L	U	20	N
In Between	27-JUN-03	2320-31533	UB:EE	N/A	L	U	20	N
In Between	27-JUN-03	2320-31534	UB:EE	N/A	L	U	20	N
800M	2-JUL-03	2320-31535	UB:EE	N/A	L	U	2	N
800M	2-JUL-03	2320-31536	UB:EE	N/A	L	U	2	N
800M	2-JUL-03	2320-31537	UB:EE	N/A	L	U	2	N
In Between	19-MAY-03	2320-31576	KK(M):EE	N/A	AHY	M	22	N
In Between	1-JUN-03	2320-31577	GW(M):EE	N/A	AHY	F	41	N
In Between	3-JUL-03	2320-31581	UB:EE	N/A	L	U	22	N
In Between	3-JUL-03	2320-31582	UB:EE	N/A	L	U	22	N

Table 3.8. Breeding and nestling willow flycatchers banded and resighted at Topock, Havasu NWR, AZ in 2003, continued.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Old color combination ^{1,2}	Age ³	Sex ⁴	Territory	Observation status ⁵
In Between	3-JUL-03	2320-31583	UB:EE	N/A	L	U	22	N
In Between	3-JUL-03	2320-31584	EE:YK(M)	N/A	SY	F	22	N
In Between	3-JUL-03	2320-31585	UB:EE	N/A	L	U	41	N
In Between	3-JUL-03	2320-31586	UB:EE	N/A	L	U	41	N
In Between	3-JUL-03	2320-31587	UB:EE	N/A	L	U	41	N
Glory Hole	17-JUL-03	2320-31588	UB:EE	N/A	L	U	3	N
In Between	INA	INA	Bs: ⁶	N/A	AHY	M	21	RS
Glory Hole	INA	INA	banded ⁷	N/A	AHY	F	3	RS
Glory Hole	INA	INA	banded ⁷	N/A	AHY	M	3	RS
In Between	N/A	N/A	unbanded	N/A	AHY	M	44	RS
In Between	N/A	N/A	unbanded	N/A	AHY	F	44	RS
800M	N/A	N/A	unbanded	N/A	AHY	M	11	RS
In Between	N/A	N/A	unbanded	N/A	AHY	M	20	RS
800M	N/A	N/A	unbanded	N/A	AHY	F	2	RS
In Between	N/A	N/A	unbanded	N/A	AHY	M	41	RS

¹N/A=not applicable; INA=information not available

²**Color-band codes:** EE=electric yellow federal band, BEs=berry federal band, Bs=blue federal band, R=red, D=dark/navy blue, B=light blue, K=black, V=violet, Z=gold, Y=yellow, G=green, W=white, O=orange, UB= unbanded, (M)=metal pin striped band, (HP)=half plastic bands/bands cut to half the height of a full plastic band. Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** L=nestling, SY=2 years, AHY=2 years or older.

⁴**Sex codes:** F=female, M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight.

⁶Color combination could not be determined due to a leg injury masking the band

⁷Bird has color-bands; combination undetermined

Table 3.9. Summary of unpaired, resident willow flycatchers and individuals for which residency and/or breeding status could not be confirmed, Topock, Havasu NWR, 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Age ³	Sex ⁴	Observation status ⁵
Glory Hole	6-JUL-02	2110-78863	RV(HP):BEs	SY	M	Unpaired; RS; detected 17 June–29 July
Hell Bird	N/A	N/A	unbanded	AHY	U	Unpaired; RS; detected 22 June–6 Aug
Platform	N/A	N/A	unbanded	AHY	U	RS; detected 16 May
250M	INA	INA	undetermined ⁶	AHY	U	Detected 11 June
250M	INA	INA	undetermined ⁶	AHY	U	Detected 11 June
Hell Bird	INA	INA	undetermined ⁶	AHY	U	Detected 20 June
Pipes 3	INA	INA	undetermined ⁶	AHY	U	Detected 3 June

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** BEs=berry federal band, R=red, V=violet, (HP)=half plastic bands/bands cut to half the height of a full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** SY=2 years, AHY=2 years or older.

