CHAPTER 2

PRESENCE/ABSENCE SURVEYS AND SITE DESCRIPTIONS

INTRODUCTION

Broadcasts of recorded conspecific vocalizations are useful in eliciting responses from nearby willow flycatchers, and multiple broadcast surveys conducted throughout the breeding season are the standard technique for determining the presence or absence of *E. t. extimus* (Sogge et al. 1997). Willow flycatchers detected between approximately 15 June and 20 July in the breeding range of *E. t. extimus* probably belong to the southwestern subspecies (Sogge et al. 1997, USFWS 2002). However, as northbound individuals of all subspecies of the willow flycatcher migrate through areas where *E. t. extimus* are actively nesting, and southbound migrants occur where *extimus* are still breeding (USFWS 2002, Sogge et al. 1997), field confirmation of the southwestern subspecies is problematic.[3] For example, the northwestern *E. t. brewsteri*, far more numerous than *E. t. extimus*, has been documented migrating north in southern California as late as 20 June (Garrett and Dunn 1981 as cited in Unitt 1987), and Phillips et al. (1964 as cited in Unitt 1987) documented *E. t. brewsteri* collected in southern Arizona on 23 June. An understanding of willow flycatcher migration ecology in combination with multiple broadcast surveys conducted throughout the breeding season is therefore needed to assess the presence and residency of Southwestern Willow Flycatchers.

Migration routes used by *E. t. extimus* are not well documented, though more is known of northbound migration in spring than the southbound migration in fall as spring is the only time that willow flycatchers sing and can therefore be distinguished from other *Empidonax* species. During northbound migration, all subspecies of willow flycatchers use riparian habitats similar to breeding habitat along major river drainages in the Southwest such as the Rio Grande (Finch and Kelly 1999), Colorado River (McKernan and Braden 1999), San Juan River (Johnson and Sogge 1997), and the Green River (M. Johnson unpublished data). Although migrating willow flycatchers may favor young, native willow habitats (Yong and Finch 1997), migrants are also found in a variety of unsuitable breeding habitats in both spring and fall. These migration stopover habitats, even though not used for breeding, are likely important for both reproduction and survival. For most long-distance Neotropical migrant passerines, migration stopover habitats are needed to replenish energy reserves to continue northbound or southbound migration.

In 2003, we completed multiple broadcast surveys at sites in 15 study areas along the lower Colorado River and its tributaries to detect both migrant and resident willow flycatchers (Figure 2.1).

[3] Throughout this document, the terms "flycatcher" and "willow flycatcher" refer to *E. t. extimus* when individuals are confirmed as residents. For individuals for which residency is undetermined, subspecies is unknown.

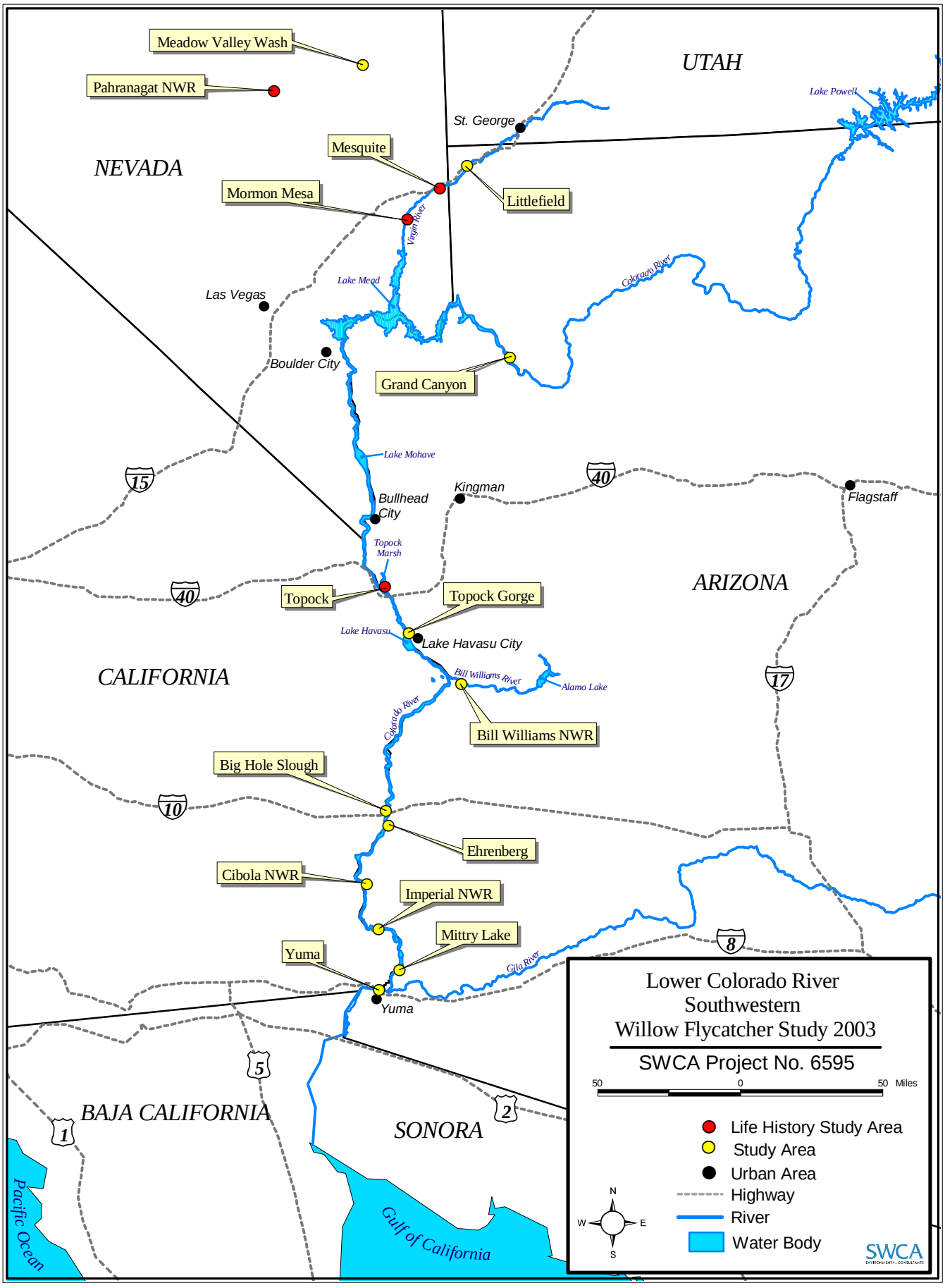

Figure 2.1. Locations of Southwestern Willow Flycatcher study areas along the lower Colorado River and tributaries, 2003. *(Note, study area labels represent the approximate center of multiple sites within that region, see Table 2.1 and Appendix B.)*

YELLOW-BILLED CUCKOO AND YUMA CLAPPER RAIL

The Yuma Clapper Rail (*Rallus longirostris yumanensis*) is listed as federally endangered by the USFWS, and the Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) is a candidate for federal listing. Both species occur along the lower Colorado River and its tributaries and are of concern to managing agencies. We did not survey specifically for these species but recorded all incidental detections.

METHODS

SITE SELECTION

Survey sites were selected based on locations surveyed during previous years of willow flycatcher studies on the lower Colorado River (McKernan 1997, McKernan and Braden 1998, 1999, 2001a, 2001b, 2002) and reconnaissance by helicopter, by boat, and on foot prior to the start of the 2003 survey period. USBR biologists Theresa Olson and John Swett guided and approved site selection. For sites that had been surveyed in previous years, we retained original site names. We provided field personnel with high-resolution aerial photographs of all selected survey sites. The photographs were overlain with a UTM grid (NAD 27) and an outline of the proposed survey area. The boundaries of all survey sites were refined to include potential flycatcher habitat actually present. New boundaries were delineated on the aerial photographs based on UTM coordinates obtained in the field. All UTM coordinates were obtained in NAD 27 using a Garmin Rino 110 GPS unit.

BROADCAST SURVEYS

We broadcast conspecific vocalizations previously recorded from 1996 to 1998 throughout the Southwest to elicit responses from nearby willow flycatchers. All flycatcher surveys were conducted according to methods described in Sogge et al. (1997), and we followed the 10-survey protocol proposed by Braden and McKernan (1998). We completed at least one survey between 15 and 30 May, at least one survey between 1 and 15 June, and eight additional surveys between 16 June and 25 July. Surveys were separated by a minimum of five days whenever logistically possible. Field personnel surveyed within the habitat wherever possible, using a portable CD player (various models were used) coupled to a Radio Shack 277-1008C mini amplified speaker. Surveyors stopped every 30–40 m and broadcast willow flycatcher primary song (*fitz-bew*) and calls (*whitts*). Field personnel watched for flycatchers and listened for vocal responses for approximately one to two minutes before proceeding to the next survey station. Wherever territorial flycatchers were detected, broadcast surveys were discontinued within a radius of 50 m of territories, and territory and nest monitoring commenced (see Chapter 4). If a willow flycatcher was observed but did not respond with song to the initial broadcast, we broadcast other conspecific vocalizations including *creets/breets*, *wee-oos*, *churr/kitters*, and a set of interaction calls given by a mated pair of flycatchers (per Lynn et al. 2003). These calls were frequently effective in eliciting a *fitz-bew* song, thereby enabling surveyors to positively identify willow flycatchers. To produce a spatial representation of all survey areas, field personnel recorded survey start and stop UTM coordinates as well as the UTM coordinates of intermediate survey points. Observers recorded start and stop times and the location(s) and behavior of all

willow flycatchers detected (see survey form, Appendix A). Field personnel also recorded the presence of Brown-headed Cowbirds and livestock, as requested by the Arizona Game and Fish Department. Cowbirds may affect flycatcher populations by decreasing flycatcher productivity (see Chapter 5), while livestock may substantially alter the vegetation in an area (USFWS 2002).

SITE DESCRIPTION

Because vegetation structure and hydrology within riparian habitats are seasonally dynamic, field personnel completed site description forms (Appendix A) for each survey site at least three times throughout the survey season: early season (mid-May to mid-June), mid-season (mid-June to mid-July), and late season (mid-July to August). Vegetation composition (native vs. exotic) at survey sites followed the definitions of Sogge et al. (1997) and the Southwestern Willow Flycatcher Range-wide Database. Vegetation composition was defined as 1) native: >90% of the vegetation at a site was native; 2) exotic: >90% of the vegetation at a site was exotic/ introduced; 3) mixed native: 50 to 90% of the vegetation at a site was native; and 4) mixed exotic: 50 to 90% of the vegetation at a site was exotic/introduced. Information from site description forms was used in conjunction with habitat photographs and comments in field notebooks and on survey forms to formulate qualitative site descriptions.

RESULTS

Field personnel spent 1,571 observer-hours conducting willow flycatcher broadcast surveys at 95 sites along the Virgin and lower Colorado Rivers and tributaries.[4,5] Willow flycatcher survey results are summarized in Table 2.1 and are presented below along with site descriptions. The UTM coordinates presented below are the centroid of each survey area. The boundaries of survey sites and occupancy in 2003 are shown on orthophotos in Appendix B, along with historically occupied habitat.[6] Because willow flycatchers detected between approximately 15 June and 20 July in the breeding range of *E. t. extimus* probably belong to the southwestern subspecies (USFWS 2002, Sogge et al. 1997), flycatcher detections between these dates are summarized in Table 2.2. Yellow-billed Cuckoo and Yuma Clapper Rail detections are summarized in Tables 2.3 and 2.4. Hydrologic characteristics of each site are summarized in Table 2.5.

[4] For sites surveyed in previous years, we counted each survey area with a distinct name as one site. In previous years, several of these areas were counted as multiple sites. For example, the report from the 2001 field season (McKernan and Braden 2002) lists 41 sites at Topock (Table 2), but only 19 sites are named on the map (Appendix 4). Total acreage surveyed for all sites in 2003 differed little from previous years.

[5] We started the 2003 survey season with 101 survey sites, ranging in size from 1 to 67 ha. Surveys at nine sites were discontinued because of poor habitat quality, inaccessibility, or loss of habitat to fire. One site was added to the survey protocol after field personnel from an unrelated project detected a willow flycatcher, and two additional sites at the Bill Williams were surveyed opportunistically.

[6] As per the USBR (1999), we defined occupied Southwestern Willow Flycatcher habitat as patches of vegetation that are similar to and contiguous with areas where willow flycatchers were detected after 15 June.

Table 2.1. Willow flycatcher detections along the Virgin and Colorado Rivers and tributaries, 2003.

