

## CHAPTER 2

# PRESENCE/ABSENCE SURVEYS AND SITE DESCRIPTIONS

---

---

### INTRODUCTION

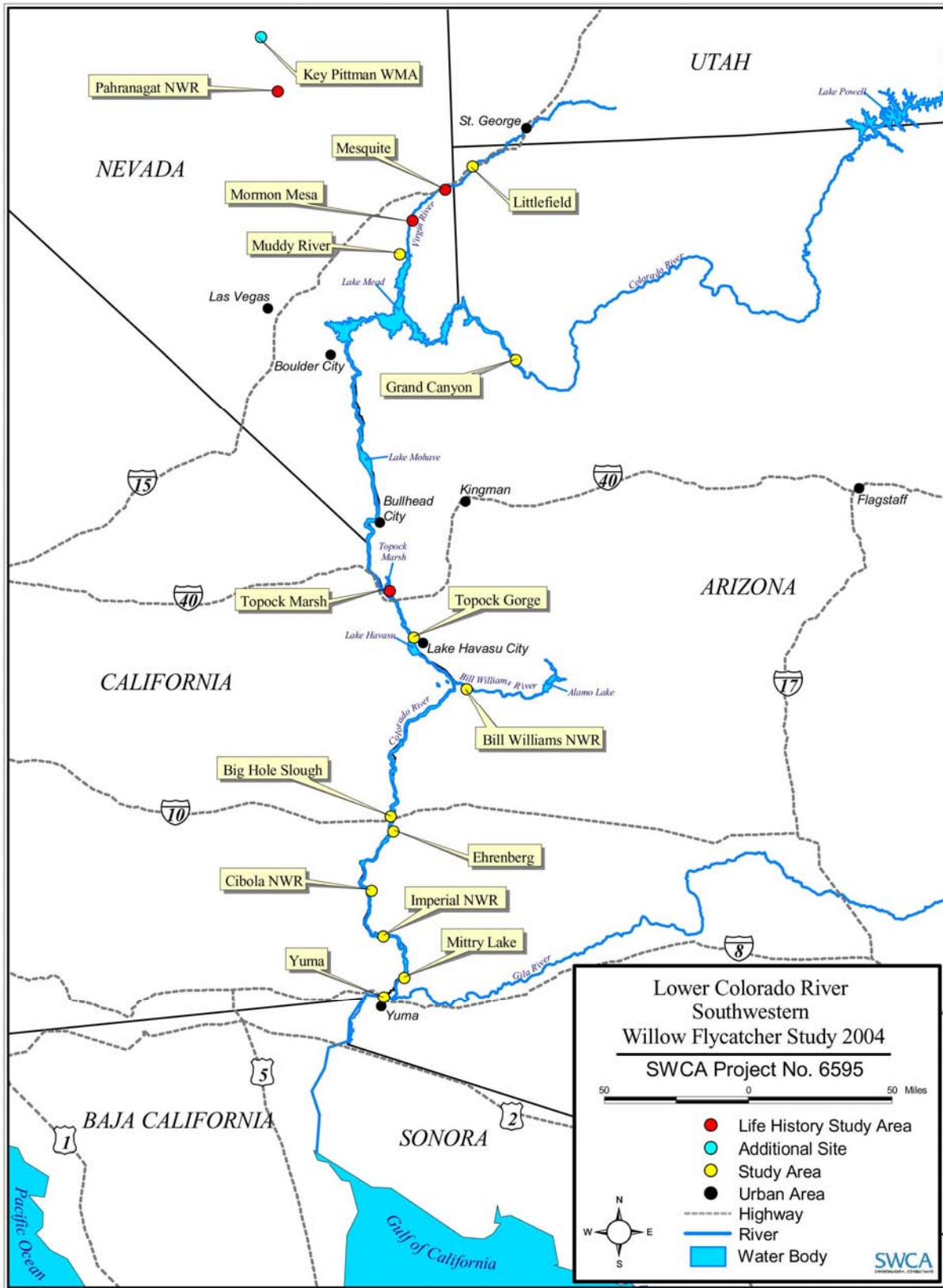
Broadcasts of recorded conspecific vocalizations are useful in eliciting responses from nearby willow flycatchers, and multiple broadcast surveys conducted throughout the breeding season are the standard technique for determining the presence or absence of *E. t. extimus* (Sogge et al. 1997). Willow 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, because 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.<sup>3</sup> 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 because 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 unpubl. 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 2004, 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).

---

<sup>3</sup> 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, 2004. (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. In most areas, we did not survey specifically for these species but recorded all incidental detections. We conducted species-specific surveys for Yellow-billed Cuckoos at two sites within Grand Canyon, at the request of the Grand Canyon National Park.

## **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; Koronkiewicz et al. 2004) and reconnaissance by helicopter, by boat, and on foot prior to the start of the 2004 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. All UTM coordinates in this report are presented in NAD 83 to comply with Federal Geographic Data Committee standards.

### ***BROADCAST SURVEYS***

To elicit responses from nearby willow flycatchers, we broadcast conspecific vocalizations previously recorded throughout the Southwest from 1996 to 1998. All flycatcher surveys were conducted according to methods described in Sogge et al. (1997), and we followed a modification of the 10-survey protocol proposed by Braden and McKernan (1998). We completed at least two surveys between 15 and 30 May, at least two surveys between 1 and 15 June, and six 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 (*breets*). 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*, *whitts*, *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 1,319 observer-hours conducting willow flycatcher broadcast surveys at 92 sites along the Virgin and lower Colorado Rivers and tributaries.<sup>4,5</sup> 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 2004 are shown on orthophotos in Appendix B, along with historically occupied habitat.<sup>6</sup> 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 after 15 June at sites where breeding or residency were not confirmed 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.

---

<sup>4</sup> 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 2004 differed little from previous years.

<sup>5</sup> We started the 2004 survey season with 94 survey sites. Surveys at five sites were discontinued because of loss of habitat to fire, and four sites were discontinued because of poor habitat quality. Seven sites were added to the survey protocol, and two additional sites in Grand Canyon were surveyed opportunistically.

<sup>6</sup> 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, 2004

Study Area <sup>1</sup>	Survey Site	Area (ha)	Number Detected (Date(s) of Detection) <sup>2,3</sup>
PAHR	Pahrnagat North	4.5	32 (11 May–12 August)
	Pahrnagat South	2.4	3 (14 May–6 August)
LIFI	Littlefield North	9.3	3 (26 May–10 August)
	Littlefield South	5.7	ND
MESQ	Mesquite West	18.2	30 (7 May–16 August)
MOME	Mormon Mesa North	15.8	4 (8 May–21 July)
	Mormon Mesa South	35.6	3 (19 May, 8 June, 23 June)
	Virgin River #1	92.6	15 (19 May–30 July)
	Delta West	12.3	5 (13 May–20 July)
MUDD	Overton WMA	12.6	4 (20 May–11 June, 12 July)
GRCA	Separation Canyon	8.0	ND
	RM 243S	1.8	ND
	Spencer Canyon	5.5	ND
	Surprise Canyon	4.8	ND
	Clay Tank Canyon	0.5	ND
	No WIFL Point	0.9	ND
	No WIFL Bay	1.1	ND
	Reference Point Creek	4.2	ND
	RM 257.5N	7.1	ND
	Burnt Springs	11.0	1 (8 and 24 June)
	Quartermaster Canyon	2.8	ND
	RM 260.5N	3.5	ND
	Columbine Falls	7.2	ND
RM 274.5N	11.1	2 (5 June–22 July)	
TOPO	Pipes #1	5.2	1 (15 May)
	Pipes #2	2.8	ND
	Pipes #3	5.7	5 (31 May–8 August)
	PC6-1	4.8	9 (4 June–11 August)
	Pig Hole	1.8	2 (19 May–26 July)
	In Between	8.0	12 (8 May–10 August)
	800M	6.2	4 (11 May–10 August)
	Pierced Egg	6.8	5 (20 May–26 July)
	Swine Paradise	3.7	3 (20 May–3 June)
	Barbed Wire	2.6	1 (25–29 May)
	IRFB03	1.0	ND
	IRFB04	1.5	ND
	Platform	1.3	1 (7–11 May)
	250M	2.3	2 (13 May–7 August)
	Hell Bird	3.7	9 (11 May–25 July)

**Table 2.1.** Willow Flycatcher Detections along the Virgin and Colorado Rivers and Tributaries, 2004, continued

Study Area <sup>1</sup>	Survey Site	Area (ha)	Number Detected (Date(s) of Detection) <sup>2,3</sup>
TOPO	Glory Hole	3.8	10 (11 May–9 August)
	Lost Lake	8.9	1 (8–16 June)
TOGO	Pulpit Rock	1.8	ND
	Picture Rock	5.5	ND
	Blankenship Bend North	27.6	2 (1 June)
	Blankenship Bend South	43.7	1 (27 May)
	Havasu NE	13.6	1 (26 May)
BIWI	Bill Williams Site 1	2.2	1 (27 May–9 June)
	Bill Williams Site 2	3.9	2 (19 May), 1 (9 June)
	Bill Williams Site 11	4.2	1 (15–16 June)
	Bill Williams Site 4	5.8	1 (16 June)
	Bill Williams Site 3	3.7	3 (13 May–5 July)
	Bill Williams Site 5	2.8	1 (30 May)
	Mineral Wash Complex	19.6	1 (23 May)
	Beaver Pond	21.3	3 (21 May), 4 (23 May), 2 (30 May), 2 (10 June), 1 (19 June)
	Bill Williams Site 8	10.3	1 (28 May)
BIHO	Big Hole Slough	16.5	1 (15 May), 3 (25 May), 14 (2 June), 2 (13 June)
EHRE	Ehrenberg	4.7	2 (15 May), 2 (25 May), 1 (2 June)
CIBO	Cibola Site 2	16.4	8 (26 May), 14 (1 June), 2 (11 June)
	Cibola Site 1	7.7	1 (26 May), 2 (1 June), 1 (11 June), 1 (14 June)
	Hart Mine Marsh	31.6	5 (25 May), 3 (1 June)
	Three Fingers Lake	70.2	11 (16 May), 33 (26 May), 6 (31 May), 3 (12 June)
	Cibola Lake #1 (North)	8.5	2 (25 May)
	Cibola Lake #2 (East)	4.5	1 (26 May), 1 (14 June)
	Cibola Lake #3 (West)	7.0	11 (25 May), 6 (1 June)
	Walker Lake	24.0	22 (25 May), 2 (31 May), 12 (9 June)
IMPE	Paradise	6.1	7 (25 May), 3 (31 May), 7 (9 June), 3 (13 June)
	Hoge Ranch	21.8	2 (20 May), 9 (30 May), 16 (2 June), 1 (11 June)
	Adobe Lake	8.2	3 (30 May), 5 (2 June)
	Rattlesnake <sup>4</sup>	1.7	ND
	Norton South <sup>5</sup>	1.5	1 (15 June)
	Picacho NW	11.0	2 (20 May), 4 (28 May), 4 (2 June), 1 (11 June)
	Milemarker 65	10.0	4 (20 May), 1 (28 May), 2 (2 June), 1 (11 June)
	Clear Lake/The Alley	8.3	1 (19 May), 3 (28 May), 1 (11 June)
	Imperial Nursery	1.4	3 (18 May), 3 (29 May), 4 (3 June)
	Ferguson Lake	29.1	2 (21 May), 16 (27 May), 6 (1 June), 3 (10 June)
	Ferguson Wash	6.8	2 (21 May), 6 (1 June), 3 (10 June)
	Great Blue	7.1	7 (17 May), 36 (29 May), 25 (3 June), 12 (10 June), 3 (11 June), 2 (12 June)