⁴**Sex codes:** M=male, U=sex unknown.

⁵**Observation status codes:** RS=resight.

⁶Presence of bands could not be determined.

Table 3.10. Paired and nestling willow flycatchers banded and resighted at Bill Williams River NWR, AZ in 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Age ³	Sex ⁴	Territory	Observation status ⁵
Site 4	29-MAY-03	2320-31401	OO(M):EE	AHY	M	5	N
Site 3	27-JUN-03	2320-31404	RD(M):EE	AHY	F	1	N
Site 3	28-JUN-03	2320-31405	EE:RW(M)	SY	F	2	N
Site 3	29-JUN-03	2320-31406	UB:EE	L	U	2	N
Site 3	29-JUN-03	2320-31407	UB:EE	L	U	2	N
Site 3	29-JUN-03	2320-31408	UB:EE	L	U	2	N
Site 3	2-JUL-03	2320-31409	UB:EE	L	U	1	N
Site 3	2-JUL-03	2320-31410	UB:EE	L	U	1	N
Site 3	2-JUL-03	2320-31411	UB:EE	L	U	1	N
Site 3	7-MAY-03	2320-31501	EE:DD(M)	AHY	M	1	N, R 27 June
Site 4	N/A	N/A	unbanded	AHY	F	5	RS
Site 3	INA	INA	undetermined ⁶	AHY	M	2	N/A

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, R=red, D=dark/navy blue, O=orange, UB=unbanded, (M)=metal pin striped band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** L=nestling, SY=2 years, AHY=2 years or older.

⁴**Sex codes:** F=female, M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, R=recapture - followed by date recaptured, RS=resight, N/A=not applicable.

⁶Presence of bands could not be determined.

Table 3.11. Summary of unpaired, resident willow flycatchers and individuals for which residency and/or breeding status could not be confirmed, Bill Williams NWR, 2003.

Site	Date banded ¹	Federal band # ¹	Color combination ²	Age ³	Sex ⁴	Observation status ⁵
Site 4	10-JUN-03	2320-31402	EE:VG(M)	AHY	M	Unpaired; N; detected 3–10 June, not detected post capture
Site 3	7-JUL-03	2320-31412	OW(M):EE	SY	M	Unpaired; N; detected 29 June–20 July, not detected post capture
Site 4	N/A	N/A	unbanded	AHY	U	Unpaired; RS; detected 14 May–27 June
Site 1	N/A	N/A	unbanded	AHY	U	Unpaired; RS; detected 10–26 June
Site 8	INA	INA	undetermined ⁶	AHY	U	Detected 6 June
Beaver Pond	INA	INA	undetermined ⁶	AHY	U	Detected 16 May
Site 11	N/A	N/A	unbanded	AHY	U	RS; detected 17 June

¹N/A=not applicable; INA=information not available.

²**Color-band codes:** EE=electric yellow federal band, V=violet, G=green, W=white, O=orange, (M)=metal pin striped band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³**Age in 2003:** SY=2 years, AHY=2 years or older.

⁴**Sex codes:** M=male, U=sex unknown.

⁵**Observation status codes:** N=new capture, RS=resight.

⁶Presence of bands could not be determined.

Table 3.12. Willow flycatchers color-banded along the Gila River and the lower Colorado River from its confluence with the Gila River south to the Mexico border, 2003.

Site	Date banded	Federal band #	Color combination ¹	Age ²	Sex ³	Observation status ⁴
Gila River Site 2 ⁵	12-JUN-03	2320-31403	EE:VK(M)	SY	M	N
Hunters Hole	15-JUN-03	2320-31578	KG(M):EE	SY	U	N
River Mile 33	18-JUN-03	2320-31579	KD(M):EE	SY	U	N
River Mile 33	18-JUN-03	2320-31580	GZ(M):EE	SY	U	N

¹**Color-band codes:** EE=electric yellow federal band, D=dark/navy blue, K=black, V=violet, Z=gold, G=green, (M)=metal pin striped band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

²**Age in 2003:** SY=2 years.