Study area[1]	Survey site	Area (ha)	# of willow flycatchers detected (date(s) of detection)[2]
PAHR	Pahranagat North	4.4	18 (13 May–6 August)[3]
	Pahranagat South	2.8	3 (13 May–6 August)[3]
MVWA	Meadow Valley #6	7.1	ND
	Meadow Valley #3	3.2	ND
	Meadow Valley #4	1.2	ND
LIFI	Littlefield North	9.3	ND
	Littlefield South	5.7	ND
MESQ	Mesquite West	18.2	38 (13 May–5 August)[3]
MOME	Mormon Mesa North	15.8	7 (14 May–17 July) [3]
	Mormon Mesa South	35.6	1 (14 May)
	Virgin River #1 (North)	43.3	7 (15 May–9 July) [3]
	Virgin River Delta #4	12.2	5[4] (14 May–15 July) [3]
GRCA	Separation Canyon	8.0	ND
	RM 243S	1.8	1 (18 July)
	Spencer Canyon	5.5	ND
	Clay Tank Canyon	0.5	ND
	Reference Point Creek	4.2	ND
	RM 257.5N	7.1	ND
	Burnt Springs	11.0	ND
	Quartermaster Canyon	2.8	ND
	RM 260.5N	3.4	ND
	RM 262.5S	12.8	ND
	RM 268N	7.2	ND
	Columbine Falls	7.2	ND
	RM 274.5N	4.5	ND
TOPO	Pipes #1	5.3	ND
	Pipes #2	2.8	ND
	Pipes #3	4.9	1 (3 June)
	In Between	8.0	12 (13 May–10 August) [3]
	800M	6.2	4 (22 May–6 August) [3]
	Pierced Egg	6.8	ND
	Swine Paradise	3.3	ND
	Barbed Wire	2.6	ND

Table 2.1, continued

Study area[1]	Survey site	Area (ha)	# of willow flycatchers detected (date(s) of detection)[2]
TOPO, cont	IRFB03	1.0	ND
	IRFB04	1.5	ND
	Platform	1.3	1 (16 May)
	250M	2.3	2 (11 June)
	Hell Bird	3.7	2 (20 June–6 August) [3]
	Glory Hole	1.0	3 (25 May–22 July) [3]
	Lost Lake	8.7	ND
TOGO	Pulpit Rock	1.8	ND
	Picture Rock	5.5	ND
	Blankenship Bend North	18.9	ND
	Blankenship Bend South	43.7	ND
	Topock Gorge North	3.8	ND
	Topock Gorge South	2.6	ND
	Havasu NE	33.5	6 (18 May), 2 (19 May)
BIWI	Bill Williams Site 1	1.9	1 (10–26 June) [3]
	Bill Williams Site 2	2.6	ND
	Bill Williams Site 11	2.2	1 (17 June)
	Bill Williams Site 4	5.8	4 (14 May–27 June) [3]
	Bill Williams Site 3	3.7	5 (7 May–20 July) [3]
	Bill Williams Site 5	2.8	ND
	Mineral Wash Complex	19.6	ND
	Bill Williams Site 8	10.3	1 (6 June)
	Beaver Pond	19.0	1 (16 May)
BIHO	Big Hole Slough	16.5	1 (17 May), 4 (10 June)
EHRE	Ehrenberg	4.7	1 (17 May)
CIBO	Cibola Site 2	16.4	1 (15 May), 1 (20 May), 1 (3 June)
	Cibola Site 1	7.7	ND
	Hart Mine Marsh	31.6	4 (20 May), 1(29 May)
	Three Fingers Lake	70.1	7 (19 May), 10 (1 June)
	Cibola Lake #1 (North)	8.5	1 (16 May), 1 (21 May), 1 (2 June)
	Cibola Lake #2 (East)	4.5	1 (18 May)
	Cibola Lake #3 (West)	7.0	1 (21 May)
	Walker Lake	24.0	1 (22 May)

Table 2.1, continued

Study area[1]	Survey site	Area (ha)	# of willow flycatchers detected (date(s) of detection)[2]
IMPE	Paradise	5.2	1 (30 May)
	Hoge Ranch	21.8	2 (29 May), 1 (30 May), 1 (12 June), 1 (17 June), 1 (2 July)
	Adobe Lake	8.2	1 (30 May), 1 (12 June)
	Taylor Lake	3.1	2 (30 May)
	Picacho NW	3.2	1 (13 June)
	Picacho Camp Store	3.3	1 (30 May), 2 (10 June), 1 (11 June), 1 (16 June)
	Milemarker 65	10.0	ND
	Clear Lake/The Alley	8.3	1 (21 May), 1 (2 June)
	Imperial Nursery	1.4	ND
	Ferguson Lake	29.1	2 (5 June)
	Ferguson Wash	6.8	1 (22 May)
	Great Blue	7.1	1 (15 May), 7 (21 May), 1 (10 June)
	Powerline	2.0	ND
	Martinez Lake	4.6	ND
MITT	Mittry West	4.4	2 (17 May), 3 (6 June), 1 (8 June), 4 (9 June), 1 (18 June)
	Mittry South	15.5	2 (23 May), 1 (27 May)
	Potholes East	2.0	1 (2 June)
	Potholes West	6.6	1 (2 June)
YUMA	I-8 Site #1	17.9	ND
	River Mile 33	20.6	6 (20 May), 3 (22 May), 1 (4 June), 2 (7 June), 4 (13 June), 1 (17 June)
	Gila Confluence West	5.6	1 (19 May), 1 (13 June), 1 (17 June)
	Gila Confluence North	4.6	1 (19 May), 1 (13 June)
	Gila River Site #1	5.7	1 (17 May), 3 (20 May), 1 (3 June), 3 (13 June)
	Gila River Site #2	8.0	1 (20 May), 3 (4 June), 14 (11 June)
	Fortuna North	4.8	3 (20 May), 4 (3 June), 4 (11 June), 4 (12 June)
	Gadsden Bend	4.4	9 (18 May), 8 (5 June), 4 (12 June), 4 (13 June), 2 (17 June)
	Gadsden	24.3	25 (19 May), 2 (1 June), 3 (16 June)
	Hunter's Hole	13.0	14 (18 May), 1 (1 June), 8 (12 June), 2 (14 June), 1 (15 June), 2 (16 June)

[1]PAHR=Pahranagat National Wildlife Refuge; MVWA=Meadow Valley Wash; LIFI=Littlefield; MESQ=Mesquite West; MOME=Mormon Mesa; GRCA=Grand Canyon; TOPO=Topock Marsh; TOGO=Topock Gorge; BIWI=Bill Williams National Wildlife Refuge; BIHO=Big Hole Slough; EHRE=Ehrenberg; CIBO=Cibola National Wildlife Refuge; IMPE=Imperial National Wildlife Refuge; MITT=Mittry Lake; YUMA=Yuma.
[2]ND = no willow flycatchers were detected.
[3]See Chapter 2 for details on territories, residency, and pairing; see Chapter 3 for details on nesting activity.
[4]One female moved to this site from Virgin River #1.

Table 2.2. Detections of willow flycatchers recorded at sites after 15 June 2003. Sites in which breeding was confirmed are not included. (See Chapters 3 and 4 for details.)

Study area[1]	Site	Date	Comments
IMPE	Picacho Camp Store	16 June	Lone flycatcher not very responsive or territorial.
YUMA	Gadsden	16 June	3 willow flycatchers detected. 1 sang spontaneously, 2 others responded to broadcasts. None could be relocated when surveyor entered area where birds had been singing.
YUMA	Hunter's Hole	16 June	2 willow flycatchers detected; unsuccessful capture attempt made on one.
BIWI	Bill Williams Site 11	17 June	Lone bird responded to broadcasts. This was the only detection of a willow flycatcher at this site.
YUMA	River Mile 33	17 June	Lone bird responded to broadcasts.
YUMA	Gila Confluence West	17 June	Lone bird responded to broadcasts.
YUMA	Gadsden Bend	17 June	2 willow flycatchers responded; neither could be relocated 45 minutes later.
MITT	Mittry West	18 June	Lone bird mildly responsive to broadcasts
IMPE	Hoge Ranch	2 July	This bird vocalized with only a single wheeo when it was startled by the arrival of the observer. It did not vocalize in response to broadcasts.
GRCA	RM 243 S	18 July	Hualapai Division of Natural Resources biologist reported that a willow flycatcher was detected "nearby" on 2 July. Flycatchers were not detected on any other dates despite multiple surveys.

[1]GRCA=Grand Canyon; BIWI=Bill Williams National Wildlife Refuge; IMPE=Imperial National Wildlife Refuge; MITT=Mittry Lake; YUMA=Yuma.

Table 2.3. Yellow-billed Cuckoo detections along the Virgin, lower Colorado, and Gila Rivers, 2003. Unless otherwise stated, number of individual cuckoos was undetermined.

Study area[1]	Site	Date(s) detected	Behavioral observations
PAHR	Pahranagat North	1, 5 Aug	primary song heard from same location, different days
MOME	Mormon Mesa North	20 June	observed foraging in canopy, silent
TOPO	Glory Hole	28 June	primary song and calls heard from canopy
BIWI	Bill Williams Site 1	13, 14 July	observed mid-canopy, silent, same location, different days
IMPE	Picacho NW	9 July	calls heard
YUMA	Gila Confluence West	24 July	calls heard
YUMA	Hunter's Hole	11 July	calls heard
		23 July	calls heard, possibly two individuals

[1]PAHR=Pahranagat National Wildlife Refuge; MOME=Mormon Mesa; TOPO=Topock Marsh; BIWI=Bill Williams River National Wildlife Refuge; IMPE=Imperial National Wildlife Refuge; YUMA=Yuma.

Table 2.4. Yuma Clapper Rail detections along the Virgin and lower Colorado Rivers, 2003. Unless otherwise stated, number of individuals was undetermined.

Study area	Site	Date(s) detected	Behavioral observations
MESQ	Mesquite West	17 May	calls heard
		20 May	calls heard
MOME	Mormon Mesa North	14 May	calls heard, two individuals
MOME	Mormon Mesa South	18 May	calls, possibly two individuals
MOME	Virgin River #1 (North)	17 May	calls heard, four individuals
		14 May	calls heard
MOME	Virgin River Delta #4	17 May	calls heard
TOPO	250M	12, 14 June	calls heard
MITT	Mittry West	16 May	calls heard

[1]MESQ=Mesquite; MOME=Mormon Mesa; TOPO=Topock Marsh; MITT=Mittry Lake.

Table 2.5. Summary of hydrologic conditions at each survey site along the Virgin and lower Colorado Rivers and tributaries, 2003. Values are given for each site as recorded in mid-May, mid-June, and mid-July.

Study area[1]	Survey site	% site inundated	Depth (cm) of surface water	% site with saturated soil[2]	Distance (m) to surface water or saturated soil
PAHR	Pahranagat North	100/80/50	50/50/20	0/20/35	0/0/0
	Pahranagat South	20/20/20	20/20/20	30/10/0	0/0/0
MVWA	Meadow Valley #6	40/40/55	30/30/50	10/10/10	0/0/0
	Meadow Valley #3	20/20/30	50/30/30	5/0/10	0/0/0
	Meadow Valley #4	25/25/20	30/30/40	15/0/5	0/0/0
LIFI	Littlefield North	40/30/30	40/20/25	40/20/15	0/0/0
	Littlefield South	10/5/5	10/10/10	20/15/15	0/0/0
MESQ	Mesquite West	60/20/5	30/10/2	30/15/5	0/0/0
MOME	Mormon Mesa North	10/0/0	40/0/0	25/0/0	0/>1000/>1000
	Mormon Mesa South	25/0/0	50/0/0	30/0/0	0/>1000/>1000
	Virgin River #1 (North)	10/0/0	30/0/0	0/0/0	0/>1000/>1000
	Virgin River Delta #4	90/0/0	30/0/0	10/0/0	0/>1000/>1000
GRCA	Separation Canyon	5/1/1	4/4/4	1/1/1	0/0/0
	RM 243S[3]	0/1/1	0/50/100	0/0/0	0/0/0
	Spencer Canyon	30/30/30	100/100/100	5/5/5	0/0/0
	Clay Tank Canyon	3/5/5	50/100/100	3/0/0	0/0/0
	Reference Point Creek[3]	0/0/0	0/0/0	0/0/0	0/0/0
	RM 257.5N[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Burnt Springs[4]	--/--/--	--/--/--	--/--/--	--/--/--
	Quartermaster Canyon	1/1/1	5/5/5	15/15/5	0/0/0
	RM 260.5N[3]	0/0/0	0/0/0	0/0/0	0/0/0
	RM 262.5S[3]	0/0/0	0/0/0	0/0/0	0/0/0
	RM 268N[3,5]	--/--/0	--/--/0	--/--/5	--/--/0
	Columbine Falls	3/3/5	15/10/10	4/5/3	0/0/0
	RM 274.5N[3]	5/1/10	50/30/50	15/5/50	0/0/0

Table 2.5, continued.