**Table 2.1.** Willow Flycatcher Detections along the Virgin and Colorado Rivers and Tributaries, 2004, continued

Study Area <sup>1</sup>	Survey Site	Area (ha)	Number Detected (Date(s) of Detection) <sup>2,3</sup>
IMPE	Powerline	2.1	1 (29 May), 1 (3 June)
	Martinez Lake	4.6	2 (18 May), 1 (29 May), 1 (3 June), 4 (10 June), 1 (24 June)
MITT	Mittry West	4.4	1 (17 May), 5 (27 May), 6 (11 June)
	Mittry South	15.5	15 (30 May), 1 (13 June)
	Potholes East	2.0	1 (18 May), 4 (27 May), 2 (10 June)
	Potholes West	6.6	1 (27 May), 3 (3 June), 2 (10 June)
YUMA	River Mile 33	20.6	11 (31 May), 2 (8 June), 2 (12 June), 1 (13 June)
	Gila Confluence West	5.6	1 (19 May), 9 (30 May), 5 (8 June)
	Gila Confluence North	4.6	5 (18 May), 14 (29 May), 1 (8 June)
	Gila River Site 2	8.1	1 (17 May), 1 (27 May), 4 (8 June)
	Fortuna Site 1 <sup>6</sup>	2.8	ND
	Fortuna North	4.8	5 (27 May), 2 (8 June)
	Gadsden Bend	4.4	8 (18 May), 8 (28 May), 1 (9 June), 2 (13 June), 1 (14 June), 1 (23 July)
	Gadsden	24.3	4 (18 May), 22 (28 May), 3 (9 June)
	Hunter's Hole	16.5	5 (18 May), 37 (30 May), 4 (9 June)

<sup>1</sup> PAHR = Pahrnagat National Wildlife Refuge; LIFI = Littlefield; MESQ = Mesquite West; MOME = Mormon Mesa; MUDD = Muddy River; 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.

<sup>2</sup> ND = no willow flycatchers were detected.

<sup>3</sup> See Chapter 3 for details on territories, residency, pairing, and color-banding; see Chapter 4 for details on nesting activity.

<sup>4</sup> Site first surveyed 16 June.

<sup>5</sup> Site first surveyed 15 June.

<sup>6</sup> Site first surveyed 28 June.

**Table 2.2.** Detections of Willow Flycatchers Recorded after 15 June 2004 at Sites Where Breeding or Residency Was Not Confirmed

Study Area <sup>1</sup>	Site	Date	Comments
IMPE	Martinez Lake	24 June	Lone flycatcher not very responsive or territorial.
YUMA	Gadsden Bend	23 July	Lone flycatcher responded to playbacks

<sup>1</sup> IMPE = Imperial National Wildlife Refuge; YUMA = Yuma.

**Table 2.3.** Yellow-Billed Cuckoo Detections along the Virgin, Lower Colorado, and Gila Rivers, 2004\*

Study Area <sup>1</sup>	Site	Date(s)	Behavioral Observations
PAHR	Pahranagat North	10 July	One silent individual preening and foraging
TOPO	Hell Bird	3 August	Calls heard, one individual
BIWI	Beaver Pond	9 July	One individual perched on high branches, sang primary song once
YUMA	River Mile 33	28 June	Primary song heard
	Hunter's Hole	9 July	Calls heard
		14 July	Calls and primary song heard, two individuals
		23 July	Calls heard

\* Unless otherwise stated, number of individual cuckoos was undetermined.

<sup>1</sup> PAHR = Pahranagat National Wildlife Refuge; TOPO = Topock Marsh; BIWI = Bill Williams River National Wildlife Refuge; YUMA = Yuma.

**Table 2.4.** Yuma Clapper Rail Detections along the Virgin and Lower Colorado Rivers, 2004\*

Study Area <sup>1</sup>	Site	Date(s)	Behavioral Observations
TOPO	Hell Bird	3 August	Counter singing, four individuals
CIBO	Cibola Lake North	14 May	Fly over
	Cibola Lake West	21 July	Calls heard
	Three Fingers Lake	14 May	Fly over
		11, 22 July	Calls heard
IMPE	Ferguson Lake	7 July	Calls heard

\* Unless otherwise stated, number of individuals was undetermined.

<sup>1</sup> TOPO = Topock Marsh; CIBO = Cibola National Wildlife Refuge; IMPE = Imperial National Wildlife Refuge.

**Table 2.5.** Summary of Hydrologic Conditions at Each Survey Site along the Virgin and Lower Colorado Rivers and Tributaries, 2004\*

Study Area <sup>1</sup>	Survey Site	% Site Inundated <sup>2</sup>	Depth (cm) of Surface Water <sup>2</sup>	% Site with Saturated Soil <sup>2,3</sup>	Distance (m) to Surface Water or Saturated Soil <sup>2</sup>
PAHR	Pahranagat North <sup>4</sup>	90/20/10	50/10/10	0/30/10	0/0/0
	Pahranagat South <sup>5</sup>	10/10/10	50/30/50	5/5/0	0/0/0
LIFI	Littlefield North	30/20/20	30/30/50	10/5/20	0/0/0
	Littlefield South	5/5/5	50/30/30	0/0/0	0/0/0
MESQ	Mesquite West	50/10/40	30/10/10	40/40/50	0/0/0



**Table 2.5.** Summary of Hydrologic Conditions at Each Survey Site along the Virgin and Lower Colorado Rivers and Tributaries, 2004\*, continued

Study Area <sup>1</sup>	Survey Site	% Site Inundated <sup>2</sup>	Depth (cm) of Surface Water <sup>2</sup>	% Site with Saturated Soil <sup>2,3</sup>	Distance (m) to Surface Water or Saturated Soil <sup>2</sup>
MOME	Mormon Mesa North	0/0/0	0/0/0	20/0/0	0/0/>30
	Mormon Mesa South	0/0/0	0/0/0	10/5/0	0/0/>100
	Virgin River #1	35/10/0	30/5/0	20/20/0	0/0/>100
	Delta West	80/0/0	30/0/0	20/10/0	0/0/>100
MUDD	Overton WMA	20/30/10	30/70/30	30/20/20	0/0/0
GRCA	Separation Canyon	<1/0/0	<5/0/0	0/0/0	0/0/0
	RM 243S <sup>4</sup>	0/0/2	0/0/30	4/0/0	0/0/0
	Spencer Canyon	15/10/10	15/25/15	25/10/10	0/0/0
	Surprise Canyon	15/5/20	30/--/30	40/3/0	0/0/0
	Clay Tank Canyon <sup>4</sup>	15/5/10	15/--/10	20/2/15	0/0/0
	No Wifl Point <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	No Wifl Bay <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Reference Point Creek <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	RM 257.5N <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Burnt Springs	0/0/0	0/0/0	0/0/0	0/0/0
	Quartermaster Canyon	--/0/0	--/0/0	--/0/0	0/0/0
	RM 260.5N <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Columbine Falls	2/3/10	5/5/--	5/2/0	0/0/0
	RM 274.5N <sup>4</sup>	3/2/4	10/50/--	5/8/6	0/0/0
TOPO	Pipes #1	0/0/0	0/0/0	5/0/0	0/100/100
	Pipes #2	0/0/--	0/0/--	0/0/--	100/100/--
	Pipes #3	80/10/1	30/5/5	20/70/10	0/0/0
	PC6-1	--/5/1	--/5/5	--/95/50	0/0/0
	Pig Hole	--/--/--	--/--/--	--/--/--	--/--/--
	In Between	2/0/--	10/0/--	1/2/--	0/0/--
	800M	--/10/--	--/5/--	--/30/--	--/0/--
	Pierced Egg	20/1/1	10/10/5	60/5/--	0/0/0
	Swine Paradise <sup>6</sup>	0/5/0	0/5/0	15/0/0	0/0/0
	Barbed Wire	0/0/0	0/0/0	10/0/0	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 <sup>6</sup>	--/0/--	--/0/--	--/10/--	0/0/0
	250M <sup>6</sup>	10/1/1	30/5/5	30/--/--	0/0/0
	Hell Bird	50/40/30	30/30/10	40/60/50	0/0/0

**Table 2.5.** Summary of Hydrologic Conditions at Each Survey Site along the Virgin and Lower Colorado Rivers and Tributaries, 2004\*, continued

