

**SOUTHWESTERN WILLOW FLYCATCHER SURVEYS, DEMOGRAPHY,
AND ECOLOGY ALONG THE LOWER COLORADO RIVER AND
TRIBUTARIES, 2005**

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Annual Report

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Lower Colorado Region
500 Fir Street
Boulder City, Nevada 89005

Submitted by

Thomas J. Koronkiewicz
Mary Anne McLeod
Bryan T. Brown
Steven W. Carothers

SWCA ENVIRONMENTAL CONSULTANTS

114 N. San Francisco St., Suite 100
Flagstaff, Arizona 86001
(928) 774-5500
www.swca.com

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EXECUTIVE SUMMARY

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*), listed as federally endangered in 1995, breeds in dense, mesic riparian habitats at scattered, isolated sites in New Mexico, Arizona, southern California, southern Nevada, southern Utah, southwestern Colorado, and, at least historically, extreme northwestern Mexico. Historical breeding records and museum collections indicate a sizable population of Southwestern Willow Flycatchers may have existed along the extreme southern stretches of the lower Colorado River region. Factors contributing to the decline of flycatchers on the breeding grounds include loss, degradation, and/or fragmentation of riparian habitat; invasion of riparian habitat by nonnative plants; and brood parasitism by Brown-headed Cowbirds (*Molothrus ater*).

Willow flycatcher studies have been conducted along the Virgin and lower Colorado Rivers and tributaries annually since 1996, in compliance with requirements set forth by the U.S. Fish and Wildlife Service (USFWS) regarding U.S. Bureau of Reclamation (Reclamation) routine operations and maintenance along the lower Colorado River. Biological Assessments and the resulting Biological Opinions on operations and maintenance were prepared as steps to developing a Multi-Species Conservation Program (MSCP) for long-term endangered species compliance and management in the historical floodplain of the lower Colorado River. The MSCP calls for continued surveys and monitoring of willow flycatchers along the lower Colorado River. The MSCP was signed in April 2005, and implementation of the program began in October 2005.

Reclamation and USFWS completed a separate consultation on the potential effects to threatened and endangered species from implementation of surplus guidelines through 2016 and an annual change in the point of diversion for up to 400,000 acre-feet of California apportionment water for 75 years. The point of diversion, previously located below Parker Dam, will change to a point above Parker Dam, and there will be no return flow to the Colorado River below Parker Dam. These changes in water regulation could cause a drop in floodplain groundwater levels of 1.55 feet (0.47 m) or less and have the potential to modify riparian habitats below Parker Dam. A Biological Opinion for Interim Surplus Criteria, Secretarial Implementation Agreements, and Conservation Measures was issued in January 2001 and required monitoring of 150.5 ha of existing, occupied southwestern willow flycatcher habitat between Parker and Imperial Dams. In 2004, Reclamation biologists initiated studies of the microclimate within potentially affected areas. In 2005, these studies were continued and expanded by SWCA Environmental Consultants (SWCA) to address how the hydrological changes might affect riparian habitats along the Parker to Imperial reach.

From 1997 to 2004, breeding populations of Southwestern Willow Flycatchers were documented along the Virgin and lower Colorado Rivers and tributaries at eight study areas from Mesquite, Nevada, south to the Bill Williams River in Arizona. Willow flycatchers also have been detected during the breeding season at several sites along the Colorado River south of the Bill Williams River to the Mexico border, with over 200 detections recorded in 2003 and over 600 in 2004. Behavioral observations and timing of detections strongly suggest this section of the river corridor is a major flyway for migrant willow flycatchers in spring. The degree to which Southwestern Willow Flycatchers use this riparian corridor is unknown and requires further study.

SWCA was contracted by Reclamation to continue surveys, monitoring, and demographic and ecological studies of the Southwestern Willow Flycatcher in suitable and/or historical riparian and wetland habitats throughout the Virgin and lower Colorado River regions in 2005. We completed presence/absence surveys and site descriptions at 98 pre-selected sites in 15 study areas from the Pahrnagat National Wildlife Refuge (NWR), Nevada, south to Yuma, Arizona. We also conducted intensive life history studies at 4 of the 15 areas: Pahrnagat NWR, Mesquite, and Mormon Mesa, Nevada, and Topock Marsh, Arizona. At these life history study areas, we monitored willow flycatcher nests to document depredation and brood parasitism rates and nesting success; color-banded and resighted as many willow flycatchers as possible to determine the breeding status of territorial flycatchers and document movement and recruitment; measured characteristics of vegetation and microclimate at nest sites and at unused sites to assess factors important in nest-site selection; and implemented trapping and removal of Brown-headed Cowbirds to evaluate the effects of trapping on nest brood parasitism and flycatcher nest success.