Study area[1]	Survey site	% site inundated	Depth (cm) of surface water	% site with saturated soil[2]	Distance (m) to surface water or saturated soil
TOPO	Pipes #1	10/0/0	35/0/0	10/0/0	0/100/100
	Pipes #2	35/5/0	100/10/0	5/10/0	0/0/100
	Pipes #3	60/10/0	15/10/0	10/25/0	0/0/100
	In Between	60/--/0	20/--/0	40/--/0	0/--/100
	800M	0/--/0	0/--/0	15/--/0	0/--/100
	Pierced Egg	30/0/0	6/0/0	70/90/0	0/0/100
	Swine Paradise[6]	0/0/0	0/0/0	0/0/0	0/0/0
	Barbed Wire	0/0/0	0/0/0	70/0/0	0/200/200
	IRFB03	0/0/0	0/0/0	0/0/0	150/150/150
	IRFB04	0/0/0	0/0/0	0/0/0	100/100/100
	Platform[6]	5/3/0	15/5/0	10/3/0	0/0/0
	250M[6]	30/5/0	--/5/0	--/5/0	0/0/0
	Hell Bird	90/75/--	100/--/--	5/--/--	0/0/--
	Glory Hole	20/5/--	45/45/--	5/--/--	0/0/--
	Lost Lake[6]	0//0/0	0/0/0	0/0/0	0/0/0
TOGO	Pulpit Rock[3]	0//0/0	0/0/0	0/0/0	0/0/0
	Picture Rock[3]	5/5/0	10/10/0	5/5/0	0/0/0
	Blankenship Bend North[3]	5/5/0	30/30/0	5/5/0	0/0/0
	Blankenship Bend South[3]	5/5/0	30/30/0	5/5/0	0/0/0
	Topock Gorge North[3]	10/0/0	10/0/0	10/5/0	0/0/0
	Topock Gorge South[3]	10/0/0	10/0/0	10/5/0	0/0/0
	Havasu NE[3]	5/0/--	20/0/--	5/0/--	0/0/--
BIWI	Bill Williams Site 1	80/10/40	50/50/20	20/10/10	0/0/0
	Bill Williams Site 2	--/20/10	--/10/20	--/50/30	0/0/0
	Bill Williams Site 11	0/--/--	0/--/--	0/--/--	0/30/30
	Bill Williams Site 4	25/0/0	100/0/0	15/1/10	0/--/--
	Bill Williams Site 3	20/0/0	80/0/0	50/1/10	0/--/--
	Bill Williams Site 5	50/30/0	>100/80/0	50/30/1	0/0/0
	Mineral Wash Complex	5/25/1	80/80/80	5/25/1	0/0/0
	Bill Williams Site 8	--/1/1	--/80/80	--/1/1	--/0/0
	Beaver Pond	50/--/--	50/--/--	0/--/--	0/--/--
BIHO	Big Hole Slough	5/0/5	8/0/5	5/5/5	0/0/0
EHRE	Ehrenberg	0/0/0	0/0/0	5/5/10	0/0/0
CIBO	Cibola Site 2[7]	5/5/3	5/5/--	10/10/0	0/0/0
	Cibola Site 1[7]	10/10/5	5/5/--	10/10/3	0/0/0
	Hart Mine Marsh[7]	50/40/5	100/100/20	5/3/3	0/0/0
	Three Fingers Lake[3]	30/30/--	150/150/--	0/0/--	0/0/0
	Cibola Lake #1 (North)[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Cibola Lake #2 (East)[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Cibola Lake #3 (West)[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Walker Lake[3,6]	0/0/0	0/0/0	0/0/0	0/0/0
IMPE	Paradise	5/5/1	100/75/40	0/0/0	0/0/0
	Hoge Ranch[3]	--/0/0	--/0/0	--/3/0	0/0/0
	Adobe Lake[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Taylor Lake[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Picacho NW[3]	0/0/0	0/0/0	0/0/0	75/75/75
	Picacho Camp Store[3]	10/0/3	20/0/10	--/0/3	0/0/0
	Milemarker 65[3]	5/0/--	40/0/--	--/0/--	0/0/0
	Clear Lake/The Alley[3]	5/5/0	10/--/0	10/5/--	0/0/0

Table 2.5, continued.

Study area[1]	Survey site	% site inundated	Depth (cm) of surface water	% site with saturated soil[2]	Distance (m) to surface water or saturated soil
IMPE	Imperial Nursery	5/30/0	25/25/0	5/--/0	0/0/40
	Ferguson Lake[3]	5/0/0	5/0/0	--/0/0	0/0/0
	Ferguson Wash[3]	1/3/5	--/--/--	0/1/2	0/0/0
	Great Blue[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Powerline[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Martinez Lake[3]	0/0/0	0/0/0	0/0/0	0/0/0
MITT	Mittry West	5/5/3	--/15/15	--/3/3	0/0/0
	Mittry South[3]	8/0/0	20/0/0	15/3/0	0/0/0
	Potholes East[7]	30/30/30	--/--/--	0/0/0	0/0/0
	Potholes West[7]	20/20/20	>100/>100/>100	0/0/0	0/0/0
YUMA	I-8 Site #1[3]	--/--/--	--/--/--	--/--/--	0/0/0
	River Mile 33	10/10/0	50/30/0	15/5/0	0/0/--
	Gila Confluence West[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Gila Confluence North[3]	0/0/0	0/0/0	5/5/5	0/0/0
	Gila River Site #1[7]	0/0/0	0/0/0	0/0/0	0/200/0
	Gila River Site #2	0/0/0	0/0/0	0/0/0	300/300/300
	Fortuna North[3]	0/0/0	0/0/0	0/0/0	0/0/0
	Gadsden Bend	1/0/5	10/0/20	0/5/0	0/0/0
	Gadsden[3]	20/20/20	40/40/40	0/0/0	0/0/0
	Hunter's Hole	20/25/10	75/50/50	5/--/2	0/0/0

[1]PAHR=Pahranagat National Wildlife Refuge; MVWA=Meadow Valley Wash; LIFI=Littlefield; MESQ=Mesquite West; MOME=Mormon Mesa; GRCA=Grand Canyon; TOPO=Topock Marsh; TOGO=Topock Gorge; BIWI=Bill Williams National Wildlife Refuge; BIHO=Big Hole Slough; EHRE=Ehrenberg; CIBO=Cibola National Wildlife Refuge; IMPE=Imperial National Wildlife Refuge; MITT=Mittry Lake; YUMA=Yuma.
[2]Percent of site with saturated soil does not include inundated areas.
[3]Site borders river or lake
[4]--=Hydrologic information not recorded
[5]Site not surveyed until July
[6]Site borders marsh
[7]Site borders canal

PAHRANAGAT NATIONAL WILDLIFE REFUGE, NEVADA

Pahranagat National Wildlife Refuge consists of a series of lakes and marshes in Pahranagat Valley approximately 150 km north of Las Vegas, Nevada. Patches of primarily native vegetation exist at the inflow and outflow of Upper Pahranagat Lake.

PAHRANAGAT NORTH

Area: 4.4 ha Elevation: 1,026 m UTM 666067E 4130786N

Pahranagat North is a stand of large-diameter Goodding willow (*Salix gooddingii*) at the inflow of Upper Pahranagat Lake. Fremont cottonwood (*Populus fremontii*) lines the northern, upland edge of the site and extends in narrow stringers around the edge of the lake. Canopy height within the patch is 15–18 m, and canopy closure is >90%. The entire site was inundated with up to 1.0 m of water in mid-May and became progressively drier through the flycatcher breeding season. By mid-July only half the site had standing water.

We located 18 resident, breeding willow flycatchers at Pahranagat North. Details of occupancy, pairing, color-banding, and breeding are presented in Chapters 3 and 4. Areas of Pahranagat North not known to be occupied by willow flycatchers were surveyed throughout the breeding season. The site lies immediately adjacent to cattle pasture, but livestock have access only to the cottonwood stringer on the northwest corner of the lake. Brown-headed Cowbirds (*Molothrus ater*) were detected during the entire season.

PAHRANAGAT SOUTH

Area: 2.8 ha Elevation: 1,023 m UTM 666774E 4127841N

Pahranagat South consists of a relatively small stringer of Goodding willow, coyote willow (*Salix exigua*), and Fremont cottonwood lining a human-made channel that carries the outflow from Upper Pahranagat Lake. The site is bordered to the west by an open marsh and to the east by upland scrub. Tamarisk (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*) form a sparse understory. Overall canopy closure at this site is approximately 50%.

We detected two resident, breeding willow flycatchers at Pahranagat South and an additional flycatcher on 6 August. Details of occupancy, color-banding, and breeding are presented in Chapters 3 and 4. Areas of Pahranagat South not known to be occupied by willow flycatchers were surveyed throughout the breeding season. Brown-headed Cowbirds were detected during the entire season.

PAHRANAGAT SALT CEDAR

We evaluated a patch of tamarisk at the outflow of Lower Pahranagat Lake for potential as willow flycatcher habitat. The site was completely dry in mid-May and is vegetated by patchy, tamarisk and sagebrush 3 m in height. Other than surveys in mid-May, no further surveys were completed at the site.

MEADOW VALLEY WASH, NEVADA

Meadow Valley Wash has its headwaters in the Wilson Creek Range near the Nevada/Utah border, flows south through a narrow valley past Elgin and Carp, and joins the Muddy River near Glendale, Nevada. We surveyed three sites in Rainbow Canyon between Elgin and Caliente, where Meadow Valley Wash is perennial. All sites consist of native vegetation, with narrow stringers of mature cottonwood and willow on either side of the stream and little to no understory. Canopy height varies from 10 to 15 m, and canopy closure along the creek ranges from 50 to 80%. All sites are used intermittently by livestock (cattle).

MEADOW VALLEY #6

Area: 7.1 ha Elevation: 1,182 m UTM: 714637E 4148655N

This site extends for 2 km along Meadow Valley Wash approximately 12 km north of Elgin. We did not detect any willow flycatchers at this site. We spent 11.9 observer-hours at the site over 10 surveys and detected Brown-headed Cowbirds on two visits.

MEADOW VALLEY #3

Area: 3.2 ha Elevation: 1,128 m UTM: 716984E 4139681N

This site extends for 800 m along Meadow Valley Wash approximately 3 km north of Elgin. We did not detect willow flycatchers or cowbirds on any of 10 surveys, totaling 2.8 observer-hours.

MEADOW VALLEY #4

Area: 1.2 ha Elevation: 1,048 m UTM: 717399E 4137919N

This site extends for 500 m along Meadow Valley Wash approximately 1.5 km north of Elgin. We did not detect willow flycatchers or cowbirds on any of 10 surveys, totaling 4.4 observer-hours.

LITTLEFIELD, ARIZONA

We surveyed two adjacent sites at Littlefield, one at the confluence of the Virgin River with Beaver Dam Wash just upstream of the I-15 overpass and the other just downstream of the I-15 overpass.

LITTLEFIELD NORTH

Area: 9.3 ha Elevation: 543 m UTM: 774404E 4087601N

This mixed-native site is a stand of mature Fremont cottonwood with an understory of willow and tamarisk. The site extends from the I-15 bridge over the Virgin River upstream to the confluence of the Virgin River and Beaver Dam Wash. The site extends 250 m up Beaver Dam Wash to a golf course. Canopy closure at the site is 25–50%. The site had standing water and saturated soil throughout the survey period.

We did not detect willow flycatchers at Littlefield North. We surveyed the site 10 times, totaling 25.0 observer-hours. Cowbirds were recorded on four visits, and there was no sign of livestock use.

LITTLEFIELD SOUTH

Area: 5.7 ha Elevation: 543 m UTM: 774466E 4087174N

This mixed-native site extends along the east bank of the Virgin River for 550 m immediately downstream from the I-15 bridge and encompasses a backwater area. Vegetation in the area is primarily willow mixed with tamarisk 3 m in height. The site also contains areas of cattail (*Typha* sp.), arrowweed (*Pluchea sericea*), and seep willow (*Baccharis salicifolia*).

We did not detect willow flycatchers at Littlefield South. We surveyed the site 10 times, totaling 21.9 observer-hours. Cowbirds were recorded on six visits, and there was no sign of livestock use.

MESQUITE, NEVADA

MESQUITE WEST

Area: 18.2 ha Elevation: 470 m UTM: 758057E 4075307N

This mixed-native site lies within the floodplain of the Virgin River in Mesquite, Nevada. Vegetation at the site is supported by runoff from two golf courses immediately adjacent to the site. The site is a mosaic of cattail and bulrush (*Schoenoplectus californicus*) marshes separated by narrow (40–50 m) strips of dense coyote willow with a scattered understory of tamarisk. The willows are generally 5 m in height, and canopy closure is >90%. Water levels within the site varied daily according to irrigation activities at the golf course, but water levels and areas of inundation generally decreased throughout the season. Runoff from heavy monsoon activity inundated areas immediately adjacent to the Virgin River in August.

We located 30 resident, breeding willow flycatchers at Mesquite West and detected an additional 8 individuals for which occupancy could not be determined. Details of occupancy, pairing, color-banding, and breeding are presented in Chapters 3 and 4.