Study Area <sup>1</sup>	Survey Site	% Site Inundated <sup>2</sup>	Depth (cm) of Surface Water <sup>2</sup>	% Site with Saturated Soil <sup>2,3</sup>	Distance (m) to Surface Water or Saturated Soil <sup>2</sup>
TOPO	Glory Hole	50/30/35	30/30/30	40/60/65	0/0/0
	Lost Lake <sup>6</sup>	10/30/--	10/30/--	50/10/--	0/0/--
TOGO	Pulpit Rock <sup>5</sup>	1/1/1	5/5/5	--/5/5	0/0/0
	Picture Rock <sup>5</sup>	10/10/10	10/10/5	2/2/2	0/0/0
	Blankenship Bend North <sup>5</sup>	20/20/20	30/30/30	10/10/10	0/0/0
	Blankenship Bend South <sup>5</sup>	20/20/20	30/30/30	10/10/10	0/0/0
	Havasu NE <sup>4</sup>	--/0/--	--/0/--	--/0/--	--/0/--
BIWI	Bill Williams Site 1 <sup>4</sup>	5/15/10	10/10/10	10/30/20	0/0/0
	Bill Williams Site 2 <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Bill Williams Site 11 <sup>4</sup>	0/--/--	0/--/--	0/--/--	0/0/0
	Bill Williams Site 4	0/0/0	0/0/0	0/0/0	>100/>100/>100
	Bill Williams Site 3	0/0/0	0/0/0	3/2/2	0/0/0
	Bill Williams Site 5	3/3/0	30/10/0	0/0/2	0/0/0
	Mineral Wash Complex	1/1/0	10/5/0	5/5/0	0/0/>35
	Beaver Pond	30/10/1	30/30/5	10/5/5	0/0/0
	Bill Williams Site 8	--/10/--	--/70/--	--/--/--	0/0/0
BIHO	Big Hole Slough	25/25/25	10/5/--	--/--/--	0/0/0
EHRE	Ehrenberg	1/0/0	5/0/0	1/0/0	0/10/10
CIBO	Cibola Site 2 <sup>7,8</sup>	--/--/--	--/--/--	--/--/--	0/0/0
	Cibola Site 1 <sup>7,8</sup>	--/--/--	--/--/--	--/--/--	0/0/0
	Hart Mine Marsh <sup>7</sup>	30/25/20	70/50/30	4/15/--	0/0/0
	Three Fingers Lake <sup>4</sup>	30/30/30	>100/>100/>100	--/0/--	0/0/0
	Cibola Lake #1 (North) <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Cibola Lake #2 (East) <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Cibola Lake #3 (West) <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Walker Lake <sup>4,6</sup>	0/0/0	0/0/0	0/0/0	0/0/0
IMPE	Paradise <sup>4</sup>	20/0/5	10/0/10	30/5/10	0/0/0
	Hoge Ranch <sup>4</sup>	--/40/45	--/10/15	--/0/--	0/0/0
	Adobe Lake <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Rattlesnake	--/0/--	--/0/--	--/25/--	--/0/--
	Norton South <sup>6</sup>	--/15/10	--/10/30	--/--/15	--/0/0
	Picacho NW <sup>4</sup>	1/0/0	5/0/0	6/0/0	0/30/30
	Milemarker 65 <sup>4</sup>	0/0/0	0/0/0	--/0/--	0/0/0

**Table 2.5.** Summary of Hydrologic Conditions at Each Survey Site along the Virgin and Lower Colorado Rivers and Tributaries, 2004\*, continued

Study Area <sup>1</sup>	Survey Site	% Site Inundated <sup>2</sup>	Depth (cm) of Surface Water <sup>2</sup>	% Site with Saturated Soil <sup>2,3</sup>	Distance (m) to Surface Water or Saturated Soil <sup>2</sup>
IMPE	Clear Lake/The Alley <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Imperial Nursery	0/0/20	0/0/0	0/0/5	40/40/0
	Ferguson Lake <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Ferguson Wash <sup>4</sup>	0/0/--	0/0/--	0/--/--	0/0/0
	Great Blue <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Powerline <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Martinez Lake <sup>4</sup>	0/0/0	0/0/0	0/2/0	0/0/0
MITT	Mittry West	70/5/15	30/30/30	30/40/20	0/0/0
	Mittry South <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Potholes East <sup>7</sup>	30/30/30	--/--/--	0/0/0	0/0/0
	Potholes West <sup>7</sup>	20/20/20	>100/>100/ >100	0/0/0	0/0/0
YUMA	River Mile 33	10/2/5	40/10/--	1/25/15	0/0/0
	Gila Confluence West <sup>4</sup>	1/0/0	5/0/0	0/0/0	0/0/0
	Gila Confluence North <sup>4</sup>	15/0/0	30/0/0	10/15/0	0/0/0
	Gila River Site 2 <sup>4</sup>	0/0/0	0/0/0	2/0/0	0/0/0
	Fortuna Site 1	--/--/15	--/--/30	--/--/15	--/--/0
	Fortuna North <sup>4</sup>	0/0/0	0/0/0	0/0/0	0/0/0
	Gadsden Bend	0/5/15	0/10/--	0/10/--	0/0/0
	Gadsden <sup>4</sup>	5/5/5	30/50/50	0/0/0	0/0/0
	Hunter's Hole	7/10/15	30/70/50	2/0/2	0/0/0

\* Values are given for each site as recorded in mid-May, mid-June, and mid-July.

<sup>1</sup> PAHR = Pahrnatag National Wildlife Refuge; LIFI = Littlefield; MESQ = Mesquite West; MOME = Mormon Mesa; MUDD = Muddy River; 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.

<sup>2</sup> -- = Hydrologic information not recorded.

<sup>3</sup> Percent of site with saturated soil does not include inundated areas.

<sup>4</sup> Site bordered by a river or lake.

<sup>5</sup> Site not surveyed until July.

<sup>6</sup> Site borders marsh.

<sup>7</sup> Site borders canal.

<sup>8</sup> Site contains cattail marshes, but hydrologic conditions within marshes unknown.

### ***PAHRNATAG NATIONAL WILDLIFE REFUGE, NEVADA***

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

## **PAHRANAGAT NORTH**

Area: 4.5 ha

Elevation: 1,026 m

UTM 665800E 4130979N

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 approximately 1 m of water in mid-May and became progressively drier through the flycatcher breeding season. By mid-June only half the site had standing water, and only 10% of the site was inundated by late July.

We located 24 resident, breeding willow flycatchers at Pahranagat North. We detected two additional territorial flycatchers and six additional flycatchers for which residency or breeding status could not be determined. 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 a cattle pasture, but livestock have access only to the cottonwood stringer on the northwest corner of the lake. Brown-headed Cowbirds were detected only once during surveys.

## **PAHRANAGAT SOUTH**

Area: 2.4 ha

Elevation: 1,023 m

UTM 666691E 4128034N

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 cottonwoods reach approximately 20 m in height, while the willows are generally less than 10 m. 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 territorial flycatcher was detected 16 May–11 June. 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 two surveys in May.

## ***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: 774264E 4087820N

This mixed-native site is a stand of mature Fremont cottonwood with an understory of willow, tamarisk, and Russian olive. Stands of cattail (*Typha* sp.) and arrowweed (*Pluchea sericea*) are also present. The site extends from the I-15 bridge over the Virgin River upstream to the confluence of the Virgin River and Beaver Dam Wash and up Beaver Dam Wash approximately 250 m to a golf course. Canopy height is 10–15 m, and overall canopy closure is 25–50%. The site had standing water and saturated soil throughout the survey period.

We detected two resident, breeding willow flycatchers and one additional territorial flycatcher at Littlefield North. Details of occupancy, color-banding, and breeding are presented in Chapters 3 and 4. Areas of Littlefield North not known to be occupied by flycatchers were surveyed 11 times throughout the breeding season, totaling 18.0 observer-hours. Cowbirds were recorded on all but two visits, and there was no sign of livestock use.

## **LITTLEFIELD SOUTH**

Area: 5.7 ha

Elevation: 543 m

UTM: 774284E 4087358N

This mixed-native site extends along the Virgin River for 550 m immediately downstream from the I-15 bridge and encompasses a backwater area. Vegetation in the area is primarily an overstory of cottonwood and willow 6 m in height mixed with tamarisk 3 m in height. The site also contains areas of cattail, arrowweed, and seep willow (*Baccharis salicifolia*). Overall canopy closure is 25–50%. The only water within the survey area was within the Virgin River channel.

We did not detect willow flycatchers at Littlefield South. We surveyed the site 11 times, totaling 15.3 observer-hours. Cowbirds were recorded on 10 visits, and there was no sign of livestock use.

## ***MESQUITE, NEVADA***

### **MESQUITE WEST**

Area: 18.2 ha

Elevation: 470 m

UTM: 757960E 4075481N

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 interspersed 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.

We located 24 resident, breeding willow flycatchers at Mesquite West and detected an additional 6 individuals for which occupancy could not be determined. Details of occupancy, color-banding, and breeding are presented in Chapters 3 and 4. Areas of Mesquite West not known to be occupied by flycatchers were surveyed throughout the breeding season. Cowbirds were detected on all but one survey. Cattle sign (tracks and dung) was noted on the periphery of the site, but no evidence of livestock use was observed on portions of Mesquite West occupied by breeding flycatchers.

### ***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 exotic 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: 739706E 4058088N

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 and to the east by the active channel of the Virgin River. From the 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 muddy in mid-May but had completely dry soils by mid-June. The active channel of the Virgin River contained flowing water in May and June but was dry by mid-July. Canopy height in Mormon Mesa North is generally 4–5 m and extends to 8 m where willow is present. Canopy closure is approximately 70–90%.

We found one breeding pair at Mormon Mesa North and detected two additional flycatchers. Details of occupancy, breeding activity, and color-banding are presented in Chapters 3 and 4. Portions of the site not known to be occupied were surveyed throughout the breeding season, totaling 23.8 observer-hours.

#### **MORMON MESA SOUTH**

North half: Area: 24.0 ha      Elevation: 385 m                      UTM: 739505E 4057375N  
South half: Area: 11.6 ha      Elevation: 385 m                      UTM: 739387E 4056872N

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 along the eastern edge of the southern half of the site. Canopy height of the willows is approximately 6–8 m. Canopy closure varies throughout the site, averaging around 50%. This site did not contain any standing water during the survey season of 2004.

We detected three willow flycatchers in the northern half of Mormon Mesa South, one each on 19 May and 8 and 23 June. Details of occupancy and color-banding are presented in Chapter 3. No other flycatchers were detected in 10 surveys totaling 43.1 observer-hours.

### **VIRGIN RIVER #1**

North half: Area: 43.3 ha	Elevation: 380 m	UTM: 739264E 4056219N
South half: Area: 49.3 ha	Elevation: 380 m	UTM: 739272E 4055493N

Virgin River #1 was also divided into two contiguous areas to facilitate streamlining of field logistics: Virgin River #1 North and Virgin River #1 South. Virgin River #1 North contains both tamarisk and willow habitats. The western half of Virgin River #1 North contains dense tamarisk 4 m in height and the eastern half is a mixture of tamarisk, Goodding willow, and coyote willow with cattails in the understory. Canopy height in the willow areas is approximately 10 m. Canopy closure throughout the site is approximately 70%. The willow areas had standing water up to 40 cm deep in mid-May and 5 cm deep in mid-June but were completely dry by mid-July.

We located four breeding pairs of willow flycatchers in the eastern half of Virgin River #1 North. We detected seven additional flycatchers for which occupancy or breeding status could not be determined. Details of occupancy, color-banding, and breeding activity are presented in Chapters 3 and 4. Portions of the site not known to be occupied were surveyed 14 times throughout the breeding season, totaling 40.3 observer-hours.

Virgin River #1 South was surveyed throughout the season, although it represents poor willow flycatcher habitat. This area is primarily tamarisk approximately 4 m in height with many dry, open areas. Canopy closure in vegetated areas is approximately 80%. The northeastern portion of Virgin River #1 South contains a few Goodding willow. This portion of the site had standing water in May and saturated soils in June, but all of Virgin River #1 South was dry by mid-July. Virgin River #1 South was surveyed 14 times, totaling 29.6 observer-hours. No flycatchers were detected.