We used recorded broadcasts of willow flycatcher song and calls to elicit responses from willow flycatchers at 98 sites, ranging in size from 1 to 68 ha, along the Virgin and lower Colorado Rivers and tributaries between 15 May and 25 July 2005, following a 10-survey protocol. We detected willow flycatchers on at least one occasion at 61 of these sites. Resident, breeding flycatchers were detected at 15 sites within the following six study areas: Pahrnagat NWR, Mesquite, Mormon Mesa, Muddy River, Topock Marsh, and Bill Williams. South of Bill Williams, over 300 willow flycatchers were recorded between 14 May and 18 June; other than a single detection at one site on 6 July, no flycatcher detections were recorded at any sites south of Bill Williams after 20 June. Monitoring results suggest these flycatchers were not resident, breeding individuals and were most likely migrants.

We used targeted mist-net and passive netting techniques to capture and uniquely color-band adult and fledgling willow flycatchers at the four life history study areas and at all survey sites where resident willow flycatchers were detected. Nestlings were banded between 8 and 10 days of age. We banded each adult and fledged willow flycatcher with a single anodized (colored), numbered U.S. federal aluminum band on one leg and one colored, aluminum band on the other. Nestlings were banded with a single anodized numbered federal band, uniquely identifying it as a returning nestling in the event it returns in a subsequent year. We used binoculars to determine the identity of previously color-banded flycatchers by observing, from a distance, the unique color combinations on their legs.

At the four life history study areas and at Littlefield, Muddy River, Grand Canyon, and Bill Williams (all monitoring sites), we color-banded 31 new adult flycatchers and recaptured 25 individuals banded in previous years, including 11 flycatchers banded as juveniles in previous years. An additional 44 previously banded flycatchers were resighted, of which 30 could be identified to individual and 8 were banded as juveniles in 2003 or 2004 but could not be recaptured to determine origin and identity. We banded 56 nestlings from 25 nests. In addition, we recaptured one fledgling that had been banded as a nestling, and captured seven previously unbanded fledglings. We banded flycatchers opportunistically at Key Pittman Wildlife Management Area, capturing and color-banding one new adult and four nestlings from one nest.

For the third consecutive year, we conducted color-banding studies from 10–30 June along the lower Colorado River downstream of Parker Dam to better determine flycatcher residency,

breeding status, and movement patterns in this area. We recorded 28 willow flycatcher detections at nine sites along the Colorado River from Hoge Ranch south to Hunter's Hole, and along the Gila River near Yuma. All these detections were recorded from 10 to 20 June. From 10 to 17 June at three sites, field personnel captured and color-banded nine new adults, of which four were second-year birds. None of the color-banded individuals were detected post-capture, and other than a single detection at one site on 6 July, no flycatcher detections were recorded at any sites south of Bill Williams after 20 June, suggesting these individuals were northbound migrants.

On 17 May, a Southwestern Willow Flycatcher banded as a nestling in 2003 or 2004 was resighted at River Mile 33, and was not detected during subsequent visits through the end of July. Because we were unable to recapture this individual, its identity could not be determined. It is likely this individual was a northbound migrant.

At the four life history study areas and at Littlefield, Muddy River, Grand Canyon, and Bill Williams we recorded a total of 73 territories. Of these, 49 (67%) consisted of paired flycatchers and 24 (33%) consisted of unpaired individuals. Five breeding males were polygynous; four were paired with two females and one was paired with three females.

Of the 108 adult willow flycatchers identified to individual in 2004, 42 (39%) returned in 2005; 5 (12%) were detected at a different study area from where they were detected in 2004. We detected two within-year, between-study-area movements in 2005; one male moved from Littlefield to Mesquite, and another male moved from Mesquite to Mormon Mesa.

Of 82 juveniles banded in 2004 that were known to have fledged, 4 (5%) were recaptured and identified in 2005. Of these, one was detected at a different study area from where originally banded, and three were detected at the same study area. Six nestlings at Key Pittman WMA were banded in 2004, of which one was recaptured at Pahrnagat in 2005. Three individuals originally banded as nestlings in 2003 and one banded in 2002 were also recaptured, all of which returned to the same study where originally banded. We also recaptured two individuals originally banded as nestlings in 2003 at Roosevelt Lake, Arizona. The median dispersal distance for all returning juvenile flycatchers exhibiting between-year movements in 2005 was 193 km.