MORMON MESA, NEVADA

For approximately 15 km upstream from its outflow to Lake Mead, the Virgin River flows through a 1-km-wide floodplain with a mosaic of habitats including tamarisk and willow forest, cattail marsh, and mixed-native and nonnative forest. Much of the area is seasonally inundated from snowmelt in the spring and monsoon rains in mid and late summer. Vegetation in much of the floodplain near the Lake Mead Delta is dead or dying as the result of fluctuating reservoir levels. Except for one small site, all the areas surveyed at Mormon Mesa are at least 10 km upstream of Lake Mead. All the areas we surveyed are used extensively by cattle, and cowbirds were detected on almost every survey.

MORMON MESA NORTH

Area: 15.8 ha Elevation: 390 m UTM: 729756E 4057879N

This mixed-exotic site is north of a dry channel of the Virgin River that cuts from east to west across the floodplain. The site is bordered to the west by a seasonally inundated cattail marsh. From the dry river channel toward the cattails, the site grades from dense arrowweed to tamarisk with arrowweed understory to a mixture of tamarisk, Goodding willow, and coyote willow. The areas with a mix of tamarisk and willow forest were inundated to a depth of 0.4 m during site reconnaissance in March. When surveys commenced in May, these areas had damp soil but standing water was present only in the cattail marsh to the west. By mid-June the cattail marsh was also dry. Canopy height in Mormon Mesa North is generally 4–5 m and extends to 8 m where willow is present.

We found three breeding pairs at Mormon Mesa North and detected one additional territorial flycatcher. Details of occupancy and breeding activity are presented in Chapters 3 and 4.

Portions of the site not known to be occupied were surveyed throughout the breeding season, totaling 30.2 observer-hours.

MORMON MESA SOUTH

North half: Area: 24.0 ha	Elevation: 385 m	UTM: 739601E 4057203N
South half: Area: 11.6 ha	Elevation: 385 m	UTM: 739464E 4056623N

Mormon Mesa South was split into two contiguous areas to facilitate tracking of survey activity. Mormon Mesa South consists of a mosaic of tamarisk 4 m in height and patches of willow and cattail. A long stringer of willow runs north to south through the east-central portion of the northern half and the eastern edge of the southern half of the site. Approximately 20% of the site contained up to 0.5 m of standing water in mid-May, but the site was completely dry by mid-June.

We detected one willow flycatcher at the western edge of Mormon Mesa South on 14 May. No other flycatchers were detected through 14 subsequent surveys totaling 36.8 observer-hours.

VIRGIN RIVER #1

North half: Area: 43.3 ha	Elevation: 380 m	UTM: 739300E 4056036N
South half: Area: 49.2 ha	Elevation: 380 m	UTM: 739340E 4055293N

Virgin River #1 was also divided into two contiguous areas to facilitate streamlining of field logistics. Surveys of the southern half were discontinued because this area is primarily tamarisk 3 m in height with many dry, open areas and represents poor willow flycatcher habitat. The northern half of Virgin River #1 contains both tamarisk and willow habitats. The western half of the site contains dense, tamarisk 4 m in height and the eastern half is a mixture of tamarisk, Goodding willow, and coyote willow. Canopy height in the willow areas is approximately 13 m. The willow areas had standing water up to 0.5 m deep in mid-May but were completely dry by mid-June. These areas were inundated again in August following monsoon storms.

We located three breeding pairs of willow flycatchers in the eastern half of Virgin River #1. An additional territorial individual was present at the site from 12 to 28 June. Details of occupancy and breeding activity are presented in Chapters 3 and 4. Portions of the site not known to be occupied were surveyed every few days throughout the entire breeding season, totaling 33.6 observer-hours.

VIRGIN RIVER #2

Area: 67.2 ha	Elevation: 380 m	UTM: 739013E 4054694N

Site reconnaissance was completed at this site during the third and fourth weeks of May, revealing poor willow flycatcher habitat. The site is a monotypic stand of tamarisk 4 m in height with 50–70% canopy closure. There was no standing water or saturated soils within the site during reconnaissance in May, and much of the vegetation was dead. Surveys were discontinued in 2003.

VIRGIN RIVER DELTA #4

Area: 12.2 ha Elevation: 370 m UTM: 738248E 4047366N

This site is approximately 7 km downstream of Virgin River #2 and is also known as Delta West. The site lies along the western edge of the floodplain, between the river channel and upland desert. The upland edge of the site is vegetated by tamarisk and arrowweed while the interior of the site contains a mix of Goodding and coyote willow forest with an understory of tamarisk. Canopy height of the willows is up to 15 m. This site was inundated with up to 0.5 m of water in mid-May. By mid-June a few patches of saturated soil remained, and by mid-July the site was completely dry. This site contained a large, active Great Blue Heron (*Ardea herodias*) and Black-crowned Night Heron (*Nycticorax nycticorax*) rookery.

We located two breeding pairs of willow flycatchers in Virgin River Delta #4 and detected an additional territorial flycatcher from 14 to 20 May. Details of occupancy and nesting are presented in Chapters 3 and 4. Field personnel spent 29.2 observer-hours surveying unoccupied portions of the site throughout the breeding season.

GRAND CANYON, ARIZONA

The Colorado River in Grand Canyon downstream of Separation Canyon is strongly influenced by water levels in Lake Mead. Potential willow flycatcher habitat in this area has changed dramatically in the last three years as the result of a 27-m drop in the level of Lake Mead since 2000. Areas that were inundated in the late 1990s are now well above the current water level, and the existing riparian vegetation in many of these areas is dead or dying. Survey efforts focused on side canyons that receive water from tributaries and on the few areas along the main channel of the Colorado River that still contain live, dense, riparian vegetation. Site names below indicate side canyons (if applicable) and the river mile, as measured downstream from Lees Ferry. River left and river right are indicated by "S" (south) and "N" (north), respectively.

SEPARATION CANYON (RM 239.5N)

Area: 8.0 ha Elevation: 378 m UTM: 810281E 3970155N

This mixed-exotic site consists of dense patches of tamarisk 5 m in height interspersed with open areas along a streambed in a narrow side canyon of the Colorado River. Overall canopy closure is <50%. The streambed was dry throughout the survey season except for a small trickle at the upstream end of the tamarisk habitat. Willow and mesquite trees are also present in the canyon, though the willow trees appeared to be dying.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 12.1 observer-hours.

RM 243S

Area: 1.8 ha Elevation: 366 m UTM: 805789E 3971656N

This site lies immediately adjacent to the Colorado River and is vegetated by dense tamarisk 5 m in height. Canopy closure is >90%. A small pool adjacent to the river was filled periodically throughout the survey season during high river flows.

We did not detect any willow flycatchers at this site during the first eight surveys from 28 May to 5 July. We detected one willow flycatcher at the site on 18 July. The flycatcher responded to broadcasts but did not vocalize spontaneously and could not be relocated on two subsequent visits. According to biologists from the Hualapai Department of Natural Resources, a willow flycatcher was detected at this site on 2 July but it could not be relocated on 3, 5 and 8 July. We surveyed this site 11 times, totaling 9.6 observer-hours. We did not detect cowbirds on any visits.

SPENCER CANYON (RM 246S)

Area: 5.5 ha Elevation: 366 m UTM: 802670E 3969264N

This side canyon consists of mixed-native vegetation and a perennial stream. Fremont cottonwood and willow form an overstory of variable height, and willow and tamarisk are present in the understory. Cattails line portions of the stream, and overall canopy closure is 70–90%.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 14.7 observer-hours.

CLAY TANK CANYON (RM 249S)

Area: 0.5 ha Elevation: 363 m UTM: 801003E 3973516N

This mixed-exotic site consists of a small patch of tamarisk and arrowweed between the Colorado River and a large pond. A stream was flowing from the pond to the river throughout the survey season. Most of the tamarisk at this site is approximately 2 m in height, though the northern edge of the site has slightly taller vegetation.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 4.2 observer-hours.

REFERENCE POINT CREEK (RM 252S)

Area: 4.2 ha Elevation: 360 m UTM: 796581E 3976052N

This site, at the confluence of Reference Point Creek with the Colorado River, is vegetated almost entirely by tamarisk 3 m in height, and a dry, backwater pond in part of the site is

growing in with young tamarisk. Soils at this site were dry throughout the survey season, and the nearest water is the Colorado River. Overall canopy closure at the site is approximately 80%.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 9.6 observer-hours.

RM 257.5N

Area: 7.1 ha Elevation: 360 m UTM: 794172E 3982334N

This mixed-exotic site borders the Colorado River. Immediately adjacent to the river, vegetation is primarily a thin band of willow 5 m in height. Behind the willow, the site is dominated by tamarisk. The site was dry throughout the survey season, and vegetation in some portions of the site is dying. Canopy closure at the site is approximately 90%.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 6.6 observer-hours. Brown-headed Cowbirds were detected on one visit.

BURNT SPRINGS (RM 259.5N)

Area: 11.0 ha Elevation: 363 m UTM: 793447E 3985647N

Vegetation within this side canyon varies from a monotypic patch of tamarisk 3 m in height near the Colorado River to a stand of mature, Goodding willow 15 m in height with an understory of cattails. Canopy closure is approximately 90%. No standing water was noted at the site, but the presence of live cattails suggests recent inundation or subsurface water.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 12.9 observer-hours. Brown-headed Cowbirds were detected on six visits.

QUARTERMASTER CANYON (RM 260S)

Area: 2.8 ha Elevation: 360 m UTM: 792285E 3984916N

This mixed-exotic site lies at the confluence of the Colorado River and Quartermaster Canyon. Vegetation is predominately tamarisk 4 m in height with patches of dead cattails and scattered willow. Throughout the survey season approximately 5% of the site contained saturated soil near a small spring. Canopy closure is approximately 90%.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 9.0 observer-hours. Brown-headed Cowbirds were detected on two visits.

RM 260.5N

Area: 3.4 ha Elevation: 354 m UTM: 791588E 3985548N

This site borders the Colorado River and stands about 3 m above the river level. Mixed-exotic vegetation at the site is dominated by tamarisk ranging in height from 1 to 4 m. The interior of the site is open and dry, with many dead and dying trees, and dead willows line the riverbank. Canopy closure at the site is approximately 70%.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 4.7 observer-hours. Brown-headed Cowbirds were detected on two visits.

RM 262.5S

Area: 12.8 ha Elevation: 354 m UTM: 790004E 3989361N

This mixed-native site lies immediately adjacent to the Colorado River. Vegetation consists of a mix of Goodding willow and tamarisk, varying in density with proximity to the river. In a 10-m-wide strip adjacent to the river, canopy closure is >90%, while interior portions of the site contain dead and dying vegetation with 20% canopy closure. Soils at the site were dry throughout the survey period.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 15.3 observer-hours. Brown-headed Cowbirds were detected on three visits.

RM 268N

Area: 7.2 ha Elevation: 354 m UTM: 784536E 3993889N

This mixed-exotic site lies immediately adjacent to the Colorado River and consists of a mix of Goodding willow 6 m in height and tamarisk 3 m in height. The interior of the site contains a low-lying area that appeared to have been wet in previous years. Canopy closure at the site is approximately 50%. Soils within the site were dry throughout the survey season.

No willow flycatchers were detected at this site. The site was surveyed four times between 6 and 19 July, totaling 4.3 observer-hours. Surveys from 31 May to 23 June took place at Wheeo (across the river from RM 268N). PTCNT1 (upstream of RM 268N) was surveyed on 2 July. Habitat at these sites is very poor, consisting of sparse canopy and many dead and dying trees. No willow flycatchers were detected at these sites. Further survey efforts were therefore spent at RM 268N, which, of the three sites, has habitat most suitable for willow flycatchers. Cowbirds were detected at PTCNT1 and on three of the four surveys at RM 268N.

COLUMBINE FALLS (RM 274.5S)

Area: 7.2 ha Elevation: 354 m UTM: 777192E 3998751N

This mixed-native site is located at the confluence of Cave Canyon and the Colorado River, and the site receives water from springs above Columbine Falls. Approximately 10% of the site had shallow, standing water or saturated soil throughout the survey season. Vegetation at the site is a mix of willow 5 m in height and tamarisk 2 m in height, and canopy closure is approximately 50%.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 10.8 observer-hours. Brown-headed Cowbirds were detected on four visits.

RM 274.5N

Area: 4.5 ha Elevation: 354 m UTM: 777130E 3999412N

This mixed-exotic site lies immediately adjacent to the Colorado River and contains seeps and small creeks. Approximately half the site contained saturated soil or standing water up to 1 m deep throughout the survey season. Vegetation at the site is a mix of Goodding willow and tamarisk. Canopy height averages about 5 m, but canopy height and relative proportions of the two species vary throughout the site. Overall canopy closure is approximately 90%.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 14.9 observer-hours. Brown-headed Cowbirds were detected on eight visits.