### **VIRGIN RIVER #2**

Area: 67.2 ha	Elevation: 380 m	UTM: 738919E 4054757N
---------------	------------------	-----------------------

Site reconnaissance and a single survey were completed at this site on 3 June and confirmed the assessment made in 2003 that this area is poor willow flycatcher habitat. The site is primarily a monotypic stand of tamarisk 4 m in height with 50–70% canopy closure. Occasional, small patches of willow are also present in this site. Canopy height within the willow patches is approximately 10 m. There was no standing water or saturated soils within the site during the survey on 3 June, and no additional surveys were completed at this site in 2004.

## **DELTA WEST**

Area: 12.3 ha

Elevation: 370 m

UTM: 738165E 4047565N

This site is approximately 7 km downstream of Virgin River #2 and in some previous years was called Virgin River Delta #4. 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 and overall canopy closure is around 70%. Most (80%) of 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 pairs of willow flycatchers in Delta West and detected an additional flycatcher from 6 to 10 June. Details of occupancy, color-banding, and nesting are presented in Chapters 3 and 4. Field personnel spent 18.1 observer-hours surveying unoccupied portions of the site throughout the breeding season.

## ***MUDDY RIVER, NEVADA***

### **OVERTON WILDLIFE MANAGEMENT AREA**

Area: 12.6 ha

Elevation: 378 m

UTM: 731540E 4044648N

The Overton Wildlife Management Area is at the inflow of the Muddy River into the Overton Arm of Lake Mead. This site was surveyed in previous years by USBR biologists. Vegetation is dominated by very dense tamarisk approximately 4 m in height with canopy closure of 70–90%. The site also contains a small patch of coyote willow. The Muddy River bisects the site, and cattails border the stream in some areas. Flowing water was present in the Muddy River throughout the survey season.

We detected one territorial flycatcher and three additional flycatchers for which occupancy could not be determined. We did not detect pairing or breeding behavior at this site. Details of occupancy and color-banding are presented in Chapter 3. This site was surveyed 11 times, totaling 23.8 observer-hours. Cowbirds were detected on 9 of the 11 surveys, and no evidence of livestock use was observed at the site.

## ***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 four 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. Livestock do not use any of the survey sites within Grand Canyon.

#### **SEPARATION CANYON (RM 239.5N)**

Area: 8.0 ha

Elevation: 378 m

UTM: 810231E 3970376N

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 section that had surface water in May. Seep willow dominates the understory near the mouth of the canyon, while young coyote willow (1–3 m in height) dominates the understory farther up the canyon. Mesquite trees (*Prosopis* sp.) are also present at this site.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 9.8 observer-hours.

#### **RM 243S**

Area: 1.8 ha

Elevation: 366 m

UTM: 805683E 3971830N

This site lies immediately adjacent to the Colorado River and is vegetated by dense tamarisk 5 m in height. Canopy closure is 70–90%. A dry wash draining a narrow side canyon cuts through the downstream end of the site. A small pool was present periodically throughout the survey season near the confluence of this wash with the Colorado River.

We detected no willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 7.3 observer-hours.

#### **SPENCER CANYON (RM 246S)**

Area: 5.5 ha

Elevation: 366 m

UTM: 802710E 3969485N

This mixed-native site consists of a patch of dense tamarisk approximately 5 m in height bordering the Colorado River and stringers of cottonwood and willow along Spencer Creek, which is perennial. Fremont cottonwood and willow form an overstory of variable height, and willow and tamarisk are present in the understory. Portions of the stream are lined with cattails and seep willow, and overall canopy closure is around 70%.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 12.6 observer-hours.

### **SURPRISE CANYON (RM 248.5N)**

Area: 4.8 ha

Elevation: 365 m

UTM: 801880E 3973132N

This mixed-exotic site consists of stringers of tamarisk and coyote willow along both sides of an intermittent stream in the bottom of a narrow canyon. The stream contained pools of water throughout the survey season but did not have a continuous, aboveground flow. Canopy height is approximately 4 m, and overall canopy closure is 25–50%. Small stands of cattails surround some of the pools, particularly near the mouth of the canyon.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed nine times, totaling 7.5 observer-hours.

### **CLAY TANK CANYON (RM 249S)**

Area: 0.5 ha

Elevation: 363 m

UTM: 800936E 3973719N

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. Tamarisk at this site ranges from 3 to 5 m in height, and overall canopy closure is around 70%.

We did not detect willow flycatchers or Brown-headed Cowbirds at this site. The site was surveyed 10 times, totaling 2.5 observer-hours.

### **NO WIFL POINT (RM 249.5S)**

Area: 0.9 ha

Elevation: 363 m

UTM: 800744E 3974111N

This mixed-exotic site consists of a narrow (20–40 m) band of tamarisk 3 m in height with seep willow bordering the site along the river. Canopy closure is approximately 50%. No standing water or saturated soils occurred in the site during the survey season, but the site borders the Colorado River.

No willow flycatchers or Brown-headed Cowbirds were detected at this site. The site was surveyed nine times, totaling 3.4 observer-hours.

### **NO WIFL BAY (RM 249.5N)**

Area: 1.1 ha

Elevation: 363 m

UTM: 800790E 3974368N

This mixed-exotic site borders the Colorado River and consists of a narrow (20–40 m) band of tamarisk 3 m in height with seep willow bordering the edge of the site along the river and arrowweed scattered throughout the site. No standing water or saturated soils occurred in the site during the survey season, and the site is elevated approximately 3 m above the Colorado River. Canopy closure is approximately 50%.

No willow flycatchers or Brown-headed Cowbirds were detected at this site. The site was surveyed nine times, totaling 4.5 observer-hours.

#### **REFERENCE POINT CREEK (RM 252S)**

Area: 4.2 ha

Elevation: 360 m

UTM: 7964871E 3976288N

This site, at the confluence of Reference Point Creek with the Colorado River, is vegetated almost entirely by tamarisk 4 m in height, and a dry, backwater pond in part of the site is growing in with young tamarisk. Open, grassy areas occur in the center of the site. 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 at this site. Cowbirds were detected on 2 of the 10 visits, which totaled 18.2 observer-hours.

#### **RM 257.5N**

Area: 7.1 ha

Elevation: 360 m

UTM: 794199E 3982463N

This mixed-exotic site borders the Colorado River. Immediately adjacent to the river, vegetation is primarily a thin band of dying willow approximately 5 m in height. Behind the willow, the site is dominated by dense tamarisk 3–4 m in height. The site was dry throughout the survey season and was elevated approximately 3 m above the level of the river. Vegetation throughout the site, particularly in the northern half of the site, is dead or dying. Canopy closure at the site is approximately 60%.

We did not detect willow flycatchers or Brown-headed cowbirds at this site. The site was surveyed 11 times, totaling 20.4 observer-hours.

#### **BURNT SPRINGS (RM 259.5N)**

Area: 11.0 ha

Elevation: 363 m

UTM: 793321E 3985796N

Vegetation within the first 200 m of Burnt Springs Canyon upstream from the Colorado River consists of monotypic tamarisk approximately 4 m in height. The next 150 m of the canyon is vegetated by very young tamarisk. This is followed by an approximately 700-m stretch of mature Goodding willow 15 m in height with an understory of cattails. Canopy closure is approximately 70–90%. No standing water was noted at the site, but the presence of live cattails suggests recent inundation or subsurface water.

We detected a willow flycatcher at this site on 8 and 24 June. Biologists from the Hualapai Department of Natural Resources reported detecting a flycatcher at this site on 28 May. The site was surveyed 11 times, totaling 26.9 observer-hours. Brown-headed Cowbirds were recorded on seven visits.

### **QUARTERMASTER CANYON (RM 260S)**

Area: 2.8 ha

Elevation: 360 m

UTM: 792228E 3985130N

This mixed-exotic site lies at the confluence of the Colorado River and Quartermaster Canyon. Vegetation along the river is predominately tamarisk 4 m in height, and canopy height decreases with distance from the river. There is a patch of dying Goodding willow that occupies approximately 5% of the site, and dry cattail marshes occupy 10% of the site. Soils at the site were dry throughout the survey season. Canopy closure is approximately 50%.

We did not detect willow flycatchers at this site. The site was surveyed 10 times, totaling 11.2 observer-hours. Brown-headed Cowbirds were detected on two visits.

### **RM 260.5N**

Area: 3.5 ha

Elevation: 354 m

UTM: 791476E 3985765N

This site borders the Colorado River and stands about 3 m above the river level. 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 50%.

We did not detect willow flycatchers at this site. The site was surveyed nine times, totaling 12.8 observer-hours. Brown-headed Cowbirds were detected on six visits.

### **COLUMBINE FALLS (RM 274.5S)**

Area: 7.2 ha

Elevation: 354 m

UTM: 777043E 3998961N

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 5–10% of the site had shallow, standing water or saturated soil throughout the survey season. Vegetation at the site is a mix of willow 5–6 m in height and tamarisk 2–3 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 15.1 observer-hours. Brown-headed Cowbirds were detected on three visits.

### **RM 274.5N**

Area: 11.1 ha

Elevation: 354 m

UTM: 777054E 3999649N

This mixed-exotic site lies immediately adjacent to the Colorado River and contains seeps and small creeks. Approximately 10% of the site contained saturated soil or standing water up to 50 cm 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 50%.

We detected one breeding pair of willow flycatchers at this site. Details of occupancy, color-banding, and nesting are presented in Chapters 3 and 4. Portions of the site not known to be occupied by flycatchers were surveyed 11 times, totaling 31.1 observer-hours. Brown-headed Cowbirds were detected on nine visits.

#### **OTHER SURVEY AREAS**

The Strip (RM 247N): Area: 0.8 ha    Elevation: 366 m    UTM: 802215E 3970878N

This site is between Spencer and Surprise Canyons and was surveyed on 20 June and 2 and 5 July, totaling 0.9 observer-hour. The site consists of a strip of tamarisk with an understory of arrowweed. Overall canopy closure is approximately 70%. No surface water was present in the site, though the site borders the Colorado River. This site was surveyed opportunistically in the middle of the flycatcher survey season.

Dry Falls (RM 251N): Area: 1.5 ha    Elevation: 362 m    UTM: 798669E 3975513N

This mixed-exotic site was surveyed on 20 June and 1 and 5 July, totaling 2.7 observer-hours. Habitat at the site consists of tamarisk approximately 6 m in height with an understory of arrowweed. Canopy closure is approximately 70%. Seep willow borders the edge of the site closest to the river. No surface water was present at the site. This site was surveyed opportunistically in the middle of the flycatcher survey season.