We documented a total of 88 willow flycatcher nesting attempts at the four life history study areas, Muddy River, and Bill Williams, 81 of which contained eggs and were used in calculating nest success and productivity. Twenty-nine (36%) nests were successful and fledged young; 48 (59%) failed; and four were of undetermined fate. Mayfield survival probability at the four life history study areas, Muddy River, and Bill Williams ranged from 0.21 to 1.00 and was 0.37 for all sites combined. Depredation was the major cause of nest failure, accounting for 64% of all failed nests and 73% of nests that failed after flycatcher eggs were laid.

Twenty-six of 81 nests (32%) with flycatcher eggs were brood parasitized by Brown-headed Cowbirds. Brood parasitism at all sites ranged from 0 to 75% and was highest at Muddy River Delta. We observed the third consecutive year of no brood parasitism at Pahrnagat. Nests that contained flycatcher eggs and were brood parasitized were less likely to fledge flycatcher young than nests that were not parasitized.

For the third consecutive year, we used a modification of the Australian crow trap to capture and remove Brown-headed Cowbirds at each of the four life history study areas. We replaced one of two traps at Pahrnagat, one of three at Mesquite, and three of six at Topock with a different design to test the relative efficacy of the two styles of trap. At Topock, the locations of the new and old traps were exchanged half way through the season to control for location effects when evaluating trapping success of the different designs.

We captured and removed 56, 61, 5, and 244 Brown-headed Cowbirds at Pahrnagat, Mesquite, Mormon Mesa, and Topock, respectively. Overall, the new traps had a significantly higher daily capture rate per trap-day than the old traps, and the ratio of the new to old trap capture rates varied depending on trap location. The escape rate of cowbirds was also significantly lower with the new trap design than with the old. The greater variety of non-target species captured in 2005 is likely the result of use of the new style trap, which captured more non-target individuals as well as cowbirds. The capture of non-target species is of concern but has been found to be unavoidable.

The proportion of flycatcher nests parasitized during the pretrapping (1997–2002) and trapping (2003–2005) periods shows no significant difference at any of the four study areas. Although statistical analysis did not reveal a decrease in brood parasitism at Pahrnagat, no brood parasitism was recorded at Pahrnagat in 2003–2005. At Mesquite and Mormon Mesa, brood parasitism continues to remain high, with 28.6 and 33.3% recorded in 2005, respectively. Brood parasitism at Topock (51.4%) was the highest recorded since monitoring was initiated in 1997.

We gathered data on vegetation and habitat characteristics at 79 nest plots, 69 non-use plots, and 43 within-territory plots within the four life history study areas and Muddy River. To obtain an overall description of entire habitat blocks at each life history study area, we gathered data at an additional 42 randomly selected plots. The life history study areas vary in vegetation age, structure, and species composition. The habitat block at Pahrnagat consists of mature, native, large-diameter trees with little shrub and sapling understory. The habitat blocks at Mesquite, Mormon Mesa, and Topock are composed primarily of very dense stands of both mixed-native (Mesquite and Mormon Mesa) and exotic (Topock) woody vegetation.

We found willow flycatchers nesting in a diverse array of riparian habitats. Willow flycatcher nest heights ranged from 1.3 to 10.0 m (mean = 3.4 m, SE = 0.2). Flycatchers placed 67% of all nests in tamarisk (*Tamarix* sp.), 6% in coyote willow (*Salix exigua*), 20% in Goodding willow (*Salix gooddingii*), 3% in Fremont cottonwood (*Populus fremontii*), and 4% in snags. Differences in nest-site characteristics between study areas were reflective of the differences in overall habitat characteristics of the sites. Nest sites consistently differed from non-use sites in several variables. We found greater canopy closure at nest sites than at non-use sites at Pahrnagat, Mesquite, and Topock. Three of the four life history study areas (Mesquite, Mormon Mesa, and Topock) had taller canopy height at nest sites than at non-use sites. At all study areas, vertical foliage density was greatest at and immediately above mean nest height. Breeding riparian birds in the desert Southwest are exposed to extreme environmental conditions, and dense vegetation at the nest may be needed to provide a more suitable microclimate for raising offspring.