OTHER SURVEY AREAS

Lake Mead Delta Elevation: 354 m UTM: 771200E 4002650N

This site was surveyed once 3 June. Surveys were discontinued because vegetation in the area is sparse and less than 2 m in height. Most of the vegetation present in previous years has since fallen off because of steep cut banks (Orthophoto not available).

TOPOCK MARSH, ARIZONA

Topock Marsh lies within Havasu NWR and encompasses over 3,000 ha of open water, cattail and bulrush marsh, and riparian vegetation. A large expanse (over 2,000 ha) of riparian vegetation occupies the Colorado River floodplain between the Colorado River on the western edge of the floodplain and the open water of Topock Marsh on the eastern edge of the floodplain. The vegetation is primarily monotypic tamarisk with isolated patches of tall Goodding willow, and seasonally wet, low-lying areas are interspersed throughout the riparian area. Brown-headed Cowbirds were detected during the entire season. Feral pigs frequent all areas surveyed.

PIPES

Pipes #1: Area: 5.3 ha	Elevation: 140 m	UTM: 726971E 3856717N
Pipes #2: Area: 2.8 ha	Elevation: 140 m	UTM: 727041E 3856527N
Pipes #3: Area: 4.9 ha	Elevation: 140 m	UTM: 727080E 3856337N

These three contiguous sites are vegetated by monotypic tamarisk 5–7 m in height. Pipes #2 is very dense, with most stems <3 cm in diameter, and large, impenetrable areas of deadfall are present within the site. The northern edge of Pipes 1 has larger stems, taller canopy, and little deadfall. Pipes 3 and the southern edge of Pipes 2 contain the wettest areas, with Pipes 3 having small, marshy openings. All three sites had areas of standing water in mid-May, and the deepest pools were over 0.5 m deep. By mid-June about 5% of the area had water approximately 0.1 m deep, and by mid-July there was no standing water although soils in some areas were still damp.

We detected one willow flycatcher at Pipes 3 on 3 June. This bird sang briefly in response to broadcasts, but additional broadcasts in the area failed to elicit further responses. No willow flycatchers were detected during the last eight surveys at the site. Pipes was surveyed 11 times, totaling 56.2 observer-hours. Cowbirds were recorded on all but one visit.

IN BETWEEN AND 800M

In Between:	Area: 8.0 ha	Elevation: 140 m	UTM: 727116E 3854983N
800M:	Area: 6.2 ha	Elevation: 140 m	UTM: 726987E 3854826N

These two contiguous sites consist of 50-m-wide linear patches of monotypic tamarisk between swampy areas. The tamarisk patches have stems spaced at approximately 0.5 to 1.0 m intervals. Canopy height is approximately 7 m, with the lowest 3 m of the stand generally lacking foliage, resulting in a relatively open understory. Canopy closure in the tamarisk stands is over 90%. In mid-May, these sites had saturated soils and some standing water, with knee-deep water in the adjacent swamps. The sites became progressively drier through the breeding season, and by early July the swamps were completely dry.

We located eight nesting pairs at In Between and 800M. Details of occupancy, color-banding, and nesting are presented in Chapters 3 and 4. Brown-headed Cowbirds were detected during the entire season.

PIERCED EGG

Area: 6.8 ha	Elevation: 140 m	UTM: 726733E 3854797N

This site borders the western edge of 800M and is a monotypic stand of tamarisk. Canopy height in this area is approximately 2 m shorter than canopy in 800M and In Between, and portions of the understory are thick with deadfall and standing dead wood. Canopy closure is approximately 90%. Parts of the site contained knee-deep standing water in mid-May, but by late June only saturated soils remained.

We did not detect willow flycatchers at this site. The site was surveyed 12 times, totaling 28.3 observer-hours. Brown-headed Cowbirds were detected on 11 visits.

SWINE PARADISE

Area: 3.3 ha Elevation: 140 m UTM: 726331E 3854278N

This site borders the open water of Topock Marsh. Near the marsh, vegetation at the site is dominated by Goodding willow 10 m in height, with some coyote willow and very little tamarisk. The remainder of the site, on both sides of the main refuge road, is vegetated by tamarisk 7 m in height. Overall canopy closure is approximately 90%.

We did not detect any willow flycatchers at this site. We surveyed the site 10 times, totaling 5.6 observer-hours. Cowbirds were detected on nine visits.

BARBED WIRE

Area: 2.6 ha Elevation: 140 m UTM: 726232E 3854356N

This site is contiguous with Swine Paradise. There is one large, emergent Goodding willow at the site; otherwise, the site is vegetated by tamarisk of varying height and density. The northeastern portion of the site contains taller stems, less dead wood in the understory, and fewer large canopy openings than the southwestern portion of the site. Soils in the northeastern part of the site were saturated in mid-May, damp in early June, and dry by mid-June.

We did not detect any willow flycatchers at this site. We surveyed the site 12 times, totaling 19.1 observer-hours. Cowbirds were detected on all visits.

IRFB03 AND IRFB04

IRFB03: Area: 1.0 ha Elevation: 140 m UTM: 726021E 3854153N
IRFB04: Area: 1.5 ha Elevation: 140 m UTM: 726025E 3854039N

These two contiguous sites are vegetated by a monotypic stand of tamarisk 7 m in height, which forms a dense canopy and relatively open understory. There is little deadfall, although many standing stems are dead. These sites had no standing water, but damp soils were present in mid-May. These sites are separated from the Barbed Wire site by a firebreak road.

A silent, unidentified *Empidonax* flycatcher was detected at the site on 1 June. We surveyed these sites seven times, totaling 5.9 observer-hours. Cowbirds were detected on all visits.

PLATFORM

Area: 1.3 ha Elevation: 140 m UTM: 725913E 3853785N

This site forms a narrow strip of vegetation between the main refuge road and the open marsh. Vegetation at the site consists of tamarisk 6 m in height with a few isolated, emergent Goodding willow. Bulrush and cattail line the eastern edge of the site adjacent to the marsh. Soils in the interior of the site were dry throughout the survey season.

We detected one willow flycatcher at Platform on 16 May, but no willow flycatchers were detected on 10 subsequent surveys, totaling 6.8 hours. Cowbirds were detected on 10 visits.

250M

Area: 2.3 ha Elevation: 140 m UTM: 725920E 3853319N

This site lies between the main refuge road and the open marsh. Vegetation composition and structure are highly variable, and the site is dominated by patches of tamarisk and coyote willow of varying height and density, with Gooding willow scattered throughout. Closest to the marsh, the site was inundated through late May. Closest to the refuge road the site is very dry and is dominated by mesquite trees (*Prosopis* spp.) with an understory of arrowweed.

We detected two, interacting willow flycatchers on the northeastern edge of the site on 11 June. As mating and agonistic flycatcher interactions (other than copulation or aggressive displacement) are similar, this observation is difficult to interpret. However, five visits to monitor this area over the next 11 days failed to detect any flycatcher activity. The site was surveyed 11 times, totaling 16.2 observer-hours. Cowbirds were detected on all but one visit.

HELL BIRD AND GLORY HOLE

Hell Bird:	Area: 3.7 ha	Elevation: 140 m	UTM: 725955E 3853061N
Glory Hole:	Area: 1.0 ha	Elevation: 140 m	UTM: 725757E 3852887N

These contiguous sites are located on an island separated from the main riparian area by a narrow, deep channel. Vegetation composition and structure is highly variable, with the survey areas vegetated primarily by a mosaic of tamarisk 6 m in height and Goodding willow 12 m in height. Approximately two-thirds of the island is surrounded by dense bulrush.

We recorded one nesting pair and one unpaired, territorial willow flycatcher in Glory Hole and one unpaired territorial flycatcher in Hell Bird. An additional flycatcher was detected a single time in Hell Bird. Details of occupancy and nesting activity are presented in Chapters 3 and 4.

LOST LAKE

Area: 8.7 ha Elevation: 140 m UTM: 727685E 3846951N

Lost Lake is located 6 km south of Glory Hole and Hell Bird. It is separated from the Colorado River to the west by a low ridge of barren sand dunes, and the site lies adjacent to marshy areas to the east. Lost Lake (a 200 x 500 m body of open water) is located north of the site. Vegetation at the site is variable. The northwestern portion of the site consists an overstory of planted cottonwoods 10 m in height, with an understory of tamarisk 5 m in height. Southeast of the cottonwoods, the site is a monotypic stand of tamarisk, 5–8 m in height. The southeastern end of the site is dominated by dense stands of coyote willow, 5–7 m in height, with an understory of arrowweed. Areas to the south and west of Lost Lake burned in the past few years and contain patches of young tamarisk and small willows.

We did not detect willow flycatchers at Lost Lake. We surveyed the site 13 times, totaling 36.8 observer-hours. Cowbirds were detected on all visits.

OTHER SURVEY AREAS

PC6-1: Area: 3.9 ha Elevation: 140 m UTM: 727367E 3855631N
PB2001: Area 3.9 ha Elevation: 140 m UTM: 727401E 3855427N

Two additional areas, PC6-1 and PB2001, were surveyed once in May. Surveys at these sites were discontinued because of poor habitat quality for willow flycatchers. Both sites demonstrated little canopy closure.

TOPOCK GORGE, ARIZONA AND CALIFORNIA

Between Topock Marsh and Lake Havasu, the Colorado River winds through Topock Gorge. Throughout the Gorge, the river is confined between steep cliffs and high bluffs, and there is little vegetation along the river. We surveyed backwater areas that support marsh and riparian vegetation.

PULPIT ROCK

Area: 1.8 ha Elevation: 156 m UTM: 734146E 3838380N

The Pulpit Rock site is a small backwater area where an unnamed wash enters the Colorado River from the Mohave Mountains. The site is vegetated primarily by tamarisk and young willow 8 m in height. The northwestern edge of the site borders the river and is vegetated by cattails. The upland edges of the site are vegetated by arrowweed and mesquite. Overall canopy closure at the site is approximately 70%. Soils within the site were dry throughout the survey period.

We did not detect any willow flycatchers at this site. We surveyed the site 10 times, totaling 5.0 observer-hours. Cowbirds were detected on four visits. Feral pigs, bighorn sheep, and burros use the site and adjacent uplands.

PICTURE ROCK

Area: 5.5 ha Elevation: 138 m UTM: 734632E 3833574N

Picture Rock is a backwater area where an unnamed wash enters the Colorado River from the west. The vegetation is mixed-exotic and is dominated by tamarisk 8 m in height with thick deadfall throughout the site. A few isolated, emergent Goodding willow are present. Bulrush and cattail are present on the edge of the site along the river, and the upland edges of the site contain arrowweed, mesquite, foothills paloverde (*Parkinsonia microphylla*), and brittlebush (*Encelia farinosa*), especially along the wash. The interior of the site was dry throughout the survey season but dead cattails within the site suggest it may have been wetter in previous years.

We did not detect any willow flycatchers at this site. We surveyed the site 10 times, totaling 14.9 observer-hours. Cowbirds were detected on five visits. Feral pigs and burros use the site and adjacent uplands.

BLANKENSHIP BEND

Blankenship Bend North: Area: 18.9 ha Elevation: 138 m UTM: 736419E 3832449N
Blankenship Bend South: Area: 43.7 ha Elevation: 133 m UTM: 736639E 3831235N

Blankenship Bend is a 2-km-long strip of riparian and marsh vegetation which lies along the east bank of the Colorado River adjacent to the Blankenship Valley. The eastern, upland edge of the site is vegetated by a 100-m-wide strip of mature tamarisk and mesquite. The northern half of the site contains a stand of large Goodding willows adjacent to a cattail marsh. Between the river and the strip of tamarisk, the southern half of the site consists of a mosaic of cattail, bulrush, and scattered islands of small willows and tamarisk. Canopy closure and height are highly variable throughout this mixed-exotic site.

We did not detect any willow flycatchers at this site. We surveyed the site 11 times, totaling 32.9 observer-hours. Cowbirds were detected on five visits. Feral pigs, bighorn sheep and burros use the site and adjacent uplands.

TOPOCK GORGE

Topock Gorge North: Area: 3.8 ha Elevation: 136 m UTM: 736634E 3828736N
Topock Gorge South: Area: 2.6 ha Elevation: 140 m UTM: 736952E 3828437N

These two mixed-exotic sites are located in adjacent backwater coves separated by a narrow, rocky ridge. An unnamed wash enters the Colorado River at each site. The vegetation at both sites grades from cattails and bulrush along the river to a strip of young closely spaced willow. Close to the center of each site, a mix of tamarisk and willow 6 m in height merge with tamarisk

and mesquite (both honey and screwbean), which border the upland edge of the sites. Within the sites, canopy closure is >90% with a few emergent Goodding willow, approximately 15 m in height. In mid-May, there was standing water to a depth of approximately 0.1 m in the portions of the site with young willow, but by the end of May the interiors of the sites were dry.