RM 262.5S: Area: 12.8 ha    Elevation: 354 m    UTM: 789924E 3989460N

Surveys at this site were discontinued after three visits. Vegetation at the site consists primarily of dead tamarisk and willow, with a narrow (2-m) strip of live vegetation along the river. Canopy closure within areas of live vegetation is 70–90%. Cowbirds were detected on two of the three surveys.

Tincanebitts: Area: 7.2ha    Elevation: 354 m    UTM: 790055E 3990748N

This site consists of patches of tamarisk 3–5 m in height separated by areas of dead willows. Canopy closure is 25–50%. No surface water was present at the site. Reconnaissance of the site on 28 May and 4 June did not reveal potential flycatcher habitat and surveys were discontinued.

RM 268N: Area: 7.2 ha    Elevation: 354 m    UTM: 784433E 3994079N

Surveys at this site were discontinued after two visits because most vegetation at the site is dead. The majority of the vegetation consists of brittle tamarisk 3 m in height, large areas of dead cattails, and dead willows. The site contained no surface water, and cowbirds were detected on one visit.

## **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. No cattle were present, but feral pigs frequented all areas surveyed.

### **PIPES**

Pipes #1: Area: 5.2 ha	Elevation: 140 m	UTM: 726906E 3856907N
Pipes #2: Area: 2.8 ha	Elevation: 140 m	UTM: 726959E 3856717N
Pipes #3: Area: 5.7 ha	Elevation: 140 m	UTM: 727012E 3856517N

These three contiguous sites are vegetated primarily by monotypic tamarisk 5–7 m in height, and canopy closure generally exceeds 70%. The northern edge of Pipes #1 has larger stems and taller canopy than the rest of Pipes and has little deadfall. The central and southern portions of Pipes #1 have many dead stems and clusters of fallen trees. Pipes #2 is very dense, with most stems <3 cm in diameter, and large, impenetrable areas of deadfall are present within the site. Pipes #1 and Pipes #2 had dry soil throughout the survey season. Pipes #3, particularly the southern portion of the site, contained the wettest areas and had small, marshy openings. All of Pipes #3 had standing water or saturated soil in mid-May. Much of the standing water was gone by mid-June, and by mid-July only 10% of the site had saturated soils.

We detected one willow flycatcher at Pipes #1 on 15 May. Five willow flycatchers, all of which were in breeding pairs, were detected in Pipes #3. Details of color-banding, occupancy, and breeding are presented in Chapters 3 and 4. Surveys of Pipes #2 were discontinued on 27 June after five surveys totaling 7.0 observer-hours because of poor habitat quality. Portions of Pipes #1 and #3 not known to be occupied by flycatchers were surveyed 10 and 11 times, respectively, totaling 34.1 observer-hours. Multiple Brown-headed Cowbirds were detected on almost all visits to Pipes.

### **PC6-1**

Area: 4.8 ha	Elevation: 140 m	UTM: 727235E 3855838N
--------------	------------------	-----------------------

This mixed-exotic site has a scattered overstory of Goodding willow approximately 10 m in height, a continuous mid-story of tamarisk 6–7 m in height, and patches of arrowweed and cattails in the understory. The portion of the site within approximately 50 m of the refuge road is very dry with thick stands of arrowweed. The portion of the site with marshy areas and willows is approximately 100 m from the refuge road. This part of PC6-1 had standing water or saturated

soil throughout the survey season. Canopy closure in the interior of the site is approximately 90%, while canopy closure on the periphery of the site near the road is about 50%.<sup>7</sup>

In PC6-1, we detected nine willow flycatchers, of which eight were members of breeding pairs. Details of color-banding, occupancy, and nesting are presented in Chapters 3 and 4. Portions of PC6-1 not known to be occupied by willow flycatchers were surveyed 10 times, totaling 16.8 observer-hours. Multiple cowbirds were recorded on all but one visit.

### **PIG HOLE**

Area: 1.8 ha                      Elevation: 140 m                      UTM: 727242E 3855395N

Pig Hole is between PB2001 (see Other Survey Areas, below) and In Between. This was not a survey site at the beginning of the season, but a new site was delineated when breeding birds were discovered outside of existing survey sites. The site is monotypic tamarisk 5–6 m in height with canopy closure 70–90%. This site was not formally surveyed but was visited every 2–4 days for territory and nest monitoring.

We detected two willow flycatchers (one breeding pair) in Pig Hole. Details of color-banding and nesting are presented in Chapters 3 and 4.

### **IN BETWEEN AND 800M**

In Between: Area: 8.0 ha      Elevation: 140 m                      UTM: 727038E 3855165N  
800M:            Area: 6.2 ha      Elevation: 140 m                      UTM: 726883E 3854997N

These two contiguous sites consist of approximately 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 late June the swamps had largely dried out.

We located 12 breeding adults at In Between and 4 breeding adults in 800M. Details of pairing, occupancy, color-banding, and nesting are presented in Chapters 3 and 4. Brown-headed Cowbirds were detected at these sites during the entire season.

### **PIERCED EGG**

Area: 6.8 ha                      Elevation: 140 m                      UTM: 726668E 3855001N

This mixed-exotic site borders the western edge of 800M and consists of dense tamarisk 7 m in height with a scattered overstory of Goodding willow 15 m in height. Areas with willows tend to

---

<sup>7</sup> Surveys of this site were discontinued during the 2003 breeding season because field personnel evaluated only the portion of the site within 50 m of the road, and the habitat in that portion was unsuitable for flycatchers.

have a more open understory and contain patches of cattails. Overall canopy closure is approximately 90%. Approximately 20% of the site was inundated in May, but only a few puddles remained by mid-July. The northern portion of the site is drier than the southern portion and contains stands of dense arrowweed.

We detected five willow flycatchers at Pierced Egg. Details of occupancy, color-banding, and nesting are presented in Chapters 3 and 4. Brown-headed Cowbirds were detected at this site throughout the breeding season.

### **SWINE PARADISE**

Area: 3.7 ha

Elevation: 140 m

UTM: 726247E 3854460N

This mixed-exotic 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 5–7 m in height. Overall canopy closure is approximately 90%.

We detected three willow flycatchers at Swine Paradise. Details of occupancy are presented in Chapter 3. We surveyed the site 10 times, totaling 11.6 observer-hours. Cowbirds were detected on nine visits.

### **BARBED WIRE**

Area: 2.6 ha

Elevation: 140 m

UTM: 726155E 3854547N

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 but dry by mid-June.

We detected one willow flycatcher at this site. Details of occupancy are presented in Chapter 3. We surveyed the site nine times, totaling 10.5 observer-hours. Cowbirds were detected on eight visits.

### **IRFB03 AND IRFB04**

IRFB03: Area: 1.0 ha

Elevation: 140 m

UTM: 725948E 3854349N

IRFB04: Area: 1.5 ha

Elevation: 140 m

UTM: 725944E 3854243N

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, and lower branches and the ground are covered with thick layers of tamarisk duff. Soils within these sites were completely dry throughout the survey season. These sites are separated from the Barbed Wire site by a firebreak road.



We did not detect willow flycatchers at these sites. We surveyed these sites 10 times, totaling 9.1 observer-hours. Cowbirds were detected on five visits.

### **PLATFORM**

Area: 1.3 ha

Elevation: 140 m

UTM: 725831E 3853980N

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. Overall canopy closure is approximately 70%. 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 from 7 to 11 May, but no willow flycatchers were detected on 10 subsequent surveys, totaling 3.2 hours. Cowbirds were detected on two visits.

### **250M**

Area: 2.3 ha

Elevation: 140 m

UTM: 725849E 3853499N

This site lies between the main refuge road and the open marsh. Vegetation composition and structure varies with distance from the marsh. Closest to the refuge road the site is very dry and is dominated by mesquite trees with an understory of arrowweed. The center of the site is dominated by tamarisk approximately 7 m in height. Closest to the marsh, the site contains patches of coyote willow and one large Goodding willow. Canopy closure within the site generally exceeds 70%. Approximately 40% of the site contained saturated soil or standing water in May. The water receded throughout the breeding season, and by mid-July only 1% of the site had standing water.

We detected two willow flycatchers (one breeding pair) in 250M. Portion of the site not known to be occupied by flycatchers were surveyed seven times, totaling 9.3 observer-hours. Cowbirds were detected on four surveys.

### **HELL BIRD AND GLORY HOLE**

Hell Bird: Area: 3.7 ha

Elevation: 140 m

UTM: 725833E 3853252N

Glory Hole: Area: 3.8 ha

Elevation: 140 m

UTM: 725702E 3853064N

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. Canopy closure ranges from 50 to 90%. Swampy areas vegetated by cattail and bulrush are interspersed throughout the survey areas. The survey areas are bordered on the west by a sand dune and on other sides by dense bulrush.

We recorded 10 willow flycatchers in Glory Hole and 9 flycatchers in Hell Bird. Details of occupancy, color-banding, and nesting activity are presented in Chapters 3 and 4.

## **LOST LAKE**

Area: 8.9 ha

Elevation: 140 m

UTM: 727677E 3847125N

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. Marshy areas lie to the east, and Lost Lake (a 200 × 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 of an overstory of planted cottonwoods 10 m in height, with an understory of tamarisk 5 m in height. Many of the cottonwoods appear to be dying. 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. Overall canopy closure is approximately 70%. 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 detected one willow flycatcher at Lost Lake. Details of occupancy and color-banding are presented in Chapter 3. We surveyed the site 10 times, totaling 15.5 observer-hours. Cowbirds were detected on seven visits.

## **OTHER SURVEY AREAS**

PB2001: Area: 3.9 ha

Elevation: 140 m

UTM: 727331E 3855625N

This mixed-exotic site immediately south of PC6-1 was explored and surveyed twice in May. Surveys were discontinued after 30 May because the habitat consisted of dry tamarisk and dense stands of arrowweed. Exploration south of active nests on the southern edge of PC6-1 in July also revealed stands of short, dense tamarisk. The few Goodding willows within the site were dying and dropping their limbs.

## ***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 little vegetation grows along the river. We surveyed backwater areas that support marsh and riparian vegetation.

## **PULPIT ROCK**

Area: 1.8 ha

Elevation: 156 m

UTM: 734071E 3838579N

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 Goodding 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 primarily dry throughout the survey period.

We did not detect any willow flycatchers at this site. We surveyed the site eight times, totaling 3.3 observer-hours. Cowbirds were detected on one visit. No livestock use at the site was recorded.

### **PICTURE ROCK**

Area: 5.5 ha

Elevation: 138 m

UTM: 734563E 3833738N

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. Canopy closure within the site is 70–90%. 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.