We collected microclimate data simultaneously at nest, within-territory, and non-use sites at the four life history study areas and Muddy River between May and July 2005. The microclimate assessment indicated that Southwestern Willow Flycatchers placed their nests in habitats that were cooler, exhibited smaller temperature fluctuations, were more humid, and had higher soil moisture than non-use sites. To a lesser extent, flycatchers also placed nests within their territories at sites exhibiting smaller temperature fluctuations.

We selected 11 sites between Parker and Imperial Dams for inclusion in the habitat monitoring study addressing how changes in water transfer actions might affect riparian habitat. We also selected two control sites above Parker Dam and two below Imperial Dam. At each site we installed 3–5 temperature/humidity data loggers and one groundwater observation well (piezometer). Soil moisture measurements were collected at each data logger location during each of approximately 10 flycatcher surveys between 15 May and 25 July. Vegetation measurements were also collected at each data logger location after surveys were completed.

Preliminary analyses of groundwater data indicate a strong correlation between piezometer water levels and releases from Parker Dam. Data did not show a correlation between piezometer water level and either temperature or absolute humidity within the habitat monitoring sites. All microclimate parameters except for mean nocturnal temperature were significantly different between Topock Marsh and the habitat monitoring sites. Topock was cooler, and exhibited higher diurnal/nocturnal relative humidity, diurnal/nocturnal vapor pressure, and soil moisture than habitat monitoring sites. However, Mormon Mesa, where flycatchers are known to nest, had higher mean diurnal temperatures than the habitat monitoring areas. This suggests that high diurnal temperatures alone may not have been responsible for the absence of known flycatcher nests in 2005 at the habitat monitoring sites.

Table 2.5. Summary of Hydrologic Conditions at Each Survey Site along the Virgin and Lower Colorado Rivers and Tributaries, 2005*, continued

Study Area ¹	Survey Site	% Site Inundated ²	Depth (cm) of Surface Water ²	% Site with Saturated Soil ^{2,3}	Distance (m) to Surface Water or Saturated Soil ²
YUMA	River Mile 33	2/5/5	50/25/25	0/10/10	0/0/0
	Gila Confluence West ⁴	5/5/5	30/30/30	5/5/5	0/0/0
	Gila Confluence North ⁴	15/10/10	10/50/10	10/15/10	0/0/0
	Gila River Site 2 ⁴	--/0/0	--/0/0	--/0/0	--/0/0
	Fortuna Site 1	--/0/0	--/0/0	0/0/0	0/0/0
	Fortuna North ⁴	5/--/0	10/--/0	45/--/0	0/--/0
	Gadsden Bend	5/5/5	50/10/30	1/1/5	0/0/0
	Gadsden ⁴	8/10/5	50/50/70	3/5/10	0/0/0
	Hunter's Hole	0/0/0	0/0/0	0/0/0	25/25/25

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

¹ PAHR = Pahrnat 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.

² -- = Hydrologic information not recorded.

³ Percent of site with saturated soil does not include inundated areas.

⁴ Site bordered by a river or lake.

⁵ Site not monitored until mid-June because high water levels in the Virgin River prevented access.

⁶ Site was monitored only until the end of May because we were denied access by local landowner.

⁷ Water within the channel of the Muddy River was up to 100 cm deep.

⁸ Distance to water was estimated in the field in previous years as 100 m. GIS was used in 2005 to obtain this more accurate measurement of the distance from the edge of the site to the nearest water.

⁹ Site borders marsh.

¹⁰ Distance to water was estimated in the field in previous years as 200 m. GIS was used in 2005 to obtain this more accurate measurement of the distance from the edge of the site to the nearest water.

¹¹ Site contains cattail marshes, but hydrologic conditions within marshes unknown.

¹² Site borders canal.

PAHRANAGAT NATIONAL WILDLIFE REFUGE, NEVADA

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

PAHRANAGAT NORTH

Area: 4.5 ha

Elevation: 1,026 m

Pahrnat North is a stand of large-diameter Goodding willow (*Salix gooddingii*) at the inflow of Upper Pahrnat 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 survey season. By mid-June 70% of the site had standing water, with only 10% of the site inundated by late July.

We located 17 resident, breeding willow flycatchers at Pahrnagat North. We detected nine additional unpaired males and four 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 Pahrnagat North not known to be occupied by willow flycatchers were surveyed five times throughout the breeding season, totaling 11.3 observer-hours. 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 during surveys in May, and none were recorded during surveys in June and July.