We did not detect any willow flycatchers at the sites. We surveyed the sites 10 times each, totaling 12.9 observer-hours. Cowbirds were detected on half the visits. Burros use the sites and adjacent uplands.

HAVASU NE

Area: 33.5 ha Elevation: m UTM: 741287E 3823576N

This mixed-native site consists of a 1.3-km-long and <100-m-wide strip of riparian vegetation along the northeastern shore of Lake Havasu. Vegetation at the site grades from cattails along the lakeshore to Goodding willow and tamarisk in the center of the site and a mix of tamarisk and mesquite on the upland edge. Soils within the site were dry throughout the survey season. Many Goodding willows at the site are mature, and stand 5 m above the 10-m-tall tamarisk and mesquite.

We detected six willow flycatchers at Havasu NE on 18 May and two on 19 May. No breeding behavior was observed, and no flycatchers were detected on 10 subsequent surveys totaling 46.5 hours. Cowbirds were detected on all but one visit. Feral pigs were observed at the site on two occasions.

BILL WILLIAMS RIVER NATIONAL WILDLIFE REFUGE, ARIZONA

The Bill Williams NWR contains the last expanse of native cottonwood-willow forest on the lower Colorado River. The refuge encompasses over 2,500 ha along the Bill Williams River upstream from its mouth at Lake Havasu and contains a mixture of native forest, stands of monotypic tamarisk, beaver ponds, and cattail marsh. No evidence of livestock use was reported. Survey sites within Bill Williams are listed below from west to east, moving progressively farther upstream.

BILL WILLIAMS SITE #1

Area: 1.9 ha Elevation: 140 m UTM: 768991E 3798298N

This mixed-native site has a tall overstory of large Goodding willow and Fremont cottonwood and an understory of tamarisk and arrowweed. The site is surrounded by water and is accessible by kayak, with approximately 40% of the site vegetated by cattail. Approximately 80% of the site was inundated with up to 0.6 m of water in mid-May, and the site got progressively drier through the summer, with approximately 40% of the site inundated to a depth up to 0.3 m in mid-July. The site contains large quantities of downed wood.

We detected one willow flycatcher at Site #1 on 20 May and 10, 17, and 26 June. The flycatcher detected on 20 May did not vocalize but approached the broadcast recording. On subsequent visits when a willow flycatcher was detected, the bird was heard vocalizing from many, widely spaced perches over a 100-m-long area. Details of occupancy and breeding status of all flycatchers at Bill Williams are presented in Chapters 3 and 4.

BILL WILLIAMS SITE #2

Area: 2.6 ha Elevation: 140 m UTM: 769122E 3798042N

This mixed-native site has an overstory of large Goodding willow and Fremont cottonwood trees up to 20 m in height and an understory of tamarisk. The site is surrounded by water and is accessible by kayak. Cattails are present along the edges of the site.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 17.6 observer-hours. Cowbirds were recorded on nine visits.

BILL WILLIAMS SITE #11

Area: 2.2 ha Elevation: 140 m UTM: 769432E 3797863N

This mixed-native site has an overstory of Goodding willow and Fremont cottonwood trees up to 20 m in height, with canopy closure approximately 50%. Tamarisk is the dominant species in the understory, and there is thick deadfall up to 2 m in height. Soils within the site were dry throughout the survey period. Standing water was present throughout the breeding season in channels approximately 30 m from the site.

We detected one willow flycatcher at the site on 17 June. No flycatchers were detected during the last seven surveys. The site was surveyed nine times, totaling 9.0 observer-hours. Cowbirds were recorded on seven visits.

BILL WILLIAMS SITE #4 AND SITE #3

Site 4: Area: 5.8 ha Elevation: 140 m UTM: 769740E 3797299N
Site 3: Area: 3.7 ha Elevation: 140 m UTM: 769897E 3797138

These two sites are contiguous and together are known as Mosquito Flats. Vegetation is mixed-native, with a overstory of Goodding willow 15 m in height and patches of monotypic tamarisk 8 m in height. Canopy closure is approximately 50%, and cattails occupy approximately 20% of the site. Ground cover in portions of the site consists of thick, dead, woody vegetation. The southern portion of Site #3 near the river had standing water up to a depth of 1.2 m in mid-May, but the interior of the sites was dry throughout the breeding season.

We located resident, breeding willow flycatchers at both sites, and details of occupancy and nesting activity are presented in Chapters 3 and 4.

BILL WILLIAMS SITE #5

Area: 2.8 ha Elevation: 143 m UTM: 771723E 3796741N

Site #5 is located on the eastern edge of the Bill Williams River floodplain and is bordered to the east by upland desert. This site consists of mixed-native vegetation, with a canopy of Goodding willow and Fremont cottonwood and an understory of tamarisk 3 m in height. Overall canopy closure is approximately 25%. The site was very wet in mid-May, with deep pools of standing water in approximately 50% of the site and saturated soils in the remainder. The site became progressively drier through the survey season and was completely dry by mid-July.

We did not detect any willow flycatchers at the site. The site was surveyed 11 times, totaling 10.8 observer-hours. Cowbirds were recorded on seven visits.

MINERAL WASH COMPLEX

Area: 19.6 ha Elevation: 162 m UTM: 774662E 3795179N

A channel of the Bill Williams River runs through this mixed-native site, approximately 3 km upstream of Site #5. The site is similar in structure and composition to the other survey sites at Bill Williams, with an overstory of Fremont cottonwood and Goodding willow and an understory of tamarisk 3 m in height. The river was flowing through the site in mid-May, but by mid-July only isolated puddles remained in the upstream portion of the site.

We did not detect any willow flycatchers at the site. The site was surveyed 10 times, totaling 22.0 observer-hours. Cowbirds were recorded on seven visits.

BILL WILLIAMS SITE #8

Area: 10.3 ha Elevation: 168 m UTM: 777994E 3794489N

This narrow, linear site borders the river channel approximately 3 km upstream from the Mineral Wash Complex, at the confluence of Mohave Wash and the Bill Williams River. This section of the river is confined between high cliffs on both banks. Cottonwood-willow stands line the river channel and the edges of beaver ponds, with tamarisk also present throughout the site. This site had flowing water in the river channel throughout the survey season.

We detected one willow flycatcher at Site #8 on 6 June. The bird vocalized three times over a 2-hour period, and only in response to broadcasts. No willow flycatchers were detected on eight subsequent surveys of the site. The site was surveyed 10 times, totaling 24.1 observer-hours. Cowbirds were detected on six visits.

ADDITIONAL SURVEY SITES

Beaver Pond: Area: 19.0 ha Elevation: 165 m UTM: 775335E 3794427N
Cougar Point: Area: 7.2 ha Elevation: 158 m UTM: 773902E 3795225N

Two additional sites, Beaver Pond and Cougar Point, were surveyed opportunistically throughout the season. Beaver Pond is between the Mineral Wash Complex and Bill Williams Site #8, and Cougar Point is located immediately downstream of the Mineral Wash Complex. These sites are comparable in structure and composition to other survey sites at Bill Williams. The downstream end of the Cougar Point area is very dry and vegetated by dense stands of mesquite.

One willow flycatcher was detected at Beaver Pond on 16 May, but no flycatchers were detected on five subsequent visits. No willow flycatchers were detected at Cougar Point.

BIG HOLE SLOUGH, CALIFORNIA

BIG HOLE SLOUGH

Area: 16.5 ha Elevation: 82 m UTM: 728876E 3723848N

This mixed-exotic site consists of a cattail marsh edged with narrow bands of young willow 5 m in height. Away from the marsh, the site contains tamarisk and mesquite 8 m in height with an understory of arrowweed. Approximately 5% of the site had shallow, standing water or saturated soils throughout the survey season.

We detected one willow flycatcher on 17 May and four willow flycatchers on 10 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 11 times, totaling 23.7 observer-hours. Cowbirds were detected on 10 visits, and livestock (cattle) was noted on 1 visit.

EHRENBERG, ARIZONA

EHRENBERG

Area: 4.7 ha Elevation: 78 m UTM: 730018E 3715571N

This site consists of a canopy of Fremont cottonwood and Goodding willow 15 m in height with many young willows in the understory. The periphery of the site is vegetated with a mix of tamarisk and mesquite. Approximately 5% of the site is vegetated with bulrush and had saturated soils throughout the survey season. Canopy closure at the site is approximately 70%.

We detected one willow flycatcher at Ehrenberg on 17 May. No willow flycatchers were detected during the last eight surveys. The site was surveyed nine times, totaling 9.5 observer-hours. Cowbirds were detected on the first three visits to the site, and burros use the periphery of the site.

CIBOLA NATIONAL WILDLIFE REFUGE, ARIZONA AND CALIFORNIA

CIBOLA SITE 2

Area: 16.4 ha Elevation: 65 m UTM: 716938E 3683913N

This mixed-native site consists of a 200-m-wide strip of vegetation bordering a canal east of the Colorado River. The northern quarter of the site consists primarily of tamarisk, while the remainder of the site is vegetated with an overstory of Fremont cottonwood and Goodding willow, with an understory of arrowweed. The cottonwoods reach 20 m in height, and canopy height of the tamarisk is approximately 6 m. Overall canopy closure is 70–90%. Small marshes are scattered throughout the southern portion of the site, and approximately 5% of the site had 5 cm of standing water throughout the survey season.

We detected one willow flycatcher at Cibola Site 2 on 15 and 20 May and 3 June. No willow flycatchers were detected during the last eight surveys. We surveyed the site 11 times, totaling 26.8 observer-hours. Cowbirds were recorded on eight visits, and burro trails were noted on the periphery of the site.

CIBOLA SITE 1

Area: 7.7 ha Elevation: 65 m UTM: 717291E 3683368N

This mixed-native site, immediately south of Cibola Site 2, borders a linear marsh along its western edge, which lies adjacent to a canal. Goodding willow and Fremont cottonwood are the dominant vegetation along the eastern edge of the marsh, and vegetation grades into tamarisk and arrowweed on the dry, eastern edge of the site. The cottonwoods and tamarisk reach heights of 20 and 6 m, respectively. Overall canopy closure is 70–90%. Approximately 10% of the site held 0.1 m of standing water throughout the survey season.

No willow flycatchers were detected at the site. The site was surveyed 11 times, totaling 23.2 observer-hours. Cowbirds were detected on nine visits, and burro trails were noted on the periphery of the site.

HART MINE MARSH

Area: 31.6 ha Elevation: 65 m UTM: 717562E 3682317N

This mixed-exotic site parallels a canal just east of the Colorado River, immediately south of Cibola Site 1. The site consists of a mix of tamarisk and linear stretches of marsh, which make up approximately half the site. Canopy height of the tamarisk is approximately 4 m, and canopy closure is approximately 70%. The marsh held up to 1 m of standing water in mid-May, began to dry up by early June, and by mid-July the marsh in the northeast section of the site was mostly dry. Tamarisk areas contained dry soils throughout the survey season.

We detected four willow flycatchers on 20 May and one on 29 May. No willow flycatchers were detected during the last nine surveys. The site was surveyed 11 times, totaling 27.4 observer-hours. Cowbirds were detected on seven visits, and burro trails were noted on the east side of the site.

THREE FINGERS LAKE

Area: 70.1 ha Elevation: 65 m UTM: 715150E 3681593N

This mixed-exotic site consists of a large island with shores vegetated by cattails, bulrush, tamarisk 6 m in height, and a few large Goodding willow. Canopy closure along the shore is 50–70%. The interior of the island is vegetated primarily by arrowweed and had dry soils throughout the survey period.

We detected 7 willow flycatchers on 19 May and 10 on 1 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 10 times, totaling 23.8 observer-hours. Cowbirds were detected on six visits, and no livestock use was noted.

CIBOLA LAKE NORTH

Area: 8.5 ha Elevation: 64 m UTM: 716541E 3679811N

This mixed-exotic site consists primarily of tamarisk 4 m in height with scattered Goodding willow and is bordered to the east by a marsh. Canopy closure is 50–70%, and soils within the site were dry throughout the survey period.

We detected one willow flycatcher at Cibola Lake North on 16 and 21 May and 2 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 11 times, totaling 9.8 observer-hours. Cowbirds were detected on six visits, and no livestock use was noted.

CIBOLA LAKE EAST

Area: 4.5 ha Elevation: 64 m UTM: 717255E 3679475N

This mixed-exotic site is vegetated primarily by tamarisk 5 m in height, with a few Goodding willow and Fremont cottonwood scattered throughout the site. Canopy closure is 70–90%. There was no standing water or saturated soils during the survey season, but the western edge of the site borders a marsh.

We detected one willow flycatcher on 18 May. No willow flycatchers were detected during the last 10 surveys. The site was surveyed 11 times, totaling 12.6 observer-hours. Cowbirds were detected on seven visits, and no livestock use was noted.