³**Sex codes:** M=male, U=sex unknown.

⁴**Observation status codes:** N=new capture.

⁵Bird was captured and color-banded between Gila River Site 2 and Gila River Site 1.

Table 3.13. Summary of willow flycatcher between-year movements during the 2003 breeding season at the four life history study areas and Bill Williams.

Study area/site/year originally banded ¹	Age banded ²	Study area/site detected 2003 ¹	Distance moved (km)	Color combination ³	Federal band #	Sex
TOPO/In Between/2002	L	MESQ/West MOME/Virgin River #1	234 208	BEs:VK(M)	2110-78861	M
MOME/1998	L	MESQ/West	40	KY(M):Rs	2140-66606	M
MOME/Virgin River Delta #4/2001	L	MESQ/West	43	Rs:OK(M)	2140-66693	M
TOPO/800M/2000	L	MESQ/West	234	VG(M):Bs	2140-66775	M
NDOW/2000	L	MESQ/West	45	RG(M):XX	2390-92365	M
MOME/Virgin River Delta #4/2001	L	MESQ/West	43	XX:WY(M)	2390-92475	U
GRCA/RM 267/1998	AHY	MOME/North	76	YR(M):XX	1710-20638	M
MOME/South/2000	AHY	MESQ/West	40	XX:YR(P)	2390-92350	M
MOME/1998	L	MESQ/West	40	GG(P):XX	2090-42022	F
MOME/North/2001	L	MESQ/West	40	XX:OW(HP)	2390-92427	F

¹ MESQ=Mesquite, MOME=Mormon Mesa, GRCA=Grand Canyon, TOPO=Topock, NDOW=Nevada Division of Wildlife Overton Wildlife Management Area located in the lower Virgin River Valley on the Overton Arm of Lake Mead.

² **Age codes:** L = nestling, AHY = after hatch year.

³ **Color-band codes:** BEs=berry federal band, XX=silver federal band, Rs=red federal band, R=red, D=dark/navy blue, K=black, V=violet, Z=gold, G=green, W=white, Y=yellow, O=orange, (M)=metal pin striped band, (P)=full plastic band, (HP)=half plastic bands/bands cut to half the height of a full plastic band.

Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated with a colon.

³ **Sex codes:** M=male, F=female, U=sex unknown.

2003 WITHIN-YEAR, BETWEEN-SITE MOVEMENTS

A male flycatcher banded as a nestling at Topock/In Between in 2002 (BEs:VK(M), 2110-78861) held a territory as a lone male at Mormon Mesa/Virgin River #1 from 12–28 June 2003. This same individual was later recaptured twice at Mesquite West on 28 July and 1 August, where it was never detected prior- or post-capture.

DISCUSSION

LIFE HISTORY STUDY AREAS AND BILL WILLIAMS

Overall, 26 new adults, 3 fledglings and 63 nestling Southwestern Willow Flycatchers were captured and color-banded in 2003. Thirty-seven individuals banded in previous years returned. This resulted in 55% of all adult flycatchers detected at the life history study areas, including Bill Williams, being color-banded by the end of the 2003 season. Maintaining high overall percentages of banded birds annually is important because it increases the ability to detect site fidelity and movement, provides a more accurate calculation of survivorship, and provides the

necessary information needed for future fecundity studies. Also, a large number of color-banded flycatchers will be vital in detecting and tracking movements in the event of a stochastic occurrence (e.g., fire, drought, flood), natural or otherwise, at any of the flycatcher life history study areas. As target and passive capture techniques are continually being refined, we anticipate the numbers of color-banded willow flycatchers at sites to increase in subsequent years.

