

**SOUTHWESTERN WILLOW FLYCATCHER SURVEYS
ALONG THE VIRGIN RIVER NEAR MESQUITE, NEVADA, 2004**

**U.S. Bureau of Land Management Contract No. FAP030379
(Southwestern Willow Flycatcher Surveys for JE25)**

Prepared for

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ABSTRACT

SWCA[®] Environmental Consultants conducted presence-absence surveys for Southwestern Willow Flycatcher (flycatcher) (*Empidonax traillii extimus*) along a 13-km stretch of the Virgin River near Mesquite, Nevada, from May 15 through July 25, 2004.

We used a ten-visit protocol along seven standardized, survey transect routes to cover 264 ha of habitat that were potentially suitable for nesting by the subspecies. Tape-recorded broadcasts of flycatcher songs and calls were employed to elicit vocal responses. Six flycatcher territories were documented: one with an active nest, two with confirmed pairs (no nest detected, but possible), and three that appeared to be occupied by single flycatchers. Two of the territories (including the one with a nest) were located on Bureau of Land Management property and the remaining four territories were on private property. A total of nine resident flycatchers were detected within the study area, and an additional 20 migrant flycatchers were detected during May and June.

Nine areas, comprising 10.6 ha, were identified as "optimal" potentially suitable habitat for nesting flycatchers. Most of this habitat (9.0 ha; 85%) was associated with abandoned meander channel features in low-lying portions of the floodplain, and all six flycatcher territories were located in these willow- or native-dominated habitats associated with abandoned meander channels. Most of the "optimal" potentially suitable habitat for nesting flycatchers (6.7 ha; 63%) was on private property.

ACKNOWLEDGMENTS

This study was funded by the Las Vegas Field Office of the U.S. Department of the Interior Bureau of Land Management (LVFO-BLM). David Waller of the LVFO-BLM was the Contracting Officer's Representative, and we appreciate his encouragement and support throughout the project. The Bunker family of Bunkerville was generous in granting access through their farm to the Virgin River corridor so that we might conduct surveys.

The Flagstaff office of SWCA[®] greatly facilitated the completion of this project by coordinating administrative procedures, housing arrangements, and equipment and field logistics; banding resident flycatchers; and conducting classes to certify personnel in Southwestern Willow Flycatcher survey techniques. We gratefully acknowledge the invaluable assistance of Lisa Dickerson, Denise Johnson, Tom Koronkiewicz, and Mary Anne McLeod. Jennifer Brown and Nora Camberos of SWCA[®] netted and banded flycatchers.

An early draft of this report was reviewed for quality assurance and quality control by Nicholas Block, Tom Koronkiewicz, Mary Anne McLeod, and Thomas Sharp.

RECOMMENDED CITATION

SWCA Environmental Consultants. 2004. Southwestern Willow Flycatcher surveys along the Virgin River near Mesquite, Nevada, 2004. Final Report to the Bureau of Land Management, Las Vegas, Nevada, submitted by SWCA Environmental Consultants, Salt Lake City, Utah. 25 pp.

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INTRODUCTION

The U.S. Bureau of Land Management (BLM) is proposing a wildland urban interface hazardous fuels reduction program (JE25) on the Virgin River at and near Mesquite in Clark County, Nevada. This program would be directed primarily at riparian areas dominated by tamarisk (*Tamarix ramosissima*), an exotic (i.e., introduced) shrub prone to wildfire due to its dry, brittle, resinous nature and tendency to produce highly flammable leaf litter. Because much potential and some occupied nesting habitat for the endangered Southwestern Willow Flycatcher (flycatcher) (*Empidonax traillii extimus*) is known to occur adjacent to or in association with tamarisk-dominated areas along the Virgin River, the BLM is conducting three successive years of flycatcher presence-absence surveys to identify areas where nesting flycatchers do not occur. These areas would then become the primary focus of the fuel reduction efforts. This report documents the findings of the first year of flycatcher surveys associated with the JE25 fuels reduction program.

The objective of this study was to determine and document the presence/absence of the Southwestern Willow Flycatcher in selected habitat areas along the Virgin River near Mesquite, Nevada, through completion of the following tasks:

1. Conduct flycatcher presence-absence surveys using the standard U.S. Fish and Wildlife Service (USFWS) protocol modified to 10 visits (Braden and McKernan 1998).
2. Document all flycatcher detections, regardless of occupancy, using global positioning system (GPS) techniques and plot their locations using geographic information system (GIS) technology.
3. Survey at least 206 ha (508 acres) along 13 linear kilometers of the Virgin River and identify the survey transect routes employed to conduct the surveys using GPS and GIS techniques.
4. Identify, describe, and plot those geographic areas representing "optimal" potentially suitable nesting flycatcher habitat using GPS and GIS techniques.
5. Document any chance detections of Yuma Clapper Rail (*Rallus longirostris yumanensis*) and Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*) that may occur during flycatcher surveys.