PAHRNAGAT WEST

Area: 0.6 ha

Elevation: 1,026 m

This native site consists of a stringer of Fremont cottonwood 20 m in height on the west edge of Upper Pahrnagat Lake. A few Goodding willow 2–4 m in height are also present, and the edge of the lake is vegetated with bulrush (*Schoenoplectus californicus*). The upland edge of the site was dry, while the lake edge had standing water throughout the survey season.

We detected one willow flycatcher at the site on 9 June. Details of banding status are presented in Chapter 3. We surveyed the site six times throughout the breeding season, totaling 3.8 observer-hours. No cowbirds or sign of livestock use were detected.

PAHRNAGAT SOUTH

Area: 2.4 ha

Elevation: 1,023 m

Pahrnagat 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 Pahrnagat Lake. The cottonwoods reach approximately 20 m in height, while the willows are generally less than 10 m. Greater vegetation volume of coyote willow was noted compared to previous years, with record winter precipitation likely contributing to this change. 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 four resident, breeding willow flycatchers at Pahrnagat South and an additional unpaired male. Details of occupancy, color-banding, and breeding are presented in Chapters 3 and 4. Areas of Pahrnagat South not known to be occupied by willow flycatchers were surveyed six times throughout the breeding season, totaling 2.8 observer-hours. One Brown-headed Cowbird was detected during one survey in May.

LITTLEFIELD SOUTH

Area: 1.6 ha

Elevation: 543 m

This site originally extended along the Virgin River for 550 m immediately downstream from the I-15 bridge and encompassed a backwater area. The backwater area was scoured by winter floods, and this mixed-native site now consists of a narrow strip of vegetation on the right bank of the Virgin River, extending for 320 m immediately downstream of the I-15 bridge. Vegetation in the area is primarily an overstory of cottonwood and willow 10–15 m in height with a scattered understory consisting primarily of tamarisk 3 m in height but also containing coyote willow and honey mesquite (*Prosopis glandulosa*). The site also contains small areas of cattail (*Typha* sp.) and arrowweed. Overall canopy closure is 25–50%. The only surface water was within the Virgin River channel, which was adjacent to the site in May but had receded to 30 m from the site in July.

We did not detect willow flycatchers at Littlefield South. We surveyed the site five times, totaling 2.0 observer-hours. Surveys were discontinued in mid-July because of the narrow width of the site and the lack of dense vegetation and moist soils. No cowbirds were detected, and there was no sign of livestock use.

MESQUITE, NEVADA

The Mesquite study area is in the floodplain of the Virgin River near Mesquite and Bunkerville, Nevada. In 2003 and 2004, we surveyed and monitored one site in the area, Mesquite West. In 2005, we surveyed and monitored two additional sites, Mesquite East and Bunker Farm, where personnel from an unrelated flycatcher project had located territorial flycatchers in 2004. All sites in the Mesquite study area experienced flooding, scouring, and deposition over the 2004–2005 winter.

MESQUITE EAST

Area: 3.8 ha

Elevation: 468 m

This mixed-native site lies on several terraces within the floodplain of the Virgin River in Mesquite, Nevada. The lowest terrace, on the north edge of the site adjacent to the river, consists of Fremont cottonwood and Goodding willow generally less than 10 m in height. The cottonwoods in this area were yellow and dropping leaves by early July. This area was inundated by winter floods but stood at least 1 m above the river level during the survey season. The central portion of the site lies on a slightly higher terrace and is vegetated entirely by dense tamarisk 7–8 m in height with canopy closure around 80%. This terrace was also inundated during winter flooding and had deposition of sediment and debris. The terrace was dry throughout the survey season. The uppermost terrace is vegetated with Goodding willow and a few Fremont cottonwood 18–25 m in height. Understory in this area consists of dense clumps of coyote willow about 8 m in height. Canopy closure on this terrace varies from 50% in the cottonwood/Goodding willow areas to over 90% in the coyote willow clumps. This upper terrace borders an agricultural field and periodically receives irrigation runoff. A small pond is present

at the end of an irrigation ditch. The western half of the upper terrace burned over the 2004–2005 winter and was not included in the survey area. The burned area also receives irrigation runoff, and wetted areas were growing thick stands of coyote willow, common reed (*Phragmites australis*), and cattail.

We located one unpaired male at Mesquite East. Details of occupancy and color-banding are presented in Chapter 3. Areas of Mesquite East not known to be occupied by flycatchers were surveyed five times throughout the flycatcher breeding season, totaling 13.5 observer-hours. Cowbirds were detected on all but one survey, and no evidence of livestock use was observed.