Breeding vs. Unpaired Territories – At the four life history study areas and Bill Williams, we recorded a total of 60 willow flycatcher territories in 2003. Of these, 40 (67%) consisted of paired flycatchers and 20 (33%) consisted of unpaired individuals. Five of the 20 unpaired territories were abandoned before mid-June and averaged nine days of activity. These individuals were most likely northbound migrants. The other 15 unpaired territories were active from 9 to 78 days (mean=36.4, SE=5.1). Detection of unpaired willow flycatchers at intensively monitored sites during the breeding season is not uncommon, and unpaired individuals have been recorded at other breeding sites (Kenwood and Paxton 2001, Smith et al. 2002, Koronkiewicz et al. 2002, Furtek and Tomlinson 2003, Whitfield 2003, Whitfield and Cohen in prep.). Additionally, other research has shown that an unequivocal determination of breeding status for all willow flycatchers in a population often cannot be made. Willow flycatchers may be detected only once during the breeding season (Kenwood and Paxton 2001, this document), some individuals are non-territorial floaters (individuals that are seen once or irregularly, are typically quiet, and do not display territorial behavior toward other flycatchers or respond aggressively to conspecific broadcasts; Kenwood and Paxton 2001, Koronkiewicz et al. 2002), and willow flycatcher males frequently engage in extra pair copulations (Paxton et al. 1997, Pearson 2002) and are commonly polygynous (Whitfield et al. 1998, Davidson and Allison 2003, this document). The documentation of unpaired flycatchers and individuals for which breeding status cannot be determined is important for demographic analyses and management and conservation of the species.

Adult and Juvenile Survivorship – Survivorship is defined as the number of individuals that survive from one year to the next, and accurate estimations depend on year-to-year detection of uniquely marked birds. In 2003, we detected a total of 27 flycatchers that returned from previous years for which age at the time of color-banding could be determined. Of these individuals, 16 (59%) had been banded as juveniles and 11 (41%) had been banded as adults and were known to have survived from previous years. Of the 38 juvenile flycatchers banded in 2002, 6 were detected in 2003. Thus, minimum estimated juvenile survival from 2002 to 2003 was 16%. Given that the numbers and identities of banded adult flycatchers detected annually from previous years is unknown to us, minimum adult annual survivorship cannot be calculated at the study areas from 2002 to 2003. Simple annual percent survivorship is problematic in that it assumes that all living flycatchers are detected in a given year, and individuals not detected are assumed to have died, unless detected elsewhere. Previous research has shown detection affects estimates of willow flycatcher annual percent survivorship in that some adults and juveniles go undetected up to three years after being banded, thus underestimating survival (Koronkiewicz et al. 2002, McKernan and Braden 2002). To provide more robust estimates of annual survival, software programs (e.g., Brownie et al. 1985, White 1996) incorporating both survival and detection probabilities have been developed in recent years. In subsequent years of this study, as more flycatcher demographic data are acquired at the life history study areas and Bill Williams,

we anticipate using this software in determining annual adult and juvenile willow flycatcher survivorship.

Adult and Nestling Between-Year Return and Dispersal – Of the 27 willow flycatchers that returned from previous years for which original banding locations were available, 17 (63%) returned to the same site at which they were banded and 10 (37%) returned to a different site. Of the 10 returning individuals detected at a different site from where originally banded, 8 (80%) were banded as nestlings. Willow flycatcher dispersal data in 2003 were consistent with results reported in previous years at the life history study areas (McKernan and Braden 2002) and range-wide data (Luff et al. 2000, Kenwood and Paxton 2001, Koronkiewicz et al. 2002), with adult flycatchers likely to exhibit strong site fidelity to breeding areas, and juveniles likely to disperse away from natal areas. Given the small population sizes and geographic isolation of willow flycatcher breeding populations in the Southwest, juvenile dispersal is an important population variable in terms of both gene flow and the establishment of new flycatcher populations. Furthermore, the observed differential age patterns in willow flycatcher dispersal may contribute to an understanding of the observed patterns of high genetic diversity within, and low reproductive isolation among Southwestern Willow Flycatcher populations (Busch et al. 2000 as cited in Koronkiewicz et al. 2002).