We did not detect any willow flycatchers at this site. We surveyed the site nine times, totaling 7.5 observer-hours. Cowbirds were detected on four visits. Feral pigs and burros use the site and adjacent uplands.

### **BLANKENSHIP BEND**

Blankenship Bend North: Area: 27.6 ha Elevation: 138 m UTM: 736550E 3832763N

Blankenship Bend South: Area: 43.7 ha Elevation: 133 m UTM: 736642E 3831470N

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 detected two flycatchers at Blankenship Bend North on 1 June and 1 flycatcher at Blankenship Bend South on 27 May. We surveyed the site eight times, totaling 11.8 observer-hours. Cowbirds were detected on three visits. Feral pigs, bighorn sheep, and burros use the site and adjacent uplands.

### **HAVASU NE**

Area: 13.6 ha

Elevation: m

UTM: 741191E 3823825N

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. Canopy closure is approximately 50%. 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 one willow flycatcher at Havasu NE on 26 May. No breeding behavior was observed, and no other flycatchers were detected on nine surveys totaling 9.5 hours. Cowbirds were detected on six visits. Feral pigs and burros were observed at the site.

#### **OTHER SURVEY AREAS**

Topock Gorge North: Area: 3.8 ha    Elevation: 136 m    UTM: 736573E 3828921N

Topock Gorge South: Area: 2.6 ha    Elevation: 140 m    UTM: 736873E 3828642N

These sites burned between the 2003 and 2004 survey seasons and were not surveyed in 2004.

#### ***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. Livestock (cattle) were present only at the two most upstream survey sites (Beaver Pond and Site #8). Survey sites within Bill Williams are listed below from west to east, moving progressively farther upstream. All survey sites at Bill Williams that are influenced by water levels in the Bill Williams River were noticeably drier during the 2004 survey season than in 2003.

#### **BILL WILLIAMS SITE #1**

Area: 2.2 ha

Elevation: 140 m

UTM: 768913E 3798508N

This mixed-native site has an overstory of large Goodding willow and Fremont cottonwood 15 m in height 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. The site contains large quantities of downed wood, and some of the overstory trees have dropped large branches, creating gaps in the canopy. Overall canopy closure is <50%. Approximately 5% of the site was inundated in mid-May. Water levels rose in mid-June, at which time about 30% of the site was under ankle-deep water. The site got progressively drier through the remainder of the summer, with approximately 10% of the site inundated in mid-July.

We detected one willow flycatcher at Site #1 from 27 May to 9 June. Details of occupancy of all flycatchers at Bill Williams are presented in Chapter 3. Site #1 was surveyed nine times, totaling 11.0 observer-hours.

#### **BILL WILLIAMS SITE #2**

Area: 3.9 ha

Elevation: 140 m

UTM: 769062E 3798260N

This mixed-native site has an overstory of large Goodding willow and Fremont cottonwood trees up to 12 m in height and an understory of tamarisk 5 m in height. Soil within the site was dry throughout the survey season, and many branches and overstory trees had fallen since the 2003

survey season. Overall canopy closure is approximately 50%. Cattail marshes within the site were mostly dry and dead. The site is bordered on the southwest by a narrow channel of open water where an arm of Lake Havasu follows the channel of the Bill Williams River. The site is accessible by kayak.

We detected three willow flycatchers on the opposite side of the channel from Site #2. Details of occupancy are presented in Chapter 3. The site was surveyed eight times, totaling 11.3 observer-hours. Each detection location was also visited three times following the initial detection, with no further detections. Cowbirds were recorded on all visits.

### **BILL WILLIAMS SITE #11**

Area: 4.2 ha                      Elevation: 140 m                      UTM: 769331E 3797914N

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, though standing water was present in a narrow channel where an arm of Lake Havasu follows the channel of the Bill Williams River. The site is accessible by kayak.

We detected one willow flycatcher at the site on 15–16 June. The site was surveyed eight times, totaling 5.1 observer-hours. Cowbirds were recorded on five visits.

### **BILL WILLIAMS SITE #4 AND SITE #3**

Site #4: Area: 5.8 ha                      Elevation: 140 m                      UTM: 769652E 3797492N  
Site #3: Area: 3.7 ha                      Elevation: 140 m                      UTM: 769819E 3797320N

These two sites are contiguous and together are known as Mosquito Flats. Vegetation is mixed-native, with an overstory of Goodding willow and Fremont cottonwood 15 m in height and patches of monotypic tamarisk up to 8 m in height. Canopy closure is approximately 50%. Stands of dead cattails occupy approximately 20% of the site. Many large willows and cottonwoods have fallen since the 2003 survey season, leaving large gaps in the canopy. Ground cover in portions of the site consists of thick, dead, woody vegetation. Saturated soil was present throughout the breeding season in approximately 2% of Site #3; otherwise, soils at these sites were dry.

We detected one willow flycatcher in Site #4 and three willow flycatchers in Site #3. No breeding activity was recorded. Details of color-banding and occupancy are presented in Chapter 3. Portions of the sites not known to be occupied by flycatchers were surveyed over 10 times, totaling 62.5 observer-hours. Cowbirds were detected on all but one visit.

## **BILL WILLIAMS SITE #5**

Area: 2.8 ha

Elevation: 143 m

UTM: 771644E 3796928N

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 10 m in height and an understory of tamarisk 3 m in height. Some of the overstory trees are dead or dying, and overall canopy closure is approximately 25%. The site contained one pool of standing water, which was 30 cm deep in late May and was completely dry by early July.

We detected one willow flycatcher at Site #5 on 30 May. This bird was not detected on three subsequent visits to the detection location in the week following the initial detection. Site #5 was surveyed nine times, totaling 12.3 observer-hours. Cowbirds were recorded on seven visits.

## **MINERAL WASH COMPLEX**

Area: 19.6 ha

Elevation: 162 m

UTM: 774558E 3795396N

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 15–20 m in height and an understory of tamarisk 3 m in height. Overall canopy closure is <50%. No flowing water was recorded at this site during the survey season. Isolated pools were present in the riverbed during May and June, but the site was completely dry by early July. Cattails that had grown in the riverbed were primarily dead by July. Many trees appear to be dead or dying, and several dead tamarisk within the site fell during the survey season.

We detected one willow flycatcher on 23 May. This bird was not detected on three subsequent visits to the detection location in the week following the initial detection. The site was surveyed nine times, totaling 16.5 observer-hours. Cowbirds were recorded on eight visits.

## **BEAVER POND**

Area: 21.3 ha

Elevation: 165 m

UTM: 775247E 3794643N

This mixed-native site consists of Fremont cottonwood and Goodding willow with an understory of tamarisk lining a string of beaver ponds along the channel of the Bill Williams River. The cottonwoods are up to 20 m in height and are emergent above the willows. Many of the cottonwoods are dying, and their canopies are primarily leafless. Cattails line the beaver ponds, and areas not immediately adjacent to the river are dry and vegetated by tamarisk and honey mesquite (*Prosopis glandulosa*) 5–7 m in height. Overall canopy closure at the site is <50%. The beaver ponds contained water up to 30 cm deep in mid-May. The water level in these ponds dropped throughout the survey season, and by July very little standing water remained.

We detected willow flycatchers at this site on various dates between 21 May and 19 June. None of these birds displayed territorial behavior, and all were suspected to be migrants. The site was surveyed 10 times, totaling 25.8 observer-hours. Cowbirds were recorded on nine visits.

### **BILL WILLIAMS SITE #8**

Area: 10.3 ha

Elevation: 168 m

UTM: 777902E 3794686N

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 and willow trees 15 m in height line the river channel and the edges of beaver ponds, with an understory of tamarisk also present throughout the site. This site had flowing water in the river channel throughout the survey season, but soils away from the channel were dry. Overall canopy closure is <50%.

We detected one willow flycatcher at Site #8 on 28 May, but no flycatchers were detected on 10 subsequent surveys. Observer-hours totaled 19.4, and cowbirds were detected on 10 visits.

### ***BIG HOLE SLOUGH, CALIFORNIA***

#### **BIG HOLE SLOUGH**

Area: 16.5 ha

Elevation: 82 m

UTM: 728526E 3724192N

This mixed-native site consists of a cattail marsh edged with narrow bands of coyote willow 5 m in height and an understory of seep willow. Away from the marsh, the site contains tamarisk and honey and screwbean mesquite (*Prosopis pubescans*) 8 m in height with an understory of arrowweed. A few tall Goodding willow and Fremont cottonwood are present at the site. Overall canopy closure is approximately 50%. The cattail marsh (approximately 30% of the site) had shallow, standing water throughout the survey season.

We detected 1 willow flycatcher on 15 May, 3 on 25 May, 14 on 2 June, and 2 on 13 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 25.5 observer-hours. Large flocks of cowbirds were detected on all visits, and no livestock use was noted.

### ***EHRENBERG, ARIZONA***

#### **EHRENBERG**

Area: 4.7 ha

Elevation: 78 m

UTM: 729946E 3715773N

This mixed-native site consists of a canopy of Fremont cottonwood and Goodding willow 15 m in height with an understory of coyote willow. The periphery of the site is vegetated with a mix of tamarisk and mesquite. Approximately 5% of the site is a cattail marsh that had 5 cm of standing water in mid-May but was dry by mid-June. The site is separated from the Colorado River by a levee. Canopy closure at the site is approximately 50%.

We detected two willow flycatchers at Ehrenberg on 15 and 25 May and one willow flycatcher on 2 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 14.5 observer-hours. Cowbirds were detected on six visits, and burros use the periphery of the site.

## ***CIBOLA NATIONAL WILDLIFE REFUGE, ARIZONA AND CALIFORNIA***

### **CIBOLA SITE #2 AND CIBOLA SITE #1**

Cibola Site #2: Area: 16.4 ha	Elevation: 65 m	UTM: 716845E 3684106N
Cibola Site #1: Area: 7.7 ha	Elevation: 65 m	UTM: 717233E 3683564N

These adjacent, mixed-exotic sites consist of a 200-m-wide strip of vegetation bordering a canal east of the Colorado River. The sites are vegetated primarily by tamarisk, which is dry and scrubby on the eastern edge of the sites and becomes denser toward the cattail marshes on the western edge of the sites adjacent to the canal. Emergent Fremont cottonwood and Goodding willow occur primarily along the eastern edge of these marshy areas. The cottonwoods and tamarisk reach heights of 20 and 6 m, respectively, and overall canopy closure is 50–70%. No standing water or saturated soil was documented at these sites, though field personnel did not explore the cattail areas to determine if water was present.