CIBOLA LAKE WEST

Area: 7.0 ha Elevation: 64 m UTM: 716761E 3679159N

This mixed-exotic site consists primarily of dense, tamarisk 4 m in height with a few Fremont cottonwood and Goodding willow. Canopy closure is 70–90%. The site is surrounded completely by a marsh, and the edges of the site are vegetated with bulrush. Soils in the interior of the site were dry throughout the survey season.

We detected one willow flycatcher on 21 May. No willow flycatchers were detected during the last nine surveys. The site was surveyed 10 times, totaling 9.3 observer-hours. Cowbirds were detected on five visits, and no livestock use was noted.

WALKER LAKE

Area: 24.0 ha Elevation: 64 m UTM: 716162E 3676068N

This mixed-exotic site is located between Walker Lake and the Colorado River. Most of the site consists of monotypic tamarisk approximately 5 m in height with 50–70% canopy closure. Patches of arrowweed, short tamarisk, and individual Goodding willow and Fremont cottonwood trees are interspersed throughout the site. A narrow band of common reed (*Phragmites* sp.) borders the site along the river. Soils in the interior of the site were dry, and water levels in the marsh on the western side of the site dropped approximately 50 cm between 22 May and 19 June.

We detected one willow flycatcher at Walker Lake on 22 May. No willow flycatchers were detected during the last eight surveys. The site was visited nine times, totaling 13.4 observer-hours. Cowbirds were detected on all visits, and no evidence of livestock was recorded.

IMPERIAL NATIONAL WILDLIFE REFUGE, ARIZONA AND CALIFORNIA

PARADISE

Area: 5.2 ha Elevation: 62 m UTM: 714184E 3665895N

This site is mixed-native habitat, with stringers of Fremont cottonwood and Goodding willow, 15–20 m in height, bordering a small cattail/bulrush marsh. Tamarisk (5 m in height) and arrowweed (3 m in height) make up the understory. Standing water was present throughout the survey season in one small pond comprising less than 5% of the survey area. The site is separated from the Colorado River by a narrow strip (50 m wide) of dense tamarisk. A dry cattail marsh borders the site to the south. Overall canopy closure is approximately 25%.

We detected one willow flycatcher on 30 May. No willow flycatchers were detected during the last nine surveys. The site was surveyed 10 times, totaling 13.2 observer-hours. Cowbirds were detected on every visit, and there was no sign of livestock use of the site.

HOGE RANCH

Area: 21.8 ha Elevation: 61 m UTM: 717220E 3660097N

This large site is mixed-exotic habitat, dominated by tamarisk (4-6 m in height), with some young (8 m in height) Goodding willows and, at the southern end of the site near the old ranch, a few emergent Fremont cottonwoods (15 to 18 m in height). There are pockets of cattails, bulrush, and common reed, which occupy less than 10% of the site. The site borders the Colorado River, and standing water 0.3 m deep was also present in interior portions of the site. Canopy closure is approximately 70%.

We detected two willow flycatchers at Hoge Ranch on 29 May and one on 30 May, 12 and 17 June, and 2 July. The flycatcher detected on 2 July was very skittish and vocalized only with a single *wheeo*. The flycatcher came in twice to broadcasts of interaction calls but was otherwise unresponsive. We surveyed the area where the flycatcher was detected on five subsequent visits but recorded no further detections. The site was surveyed 12 times, totaling 12.3 observer-hours. Cowbirds were detected on two visits, and there were signs of wild burros using portions of the site.

ADOBE LAKE

Area: 8.2 ha Elevation: 60 m UTM: 717395E 3658838N

This site consists primarily of exotic vegetation, consisting of dense tamarisk (5 to 7 m in height) with many dead branches in the understory. There are scattered Goodding willows (10 m in height) in the site, but there are no contiguous stands of willows. The site is adjacent to the Colorado River, but soils within the site were dry. Canopy closure within the site is 70–90%.

We detected one willow flycatcher on 30 May and 12 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 11 times, totaling 9.8 observer-hours. Cowbirds were detected on two visits, and there was no sign of livestock use of the site.

TAYLOR LAKE

Area: 3.0 ha Elevation: 60 m UTM: 721647E 3657207N

Taylor Lake is a mixed-native site, consisting of an overstory of Goodding willow (15 m in height) and an understory (3–4 m in height) of varying densities of tamarisk, seep willow, and arrowweed. Dead willow branches compose much of the ground cover, and canopy closure is approximately 50%. The site borders the Colorado River, and the interior of the site is separated from the river by hummocks of live and dead common reed. Soils in the interior of the site were dry throughout the survey period.

We detected two willow flycatchers at Taylor Lake on 30 May. No willow flycatchers were detected during the last nine surveys. The site was surveyed 10 times, totaling 15.0 observer-

hours. Cowbirds were detected on six visits, and there was evidence of occasional use of the site by wild burros.

PICACHO NW

Area: 3.2 ha Elevation: 59 m UTM: 722574E 3656387N

This site is mixed-native habitat that was intensively managed in the 1990s to remove tamarisk and plant cottonwoods. It is currently a gallery forest of Fremont cottonwood and Goodding willow, 15–20 m in height, with canopy closure approximately 50%. The understory is 2–4 m in height and contains honey mesquite, arrowweed, seep willow, and tamarisk. The site borders the Colorado River, but there was no standing water in the gallery forest during the survey period. Outside of the managed area, the habitat is dominated by tamarisk and common reed. To the west of the site there is a flooded area with tamarisk snags.

We detected one willow flycatcher at Picacho NW on 13 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 10 times, totaling 7.2 observer-hours. Cowbirds were detected on half the visits, and there was evidence of heavy use of the site by wild burros.

PICACHO CAMP STORE

Area: 3.3 ha Elevation: 58 m UTM: 724472E 3656376N

Picacho Camp Store is a mixed-native site, dominated by Goodding willow 20 m in height with an understory of common reed and tamarisk 3 m in height. Canopy closure is 50–70%. The site is bordered to the north by the Colorado River and to the south and west by a patchwork of cattail marshes bordered by Goodding willow and tamarisk 4 m in height. Standing water was present in approximately 5% of the site throughout the survey season.

We detected one willow flycatcher on 30 May, 11 June, and 16 June and detected two willow flycatchers on 10 June. No willow flycatchers were detected during the last seven surveys. The site was visited 12 times, totaling 21.6 observer-hours. Cowbirds were recorded on six visits, and there was evidence of occasional use of the site by wild burros.

MILEMARKER 65

Area: 10.0 ha Elevation: 58 m UTM: 726278E 3657468N

Milemarker 65 is a narrow strip of mixed-exotic vegetation between the Colorado River and a backwater marsh, which is dominated by bulrush. Vegetation at the site consists entirely of dense tamarisk 5 m in height. Dense common reed, approximately 3 m in height, also occurs throughout the site and together with the tamarisk creates almost complete canopy closure. Soils within the site were dry.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 11.4 observer-hours. Cowbirds were recorded on six visits.

CLEAR LAKE/THE ALLEY

Area: 8.3 ha Elevation: 59 m UTM: 731531E 3657701N

Vegetation at this site is primarily exotic, consisting of monotypic tamarisk 8–10 m in height. Emergent Goodding willow, up to 13 m in height, are scattered throughout the site. The tamarisk is mature, with large amounts of deadfall ground cover, and canopy closure is approximately 90%. The site is surrounded on the east, north, and west by upland desert and is bordered on the south by cattail marshes and common reed. A narrow, backwater channel runs northward from the Colorado River into the center of the site, but soils outside of the channel were dry.

We detected one willow flycatcher on 21 May and 2 June. No willow flycatchers were detected during the last ten surveys. The site was surveyed 12 times, totaling 25.3 observer-hours. Cowbirds were detected on half the visits, and wild burros use the site and the surrounding uplands.

IMPERIAL NURSERY

Area: 1.4 ha Elevation: 58 m UTM: 734341E 3653620N

This site is a cottonwood planting managed by the Imperial NWR. The cottonwoods are approximately 10 m in height, and there is a 10-m-diameter clump of willows 4 m in height in one portion of the understory. Except for this clump of willows, the understory is completely open, and canopy closure is approximately 90%. The site is bordered to the north by a patchwork of cattails, common reed, and tamarisk. The cottonwood plantation was inundated with up to 25 cm of water on 14 June but was completely dry on 26 June and 13 July.

We did not detect willow flycatchers at this site. The site was surveyed 13 times, totaling 7.5 observer-hours. Cowbirds were detected on nine visits, and there was no evidence of livestock using the site.

FERGUSON LAKE

Area: 29.1 ha Elevation: 57 m UTM: 733660E 3651506N

The Ferguson Lake site is on a strip of land between Ferguson Lake and the Colorado River. Vegetation is mixed-native, with stringers of Goodding willow and Fremont cottonwood, up to 15 m in height, forming a sparse overstory with <50% canopy closure along the western edge of the site along Ferguson Lake. On the eastern edge of the site adjacent to the Colorado River, soils were dry and the area is vegetated by scattered tamarisk, arrowweed, and mesquite.

This site was not scheduled for surveys because much of the site had recently burned. Personnel from an unrelated field crew heard a willow flycatcher singing along the Ferguson Lake shore on 20 May, and formal surveys of the site commenced on 5 June. Two willow flycatchers were detected on the first survey, but flycatchers were not detected on nine subsequent visits, totaling 22.9 observer-hours for all surveys. Cowbirds were detected on all visits, and evidence of burros using the site was documented on one visit.

FERGUSON WASH

Area: 6.8 ha Elevation: 58 m UTM: 734059E 3650162N

This mixed-exotic site, at the outflow of Ferguson Wash into Ferguson Lake, is dominated by dense, mature tamarisk, approximately 7 m in height, with dense deadfall in the understory. A few scattered, emergent Goodding willows are present near the lake, and canopy closure is >90%. The site is bordered on the lakeside by cattails and bulrush and on the upland side by desert scrub. A backwater channel penetrates to the interior of the site.

One willow flycatcher was detected at this site on 22 May. No willow flycatchers were detected during the last ten surveys. The site was visited 11 times, totaling 20.5 observer-hours. Cowbirds were recorded on five visits, and burro trails are abundant on the periphery of the site.

GREAT BLUE

Area: 7.1 ha Elevation: 58 m UTM: 736946E 3652143N

This site, on the eastern shore of Martinez Lake, consists of mixed-exotic vegetation. Near the shore of Martinez Lake, Goodding willows form an overstory 15 m in height, with an understory of tamarisk, common reed, and giant reed (*Arundo* sp.). Canopy closure in this area is 80%. Farther from the lake, the site is vegetated by scattered arrowweed and tamarisk 6 m in height, with canopy closure <50%. No standing water or saturated soils were noted within the site.

One willow flycatcher was detected on 15 May; seven were detected on 21 May, and one was detected on 10 June. No willow flycatchers were detected during the last nine surveys. The site was surveyed 13 times, totaling 32 observer-hours. Cowbirds were detected on all but one visit, and burros use the uplands on the periphery of the site.

POWERLINE

Area: 2.0 ha Elevation: 58 m UTM: 737443E 3651901N

This site is located south of Great Blue Heron along the eastern shore of Martinez Lake. Vegetation is mixed-native, and consists of a strip of Goodding willow and Fremont cottonwood along the border of a dry cattail marsh. Overstory height is approximately 12 m, and canopy closure is <50%. Tamarisk, arrowweed, and seep willow are present in the understory. No standing water or saturated soils were noted within the site.

We did not detect willow flycatchers at this site. The site was surveyed 12 times, totaling 7.3 observer-hours. Cowbirds were recorded on nine visits, and burros use the uplands on the periphery of the site.

MARTINEZ LAKE

Area: 4.6 ha Elevation: 58 m UTM: 737445E 3651592N

This mixed-native site is adjacent to and south of the Powerline site on the eastern shore of Martinez Lake. Goodding willows <10 m in height are scattered throughout the northern portion of the site, and clustered Goodding willows and Fremont cottonwoods up to 15m in height are present in the southern portion of the site. Arrowweed and tamarisk dominate the understory, and overall canopy closure is <25%. Cattails and common reed border the site along the lakeshore. No standing water or saturated soils were recorded within the site.

We did not detect willow flycatchers at this site. The site was visited 12 times, totaling 17.8 observer-hours. Cowbirds were detected on every visit, and burros use the adjacent uplands.

MITTRY LAKE, ARIZONA AND CALIFORNIA

MITTRY WEST

Area: 4.4 ha Elevation: 48 m UTM: 735055E 3638408N

The center of this mixed-native site is dominated by Goodding willow 12 m in height with a dense understory of arrowweed and tamarisk. Canopy closure is approximately 80%. Honey and screwbean mesquite are scattered throughout the site but are more common near the periphery. Portions of the site appear to have burned within the last several years. There are patches of cattail within the site, and <15 cm of standing water was reported in approximately 5% of the site throughout the survey season.