2003 Within-Year, Between-Site Movements – We resighted a male flycatcher that held an unpaired territory at Mormon Mesa/Virgin River #1 from 12–28 June 2003. This same individual was later recaptured at Mesquite West on 28 July and 1 August, where it was never detected prior- or post-capture. Straight-line distance between the sites is only approximately 40 km, no great distance for a Neotropical migrant passerine. However, this movement and detection at two sites within a very short period of time illustrates why for some individual flycatchers, breeding status and/or residency at a particular site cannot be determined.

GILA RIVER AND COLORADO/GILA RIVER CONFLUENCE SOUTH TO MEXICO

In 2003, we initiated color-banding studies at sites along the Gila River and the Colorado/Gila River confluence south to the Mexico border to better determine flycatcher residency, breeding status, and movement patterns in this area. Of 59 willow flycatcher detections, we captured and color-banded four adults at three sites. Flycatcher behavioral observations in combination with active molt patterns exhibited on captured individuals suggest strongly that the individuals detected at these sites were northbound migrants. Of the 59 detections at nine sites, all were recorded within an eight-day period with no subsequent detections post 17 June. Although flycatchers detected did sing and call in response to conspecific broadcasts used for target capture, the agonistic behaviors exhibited toward broadcasts were weak (i.e., no direct movements toward speaker locations) in comparison to flycatchers at breeding sites. One of the flycatchers captured exhibited moderate to heavy, active body molt that included the head, mantle, flanks, and belly, and another captured individual was actively growing in primary coverts. As it is known that willow flycatchers molt on the wintering grounds (Pyle 1997, 1998; T. Koronkiewicz unpublished data) and active molt at breeding sites is rare in Southwestern Willow Flycatcher populations (P. Unitt pers. com., T. Koronkiewicz unpublished data), these data strongly suggest that these individuals were still migrating. Also, all four captured flycatchers were second year birds (born in 2002) based on the presence of retained

flight feathers (per Kenwood and Paxton 2001 and Koronkiewicz et al. 2002). Whether there are differential age patterns in willow flycatcher northbound migration along the lower Colorado River is in need of further study. Likewise, it is quite apparent that the lower Colorado and Gila River riparian corridors are important flyways and stopover habitat for northbound willow flycatchers. The degree to which Southwestern Willow Flycatchers use these riparian corridors is unknown and requires further study.

CHANGE IN COLOR-BAND METHODOLOGY

Field personnel experienced difficulty resighting and correctly identifying the color combinations of willow flycatchers previously banded with celluloid-plastic color-bands and epoxy-enamel colored federal bands. As has been shown by Lindsey et al. (1995), celluloid-plastic leg bands undergo fading and discoloration to such a degree that within two years primary colors cannot be recognized under field conditions. Upon recapturing flycatchers previously banded with epoxy-enamel colored federal bands, we found that chipping of the enamel, which revealed the original silver band color underneath, caused the difficulties in correct color identification. Chipping of the epoxy enamel was recorded on federal bands less than one year old. Correct field identification over multiple years of the unique set of color-bands on a bird's legs is important in a long-term study such as this because it eliminates the need to recapture an individual flycatcher multiple times to determine identity. To remedy the color-band problems noted above, in 2003 we used metal pinstriped color-bands and color anodized federal bands, which have shown to be safe for willow flycatchers and colorfast for over six years (Koronkiewicz et al. in prep.). These metal color-bands were used on all newly captured flycatchers and on recaptured flycatchers in 2003 that wore faded and indistinguishable color-bands.