MESQUITE WEST

Area: 13.8 ha

Elevation: 470 m

This mixed-native site lies within the floodplain of the Virgin River in Mesquite, Nevada. The site is a mosaic of cattail and bulrush marshes separated by narrow (40–50 m) strips of dense coyote willow with interspersed tamarisk. The willows are generally 4 m in height, and canopy closure varies from 50 to >90%.

The southeastern portion of the site was completely inundated during winter floods, which deposited up to 0.5 m of sediment in the vegetation, reducing overall canopy height in this area. Adjacent cattail/bulrush marshes in this area were scoured, and willow foliage density in the inundated area was less than observed in 2003 or 2004, with yellowing and dying vegetation likely caused by reduced water availability or sediment deposition on the root crowns. Winter floods also shifted the Virgin River to the north, removing approximately 0.8 ha of the site. No flycatcher nests were recorded in the scoured area in 2003 or 2004, but territorial flycatchers and flycatchers for which residency status could not be determined were present.

In 2003 and 2004, the amount of surface water present within the site was influenced by irrigation runoff from two golf courses immediately adjacent to the site. These irrigation return flows supported much of the vegetation within the site, and water levels varied on a daily basis. In 2005, portions of the site where deposition occurred had no surface water, and only the western and northern portions of the site were inundated throughout the flycatcher breeding season. The lack of surface water within the southeastern portion of the site may have been the result of the sediment deposition noted above, with this area now perched higher than the runoff from the golf courses, and may also have been influenced by changes in irrigation patterns on the golf course.

We located 10 resident, breeding willow flycatchers at Mesquite West and detected two unpaired males. 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 nine times throughout the flycatcher breeding season, totaling 29.7 observer-hours. Cowbirds were detected on all surveys. No evidence of livestock use was observed.

Table 3.1. Summary of Willow Flycatchers Detected at Monitored Sites during the 2005 Breeding Season*

Study Area	Site	Total Adults Detected	Recaptured				Resighted				Nestlings Banded (# Nests)	Fledglings Captured	% of All Adults Banded	
			New Captured	Not including returning Nestlings	Returning Nestlings	Color combination confirmed, individual identified	Color combination confirmed, individual not identified	Unbanded	Band Status Undetermined	Banded (color combinations unconfirmed)				
Pahranaagat	North	30	12	6	5	6	1 ¹	0	0	0	0	14 (5)	8 ²	100
	South	5	2	1	1	1	0	0	0	0	0	7 (2)	0	100
	West	1	0	0	0	0	0	1	0	0	0	0	0	0
	MAPS	1	0	0	1	0	0	0	0	0	0	0	0	100
	Study Area Total		37	14	7	7	7	1	1	0	0	21 (7)	8	97
Littlefield	North	2	0	0	0	1 ³	0	0	1	0	0	0	0	50
	East	1	1	0	0	0	0	0	0	0	0	0	0	100
	West	12	1	1	0	7 ³	1 ⁴	0	0	0	2	8 (5)	0	100
	Bunker Farm	6	2	2	0	2 ⁵	0	0	0	0	0	5 (2)	0	100
	Study Area Total		19	4	3	0	9	1	0	0	2	13 (7)	0	100
Mormon Mesa	North	4	0	0	0	1	1 ¹	2	0	0	0	2 (1)	0	50
	Virgin River #1	2	0	0	0	0	0	0	1	1	0	0	0	50
	North	7	1	2 ⁵	1	1	1 ¹	1	0	0	0	0	0	86
	Virgin River #2	1	0	0	0	1	0	0	0	0	0	0	0	100
	Delta West	1	0	0	0	1	0	0	0	0	0	0	0	100
Study Area Total		14	1	2	1	3	2	3	1	1	2 (1)	0	71	
Muddy River	Overton WMA	12	4	0	0	1	3 ¹	3	0	0	4 (2)	1	75	
Grand Canyon	RM 274.5	1	1	0	0	0	0	0	0	0	0	0	0	100
	Pipes 1	2	0	0	0	0	0	0	2	0	0	0	0	50
	Pipes 3	2	0	0	1	0	0	1	0	0	0	0	0	100
	PC6-1	3	1	0	0	0	0	2	0	0	0	0	0	33
	The Wallows	1	0	0	0	0	0	1	0	0	0	0	0	0
In Between	800M	6	0	0	0	3	0	5	0	1	6 (3)	0	0	50
	Pierced Egg	8	1	0	0	5	0	1	0	0	4 (2)	0	0	83
						0	2 ¹	3	0	0	2 (1)	0	0	63