We detected two willow flycatchers on 17 May, three on 6 June, one on 8 June, four on 9 June, and one on 18 June. No flycatchers were detected during the last eight surveys. The site was visited 15 times, totaling 37.2 observer-hours. Cowbirds were detected on 11 visits, and burros use the uplands adjacent to the site.

MITTRY SOUTH

Area: 15.5 ha Elevation: 46 m UTM: 736068E 3634182N

This monotypic tamarisk site borders Mittry Lake. Vegetation at the site is very dense, with many dead branches and deadfall in the understory. Canopy closure within the tamarisk is >90%, and canopy height is approximately 7 m. The site is bordered to the south by Mittry Lake, and the marshy edge of the site is vegetated by cattail, bulrush, and common reed. The northern edge of the site was dry and is bordered by an area that has been recently bulldozed.

Two willow flycatchers were detected at Mittry South on 23 May, and one flycatcher was detected on 27 May. No willow flycatchers were detected during the last 11 surveys. The site was visited 13 times, totaling 18.8 observer-hours. Cowbirds were detected on 10 visits, and no evidence of livestock use was recorded.

POTHOLES EAST

Area: 2.0 ha Elevation: 54 m UTM: 731905E 3634205N

This mixed-exotic site is located adjacent to the All American Canal. A cattail pond in the center of the site is surrounded by athel (*Tamarix aphylla*) and tamarisk 8 m in height and a few emergent Fremont cottonwoods up to 15 m in height. Overall canopy closure is <25%. Fan palms (*Washingtonia* sp.) are also present at the site, and honey mesquite trees grow on the upland edges of the site.

One willow flycatcher was detected on 2 June. No willow flycatchers were detected during the last ten surveys. The site was surveyed 12 times, totaling 5.8 observer-hours. Cowbirds were detected on all visits, and evidence of burros was abundant in the upland areas surrounding the site.

POTHOLES WEST

Area: 6.6 ha Elevation: 53 m UTM: 730489E 3635396N

This mixed-exotic site is located adjacent to the All American Canal. A pond with cattails and bulrush occupies the center of the site and is surrounded by tamarisk and athel. Canopy closure is 50–70%, and canopy height ranges from 5 to 10 m. Soils away from the pond were very dry, and there is a patch of mesquite trees on the north side of the site.

One willow flycatcher was detected on 2 June. No willow flycatchers were detected during the last 10 surveys. The site was surveyed 12 times, totaling 9.1 observer-hours. Cowbirds were detected on 10 visits, and burros use the uplands surrounding the site.

YUMA, ARIZONA

I-8 SITE 1

Area: 17.9 ha Elevation: UTM: 723956E 3623696N

This mixed-native site was vegetated by Goodding willow and dense tamarisk. Soils were dry, except on the western edge of the site adjacent to a backwater channel. The site borders the Colorado River.

This site was surveyed twice before it burned between 11 and 28 June. No willow flycatchers were detected.

RIVER MILE 33

Area: 20.6 ha Elevation: 38 m UTM: 726401E 3622886N

This mixed-native site borders the Gila River. The center of the site consists of a stand of Goodding willow and Fremont cottonwood with a multilayered canopy up to 15 m in height. Tamarisk is present in the understory, and common reed occurs in dense clumps. This portion of the site was inundated with approximately o.5 m of water in early June but was completely dry by 28 June. Cottonwoods and willows also occur in narrow stringers along irrigation ditches on the periphery of the site. These ditches contained water up to 1 m deep in early June and were dry by 28 June. Portions of the site that were dry throughout the survey period are vegetated by tamarisk, arrowweed, and young, dying willows.

At River Mile 33, we detected six willow flycatchers on 20 May, three on 22 May, one on 4 June, two on 7 June, four on 13 June, and one on 17 June. No flycatchers were detected during the last six surveys. The site was surveyed 13 times, totaling 39.7 observer-hours. Cowbirds were detected on all but one visit, and there was no evidence of livestock use at the site.

GILA CONFLUENCE WEST

Area: 5.6 ha Elevation: 37 m UTM: 729176E 3622701N

This mixed-native site borders the Colorado and Gila Rivers. Goodding willows and Fremont cottonwoods surround a dry cattail marsh in the center of the site. Canopy height is approximately 10 m, and canopy closure is 25–50%. Arrowweed and tamarisk form a patchy understory. Soils within the site were dry.

One willow flycatcher was detected on 19 May and 13 and 17 June. The flycatcher detected on 19 June was detected during a survey of the adjacent Gila Confluence North site. No willow flycatchers were detected during the last seven surveys. The site was surveyed 11 times, totaling 10.5 observer-hours. Cowbirds were detected on all but one visit, and there was no evidence of livestock use of the site.

GILA CONFLUENCE NORTH

Area: 4.6 ha Elevation: 40 m UTM: 729535E 3622938N

This mixed-native site borders the north side of the Colorado River at the confluence of the Gila and Colorado Rivers. Goodding willow, approximately 8 m in height and closely spaced, is the dominant vegetation at the site, although many appear to be dying, and canopy closure is approximately 50%. Fremont cottonwoods up to 13 m in height are also scattered throughout the site, and arrowweed, tamarisk, and seep willow are common in the understory. Areas of cattails within the site were dry throughout the survey season, and the only saturated soils were adjacent to the Colorado River.

One willow flycatcher was detected at Gila Confluence North on 19 May and 13 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling13.4 observer-hours. Cowbirds were detected on all but one visit, and there was no evidence of livestock use at the site.

GILA RIVER SITE 1

Area: 5.7 ha Elevation: 44 m UTM: 733864E 3623420N

The center of this mixed-native site consists of a grove of Fremont cottonwood up to 20 m in height. Stringers of cottonwood, Goodding willow, and tamarisk extend to the east and west, with pockets of arrowweed present throughout the site. Canopy closure is <50%. The site is bordered to the north by agricultural fields and to the south by the Gila River. Water was observed in a canal in the center of the site on 3 June and 10 July but not on 13 June.

One willow flycatcher was detected at the site on 17 May and 3 June, and three willow flycatchers were detected on 20 May and 13 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 12 times, totaling 12.1 observer-hours. Cowbirds were detected on all but one visit, and there was no evidence of livestock use at the site.

GILA RIVER SITE 2

Area: 8.0 ha Elevation: 45 m UTM: 736565E 3623600N

This mixed-native site consists of an overstory of Fremont cottonwood (up to 15 m in height) and an understory of arrowweed. Tamarisk is present along the northern edge of the site, and canopy closure is <50%. The site is bordered to the north by agricultural fields and to the south by an open, sandy area vegetated by arrowweed. A stringer of cottonwoods and Goodding willows extends to the west along the edge of the agricultural fields toward Gila River Site 1. There was no standing water or saturated soils within the site, but the western edge of the site borders a large pond.

One willow flycatcher was detected on 20 May and 11 June, and three flycatchers were detected on 4 June. No willow flycatchers were detected during the last eight surveys. An additional 13 willow flycatchers were detected on a single day on 11 June in a stringer of cottonwoods and willows between Gila River Site 2 and Gila River Site 1. Gila River Site 2 was surveyed 11 times, totaling 17.0 observer-hours. Cowbirds were detected on all visits, and there was no evidence of livestock use at the site.

FORTUNA NORTH

Area: 4.8 ha Elevation: 46 m UTM: 739857E 3625337N

This site is vegetated primarily by mature tamarisk approximately 8 m in height. Goodding willow and honey mesquite are scattered throughout the site but make up less than 10% of the vegetation, and canopy closure is approximately 80%. There was no standing water or saturated soils within the site, but the western edge of the site borders the Gila River.

Three willow flycatchers were detected on 20 May, and four flycatchers were detected on 3, 11, and 12 June. No willow flycatchers were detected during the last eight surveys. The site was surveyed 12 times, totaling 18.1 observer-hours. Cowbirds were recorded on seven visits, and burro sign was recorded on one visit.

GADSDEN BEND

Area: 4.4 ha Elevation: 28 m UTM: 707333E 3605485N

This mixed-native site is adjacent to a beaver pond along old backwater channels of the Colorado River. The canopy reaches 20 m in height and is composed of Fremont cottonwood and Goodding willow. Many of these trees appear to be dying, and canopy closure is <50%. The site contains a sparse understory of scattered tamarisk and patches of arrowweed and common reed. The site is bordered to the north and east by agricultural fields and to the south by a large stand of mesquite.

At Gadsden Bend, we detected nine willow flycatchers on 18 May, eight on 5 June, four on 12 June, four on 13 June, and two on 17 June. No flycatchers were detected during the last six surveys. The site was surveyed 12 times, totaling 18.8 observer-hours. Cowbirds were detected on 10 visits. No livestock use was recorded at the site, but site receives heavy foot traffic by illegal immigrants.

GADSDEN

Area: 24.3 ha Elevation: 25 m UTM: 707210E 3603847N

This mixed-native site consists of stringers of Goodding willow and scattered Fremont cottonwood along backwater channels of the Colorado River. Canopy height is approximately 8 m, and canopy closure is <25%. The site is bordered to the east by agricultural fields. The backwater channels, portions of which are vegetated by cattail and bulrush, have open, sandy shores.

Twenty-five willow flycatchers were detected on 19 May, two were detected on 1 June, and three were detected on 16 June. No flycatchers were detected during the last seven surveys. The site was surveyed 11 times, totaling 17.9 observer-hours, and cowbirds were recorded on 10 visits. No livestock use was recorded at the site, but site receives heavy foot traffic by illegal immigrants.

HUNTER'S HOLE

Area: 13.0 ha Elevation: 26 m UTM: 706558E 3600016N

This mixed-native site consists of two patches of Goodding willow separated by a pond surrounded by cattail and common reed. In the southern patch, stringers of willow 10 m in height surround an oxbow that was full of water in May but completely dry by 29 June. Areas away from the oxbow are vegetated by arrowweed and tamarisk with sparse canopy.

The northern patch is a mixture of willow and scattered Fremont cottonwood in stringers along channels and ponds. Between the stringers, vegetation is a mix of tamarisk and arrowweed. Water was present in ponds and a small stream in the northern patch throughout the survey season. Agricultural fields border the site to the east.

At Hunter's Hole, we detected 14 willow flycatchers on 18 May, one on 1 June, eight on 12 June, two on 14 June, one on 15 June, and two on 16 June. No flycatchers were detected during the last six surveys. The site was surveyed 12 times, totaling 34.8 observer-hours, and cowbirds were recorded on 11 visits. No livestock use was recorded at the site, but site receives heavy foot traffic by illegal immigrants.

DISCUSSION

In 2003, we found resident, breeding Southwestern Willow Flycatchers at Pahranagat NWR, Mesquite West, Mormon Mesa, Topock Marsh, and Bill Williams River NWR (details presented in Chapters 3 and 4). Although many flycatchers were recorded at 32 of the 38 sites south of Bill Williams until 18 June, with a single detection recorded on 2 July, monitoring results at these sites suggest these flycatchers were not resident, breeding individuals. Based upon the variation in total numbers of flycatchers detected at a particular site over the survey period (e.g., 14 flycatcher detections at Gila River #2 on 11 June, no detections on 20 June), the overall lack of territorial, aggressive behaviors exhibited toward conspecific broadcasts, and the molt patterns exhibited on captured individuals (see Chapter 3 for details), willow flycatchers detected at sites south of Bill Williams in 2003 were most likely northbound migrants. Given that willow flycatchers are one of the last long-distance Neotropical migrant passerines to arrive in the Southwest in spring,[7] the occurrence of migrant flycatchers along the southern stretches of lower Colorado River until the end of June is not surprising. Results at survey sites south of Bill Williams in 2003 are consistent with those of previous years from 1997 to 2001 (McKernan and Braden 2002), with no confirmed nesting recorded since 1938 (Unitt 1987). Residency and breeding status of the flycatcher detected on 18 July at RM 243 in Grand Canyon is undetermined; however, based upon survey results (no detections at the site on eight visits prior to the detection and no detections on subsequent visits after the detection) this individual was most likely not resident at the site for the entire 2003 breeding season.

Although conservative estimates of the total number of flycatchers detected at a site on a particular survey day are presented above, estimating the total number of flycatchers detected at a site throughout the season is problematic. Unless the birds are uniquely color-banded there is no way of determining if the same individuals were observed at a site multiple times or if different individuals were present on subsequent surveys. Although we did initiate color-banding studies at sites south of Bill Williams in 2003 (see Chapter 3), no detections were recorded on subsequent visits to sites where flycatchers were captured and color-banded. Color-banding studies at sites south of Bill Williams will be conducted in subsequent years to better determine residency, breeding status, and movement patterns in this area.

[7] Migrants have been documented as late as 23 June in southern Arizona (Phillips et al. 1964) and resident, wintering individuals have been recorded as far south as Costa Rica until the end of May (Koronkiewicz 2002).