We detected 9 willow flycatchers at these sites on 26 May, 16 on 1 June, 3 on 11 June, and 1 on 14 June. No willow flycatchers were detected during the last five surveys. We surveyed the sites 10 times, totaling 32.8 observer-hours. Cowbirds were recorded on all visits, and burro trails were noted on the periphery of the site.

### **HART MINE MARSH**

Area: 31.6 ha	Elevation: 65 m	UTM: 717492E 3682569N
---------------	-----------------	-----------------------

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 5 m, and canopy closure is approximately 70%. The marsh held up to 70 cm of standing water in mid-May, and the water level fell throughout the survey season. Tamarisk areas contained dry soils throughout the survey season.

We detected five willow flycatchers on 25 May and three on 1 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 18.3 observer-hours. Cowbirds were detected on eight visits, and burro trails were noted on the east side of the site.



### **THREE FINGERS LAKE**

Area: 70.2 ha

Elevation: 65 m

UTM: 715066E 3681800N

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 11 willow flycatchers on 16 May, 33 on 26 May, 6 on 31 May, and 3 on 12 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 35.7 observer-hours. Cowbirds were detected on all visits, and no livestock use was noted.

### **CIBOLA LAKE NORTH, EAST, AND WEST**

Cibola Lake North: Area: 8.5 ha

Elevation: 64 m

UTM: 716468E 3680005N

Cibola Lake East: Area: 4.5 ha

Elevation: 64 m

UTM: 717146E 3679673N

Cibola Lake West: Area: 7.0 ha

Elevation: 64 m

UTM: 716748E 3679317N

These mixed-exotic sites border Cibola Lake. The perimeter of each site adjacent to the lake is vegetated by cattail and bulrush. Areas immediately inland from the cattail marshes are vegetated by dense tamarisk 4–6 m in height with scattered Goodding willow. The interiors of the sites have patchy vegetation with a mix of tamarisk, arrowweed, and open sandy areas. Canopy closure along the marsh edges is 50–70%, while the interiors of sites have canopy closure <25%. Soils within all sites were dry throughout the survey period.

We detected two willow flycatchers at Cibola Lake North on 25 May. At Cibola Lake East, we detected one willow flycatcher on 26 May and 14 June. At Cibola Lake West, we detected 11 flycatchers on 25 May and 6 flycatchers on 1 June. No willow flycatchers were detected during the last five surveys. The sites were surveyed 10 times, totaling 44.6 observer-hours. Cowbirds were detected on all visits, and tracks of burros and feral pigs were noted at Cibola Lake East.

### **WALKER LAKE**

Area: 24.0 ha

Elevation: 64 m

UTM: 716081E 3676249N

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 throughout the survey season.

We detected 22 willow flycatchers at Walker Lake on 25 May, 2 on 31 May, and 12 on 9 June. No willow flycatchers were detected during the last seven surveys. The site was visited 10 times, totaling 11.0 observer-hours. Cowbirds were detected on eight visits, and no evidence of livestock was recorded.

### ***IMPERIAL NATIONAL WILDLIFE REFUGE, ARIZONA AND CALIFORNIA***

#### **PARADISE**

Area: 6.1 ha

Elevation: 62 m

UTM: 714108E 3666148N

This site is mixed-native habitat, with stringers of Fremont cottonwood and Goodding willow, 15–20 m in height, bordering a small cattail 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 the cattail/marsh. The site is separated from the Colorado River by a narrow strip (50 m wide) of dense tamarisk. A cattail marsh borders the site to the south. Overall canopy closure is approximately 25%.

We detected seven willow flycatchers on 25 May, three on 31 May, seven on 9 June, and three on 13 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 14.4 observer-hours. Cowbirds were detected on every visit, and no sign of livestock use was observed on the site.

#### **HOGUE RANCH**

Area: 21.8 ha

Elevation: 61 m

UTM: 717191E 3660298N

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 20% of the site. The marshes in the interior of the site were dry in May but had standing water in early July, which persisted throughout the remainder of the survey season. The site also borders the Colorado River. Canopy closure is approximately 70%.

We detected 2 willow flycatchers at Hogue Ranch on 20 May, 9 on 30 May, 16 on 2 June, and 1 on 11 June. No flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 15.9 observer-hours. Cowbirds were detected on nine visits, and there were signs of wild burros using portions of the site.

#### **ADOBE LAKE**

Area: 8.2 ha

Elevation: 60 m

UTM: 717307E 3659034N

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) on the site, but 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 three willow flycatchers on 30 May and five on 2 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 3.3 observer-hours. Cowbirds were detected on two visits, and there was no sign of livestock use of the site.

### **RATTLESNAKE**

Area: 1.7 ha

Elevation: 60 m

UTM: 720031E 3659546N

This mixed-native site is a patchwork of emergent Goodding willow, strips of dense coyote willow 6–8 m in height, and tamarisk. Tamarisk is widespread in patches throughout the site but is not the dominant vegetation. Canopy closure is 70–90%. Large cattail marshes separate this site from the Colorado River. This site had saturated soils in late June and may have been inundated earlier in the season.

No willow flycatchers were detected at this site. The site was first surveyed on 16 June as a replacement for sites that had burned over the winter. This site is difficult to access but is extensive and warrants further exploration. The site was surveyed five times, totaling 7.6 observer-hours. Cowbirds were detected on four occasions, and no livestock use was noted.

### **NORTON SOUTH**

Area: 1.5 ha

Elevation: 60 m

UTM: 720960E 3656695N

This mixed-native site consists of a planted stand of Goodding willow and Fremont cottonwood approximately 20 × 100 m in size. Canopy height is 15–20 m and overall canopy closure is around 50%. The understory is varied and contains tamarisk, arrowweed, seep willow, cattail, mesquite, and coyote willow. The site is bordered to the north by a cattail marsh on the margin of Taylor Lake and to the south by desert upland. The site had standing water and saturated soils in the cattail marsh on the north edge of the site.

We detected one willow flycatcher at Norton South on 15 June, the date the first survey of this site was completed. This site was selected as a replacement survey location for sites that had burned over the winter. This site was surveyed six times, totaling 6.2 observer-hours. Cowbirds were detected on four visits, and burros use the desert areas surrounding the site.

### **PICACHO NW**

Area: 11.0 ha

Elevation: 59 m

UTM: 722799E 3656503N

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, and small portions of the site near the river contained saturated soil in May and June. The eastern portion of the site is fenced to exclude burros, and this portion of the site has a denser understory than unfenced portions. Outside of the managed area, the habitat is dominated by tamarisk and common reed.

We detected two willow flycatchers at Picacho NW on 20 May, four on 28 May and 4 June, and one on 11 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 13.4 observer-hours. Cowbirds were detected on eight visits, and there was evidence of heavy use of the site by wild burros.

### **MILEMARKER 65**

Area: 10.0 ha

Elevation: 58 m

UTM: 726646E 3657774N

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 primarily of dense tamarisk 6 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 during the survey period.

We detected four willow flycatchers on 20 May, one on 28 May, two on 2 June, and one on 11 June. The site was surveyed 10 times, totaling 6.4 observer-hours. Cowbirds were recorded on nine visits, and no livestock use was noted.

### **CLEAR LAKE/THE ALLEY**

Area: 8.3 ha

Elevation: 59 m

UTM: 731425E 3657901N

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 during the survey period.

We detected one willow flycatcher on 19 May, three on 28 May, and one on 11 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 11 times, totaling 8.7 observer-hours. Cowbirds were detected on seven visits, and wild burros use the site and the surrounding uplands.

## **IMPERIAL NURSERY**

Area: 1.4 ha

Elevation: 58 m

UTM: 734247E 3653822N

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. Refuge personnel periodically inundate the cottonwood plantation with up to 15 cm of water.

We detected three willow flycatchers on 18 and 29 May and four flycatchers on 3 June. 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: 733614E 3651765N

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 bordering Ferguson Lake. On the eastern edge of the site adjacent to the Colorado River the area is vegetated by scattered tamarisk, arrowweed, and mesquite. Soils were dry during the survey period.

We detected 2 willow flycatchers at Ferguson Lake on 21 May, 16 on 27 May, 6 on 1 June, and 3 on 10 June. No flycatchers were detected on the last six visits. Cowbirds were detected on nine visits, and no evidence of livestock use was recorded.

## **FERGUSON WASH**

Area: 6.8 ha

Elevation: 58 m

UTM: 733936E 3650383N

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 around 90%. The site is bordered on the lakeside by cattails and bulrush and on the upland side by desertscrub. A backwater channel penetrates to the interior of the site.

We detected two willow flycatchers at Ferguson Wash on 21 May, six on 1 June, and three on 10 June. No willow flycatchers were detected during the last six surveys. The site was visited 10 times, totaling 12.8 observer-hours. Cowbirds were recorded on four visits, and burro trails were abundant on the periphery of the site.

## **GREAT BLUE HERON**

Area: 7.1 ha

Elevation: 58 m

UTM: 736876E 3652307N

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.

We detected 7 willow flycatchers on 17 May, 36 on 29 May, 25 on 3 June, 12 on 10 June, 3 on 11 June, and 2 on 12 June. The site was surveyed 11 times, with 38.2 observer-hours spent at the site. Flycatcher banding activities occurred at this site on 10–12 June. Cowbirds were recorded on nine visits, and burros use the uplands on the periphery of the site.

## **POWERLINE**

Area: 2.1 ha

Elevation: 58 m

UTM: 737353E 3652098N

This site is located south of the Great Blue Heron site 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 detected one willow flycatcher at this site on 29 May and 3 June. The site was surveyed 11 times, with 7.4 observer-hours spent at the site. 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: 737362E 3651773N

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. 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 detected two willow flycatchers at Martinez Lake on 18 May, one on 29 May and 3 June, four on 10 June, and one on 24 June. The site was visited 11 times, totaling 11.1 observer-hours. Cowbirds were detected on eight visits, and burros use the adjacent uplands.

## **OTHER SURVEY AREAS**

Taylor Lake                      Area: 3.0 ha    Elevation: 60 m                      UTM: 721566E 3657387N  
Picacho Camp Store: Area: 3.3 ha    Elevation: 58 m                      UTM: 724451E 3656575N

These sites burned over the winter prior to the 2004 flycatcher breeding season; thus, surveys of these sites were discontinued. Although these sites had burned and were essentially devoid of green vegetation, two willow flycatchers were detected at Taylor Lake and one at Picacho Camp Store on 20 May.

## ***MITTRY LAKE, ARIZONA AND CALIFORNIA***

### **MITTRY WEST**

Area: 4.4 ha                                      Elevation: 48 m                                      UTM: 734967E 3638617N

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 standing water was present within the site throughout the survey season.

We detected one willow flycatcher on 17 May, five on 27 May, and six on 11 June. No flycatchers were detected during the last six surveys. The site was visited 10 times, totaling 17.0 observer-hours. Cowbirds were detected on all visits, and burros use the uplands adjacent to the site.

### **MITTRY SOUTH**

Area: 15.5 ha                                      Elevation: 46 m                                      UTM: 735918E 3634361N

This monotypic tamarisk site borders Mittry Lake. Vegetation at the site is very dense, with abundant 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 during the survey period and is bordered by an area that has been recently bulldozed.

We detected 15 flycatchers at Mittry South on 30 May and 1 on 13 June. No willow flycatchers were detected during the last six surveys. The site was visited 10 times, totaling 15.2 observer-hours. Cowbirds were detected on eight visits, and no evidence of livestock use was recorded.

## **POTHOLES EAST**

Area: 2.0 ha

Elevation: 54 m

UTM: 731831E 3634398N

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.

We detected one willow flycatcher on 18 May, four on 27 May, and two on 10 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 4.9 observer-hours. Cowbirds were detected on eight visits, and evidence of burros was abundant in the upland areas surrounding the site.

## **POTHOLES WEST**

Area: 6.6 ha

Elevation: 53 m

UTM: 730497E 3635593N

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 during the survey period, and there is a patch of mesquite trees on the north side of the site.

We detected one willow flycatcher on 27 May, three on 3 June, and two on 10 June. No willow flycatchers were detected during the last six surveys. The site was surveyed 10 times, totaling 7.5 observer-hours. Cowbirds were detected on nine visits, and burros use the uplands surrounding the site.

## **YUMA, ARIZONA**

### **RIVER MILE 33**

Area: 20.6 ha

Elevation: 38 m

UTM: 726379E 3623030N

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. Canopy cover is variable from 25 to 70%. This portion of the site was inundated with approximately 0.5 m of water in mid-May, but only saturated soil remained by 12 June. Cottonwoods and willows also occur in narrow stringers along irrigation ditches on the periphery of the site. 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 11 willow flycatchers on 31 May, 2 on 8 and 12 June, and 1 on 13 June. An unsuccessful attempt was made to capture the flycatcher detected on 13 June.



No flycatchers were detected during the last six surveys. The site was surveyed 11 times, totaling 34.2 observer-hours. Cowbirds were recorded 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: 729115E 3622896N

This mixed-native site borders the Colorado and Gila Rivers. Sparse 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, with sandy, open areas throughout the site. Soils within the site were primarily dry during the survey period.

We detected one willow flycatcher on 19 May, nine on 30 May, and five on 8 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 9.7 observer-hours. Cowbirds were detected on eight visits, and no evidence of livestock use was noted.

#### **GILA CONFLUENCE NORTH**

Area: 4.6 ha

Elevation: 40 m

UTM: 729445E 3623131N

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. 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 inundated or saturated soils were adjacent to the Colorado River.

We detected 5 willow flycatchers at Gila Confluence North on 18 May, 14 on 29 May, and 1 on 8 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 14.3 observer-hours. Cowbirds were detected on six visits, and no evidence of livestock use was noted.

#### **GILA RIVER SITE #2**

Area: 8.1 ha

Elevation: 45 m

UTM: 736504E 3623771N

This mixed-native site consists of an overstory (up to 15 m in height) of Fremont cottonwood and Goodding willow, with 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. There was no standing water or saturated soils within the site during the survey period, but the western edge of the site borders a large pond.

One willow flycatcher was detected on 17 and 27 May, and four flycatchers were detected on 8 June. No willow flycatchers were detected during the last eight surveys. Gila River Site #2 was surveyed 11 times, totaling 14.4 observer-hours. Cowbirds were detected on nine visits. No evidence of livestock use was observed within the site, though burros use adjacent areas.

### **FORTUNA SITE #1**

Area: 2.8 ha

Elevation: 45 m

UTM: 737635E 3623622N

This mixed-native site consists of a narrow patch of Fremont cottonwood and Goodding willow about 10 m in height with 50–70% canopy closure. Tamarisk and arrowweed form a patchy understory on the periphery of the site. Within the densest cottonwood/willow areas, there is little understory but many downed branches. The site is bordered to the north by agricultural fields and to the south by a cattail marsh and the Gila River.

We did not detect any willow flycatchers at this site. Surveys of this site commenced on 28 June, after Gila River Site #1 had burned. We surveyed the site four times, totaling 4.4 observer-hours. Cowbirds were detected on three visits, and no evidence of livestock use was noted at the site.

### **FORTUNA NORTH**

Area: 4.8 ha

Elevation: 46 m

UTM: 739761E 3625570N

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. Canopy closure is approximately 80%. There was no standing water or saturated soils within the site during the survey period, but the western edge of the site borders the Gila River.

Five willow flycatchers were detected on 27 May, and two flycatchers were detected on 8 June. No willow flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 10.2 observer-hours. Cowbirds were detected on eight visits, and no sign of livestock use was recorded.

### **GADSDEN BEND**

Area: 4.4 ha

Elevation: 28 m

UTM: 707180E 3605713N

This mixed-native site is adjacent to a beaver pond along 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 and west by a large stand of mesquite.

At Gadsden Bend, we detected eight willow flycatchers on 18 and 28 May, one on 9 June, two on 13 June, and one on 14 June and 23 July. No flycatchers were detected on five surveys between 14 June and 23 July. The flycatcher detected on 23 July appeared to have unusually dark plumage with prominent wing bars and a visible gape, suggesting it may have been a hatch-year bird. The site was surveyed 11 times, totaling 10.9 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: 707181E 3603994N

This mixed-native site consists of stringers of Goodding willow and scattered Fremont cottonwood lining backwater channels of the Colorado River. Canopy height is variable, ranging from approximately 8 to 12 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. Open, sandy areas between the channels comprise approximately 50% of the site and are sparsely vegetated by arrowweed.

We detected 4 willow flycatchers at Gadsden on 18 May, 22 on 28 May, and 3 on 9 June. No flycatchers were detected during the last eight surveys. The site was surveyed 10 times, totaling 16.0 observer-hours, and cowbirds were recorded on nine visits. No livestock use was recorded, but the site receives heavy foot traffic by illegal immigrants.

#### **HUNTER'S HOLE**

Area: 16.5 ha

Elevation: 26 m

UTM: 706429E 3600299N

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. Areas away from the oxbow are vegetated by arrowweed and tamarisk with sparse canopy. Water depth in the oxbow varied throughout the season from 0 to >100 cm, apparently as the result of irrigation or upstream water releases. The northern patch is a mixture of willow and scattered Fremont cottonwood in stringers along channels and ponds. Canopy closure along the stringers is approximately 50%. Between the stringers, vegetation is a mix of tamarisk and arrowweed. Water was present in ponds and in 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 5 willow flycatchers on 18 May, 37 on 30 May, and 4 on 9 June. No flycatchers were detected during the last seven surveys. The site was surveyed 10 times, totaling 15.8 observer-hours, and cowbirds were recorded on all visits. No livestock use was recorded at the site, but site receives heavy foot traffic by illegal immigrants.

## OTHER SURVEY AREAS

Gila River Site #1: Area: 5.7 ha      Elevation: 44 m      UTM: 733877E 3623626N

This mixed-native site burned during the field season. The center of the site consisted of a grove of Fremont cottonwood up to 20 m in height. Stringers of cottonwood, Goodding willow, and tamarisk extended to the east and west, with pockets of arrowweed present throughout the site.

Eight willow flycatchers were detected at this site on 27 May. After the site burned between 27 May and 8 June 2004, surveys were discontinued.

## DISCUSSION

In 2004, we found resident, breeding Southwestern Willow Flycatchers at the four life history study areas (Pahrnagat NWR, Mesquite, Mormon Mesa, and Topock Marsh) as well as at Littlefield and Grand Canyon (details of occupancy and breeding presented in Chapters 3 and 4). Resident, territorial flycatchers were also detected at Overton Wildlife Management Area and Bill Williams NWR, but no breeding activity was recorded at these sites. These results differ from those of previous years (McKernan and Braden 2002, Koronkiewicz et al. 2004) in that breeding (a single pair) was detected at Littlefield for the first time in 2004, and no breeding was detected at Bill Williams for the first time since 1998. Survey sites at Bill Williams had noticeably less standing water or saturated soil in 2004 than in 2003, and many trees displayed leafless branches, fallen branches, or mortality during the 2004 breeding season. These changes in habitat structure and abiotic characteristics may have influenced flycatcher occupancy at Bill Williams. Willow flycatchers have been detected within Grand Canyon since surveys began in 1997, with breeding flycatchers detected in 1999–2001 but not in 2002 or 2003. Flycatchers in Grand Canyon may also be responding to dramatic changes in water levels and habitat structure. Water levels in Lake Mead have been dropping since 2002, and many areas along the banks of the Colorado River in lower Grand Canyon that were inundated in 1998 and 1999 are now several meters above water level. Much of the vegetation in these areas is dead or dying. New stands of vegetation have also been arising in areas exposed by the receding water. Breeding was once again recorded in Grand Canyon in 2004.

Although many flycatchers were recorded at all surveyed sites south of Bill Williams until 15 June, with single detections recorded on 24 June and 23 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., 4 flycatcher detections at Gadsden on 18 May, 22 on 28 May, 3 on 9 June, and 0 on 13 June) and the overall lack of territorial, aggressive behaviors exhibited toward conspecific broadcasts, willow flycatchers detected at sites south of Bill Williams in 2004 were most likely migrants. Given that willow flycatchers are one of the last long-distance Neotropical migrant passerines to arrive in the Southwest in spring,<sup>8</sup> the occurrence of northbound, migrant flycatchers along the southern stretches of lower Colorado River until late June is not surprising. Furthermore, with over 200 willow detections recorded in 2003 (Koronkiewicz et al. 2004) and over 600 detections

---

<sup>8</sup> 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).

recorded in 2004, this section of the lower Colorado River corridor is undoubtedly a major flyway for migrant willow flycatchers in spring. Results at survey sites south of Bill Williams in 2004 are consistent with those of previous years from 1997 to 2003 (McKernan and Braden 2002, Koronkiewicz et al. 2004), with no confirmed nesting recorded since 1938 (Unitt 1987). The flycatcher detected on 23 July at Gadsden Bend south of Yuma had unusually dark plumage, prominent wing bars, and a visible gape, suggesting that it was a young of the year. It is unlikely that this individual fledged at the Gadsden Bend site, however, given that no flycatchers were detected on five surveys between 22 June and 14 July. Given that young flycatchers at breeding sites we monitored in 2004 fledged as early as 23 June, a hatch year individual recorded at this time of the year is not unusual.

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 conduct color-banding studies at sites south of Bill Williams in 2004 (see Chapter 3), no resightings 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.