STUDY AREA

The study area (mean elevation approximately 470 m) encompassed a 13-km linear reach of the Virgin River floodplain, from the Arizona/Nevada state line downstream to a point approximately 1 km upstream from the mouth of Toquop Wash (immediately west of Bunkerville; Figure 1). The Virgin River at this locale is a low-gradient stream in a broad floodplain (approximately 0.5 to 1.0 km wide) subject to overbank flooding and exhibits an active, meandering channel (approximately 10 m wide) adjacent to some low-lying areas in abandoned (i.e., cut-off) meander channels. River flows during the study period ranged from 0.5 to 350.0 cubic feet per second (as measured at the U.S. Geological Survey gaging station near Littlefield, Arizona), with the largest flows occurring as brief peaks during the summer monsoon thunderstorms in mid and late July. A diversion dam is located approximately midway between

the Arizona/Nevada state line and the Highway 170 bridge; it channels a large portion of the river's volume into an irrigation ditch to the south. Some of the irrigation water is returned to the active river channel immediately upstream of the Highway 170 bridge, and the remainder proceeds through the ditch to Bunkerville. The floodplain is bordered primarily by urban development, golf courses, and bluffs to the north and agricultural development to the south.

Vegetation along this reach of the Virgin River is a diverse mix of native and exotic (i.e., introduced) riparian trees and shrubs undergoing active riparian succession. Large monocultures of tamarisk in various age classes occur on the higher, more arid portions of the floodplain. Since autumn of 2003, extensive areas of tamarisk have been subjected to catastrophic wildfire (e.g. north of the river near Mesquite) or have been cleared via bulldozer by the BLM (e.g. south of the river at the downstream end of the study area). Elsewhere, native vegetation, composed primarily of coyote willow (*Salix exigua*), Goodding willow (*S. gooddingii*), Fremont cottonwood (*Populus fremontii*), arrowweed (*Pluchea sericea*), seepwillow (*Baccharis* spp.), and cattail (*Typha* spp.), occurs in mixed association with tamarisk, as pure native associations along the active river channel, or in small patches interspersed with bare sand, gravel deposits, tamarisk monocultures, and agricultural fields.

METHODS

SITE SELECTION

The original contract between the BLM and SWCA[®] specified that flycatcher presence-absence surveys be conducted on 206 ha (508 acres) at approximately 30-35 study sites and that any other areas constituting potentially suitable flycatcher nesting habitat be documented. In early spring of 2004, the BLM provided SWCA[®] with an electronic file of digital polygons corresponding to the study sites identified in the contract. Subsequent examination and ground-truthing of the polygons, which were based on aerial photography of unknown date, revealed they did not accurately portray conditions on the ground in 2004: the active river channel had changed course (in some cases substantially) through much of the study area, and an unknown number of years of riparian vegetation succession had occurred in the identified polygons.

For these reasons, the BLM authorized SWCA[®] to survey only those sites that we estimated to constitute potentially suitable habitat for nesting flycatchers based on our professional experience and the published descriptions of Sogge et al. (1997) and Sogge and Marshall (2000) provided the total area surveyed was at least 206 ha, equivalent to the area specified in the contract. We were instructed to prioritize survey efforts in the following order:

1. BLM lands upstream of the Highway 170 bridge, where potential flycatcher habitat on BLM lands was in close proximity to rapid development in the Mesquite area;
2. BLM lands downstream of Bunkerville; and
3. Private lands between the Highway 170 bridge and Bunkerville, where permission could be obtained.

Areas constituting "optimal" potentially suitable flycatcher nesting habitat (also based on our professional experience and the published descriptions of Sogge et al. [1997] and Sogge and

Marshall [2000]), were identified via ground surveys prior to the initiation of flycatcher surveys and were delineated on aerial photographs using GIS technology.

BROADCAST SURVEYS

Field techniques were designed to be identical to those used in ongoing flycatcher surveys being conducted in contract with the U.S. Bureau of Reclamation (BOR) along the Lower Colorado River (Koronkiewicz et al. 2004). We followed a modification of the ten-visit protocol proposed by Braden and McKernan (1998) and broadcasted songs and calls to elicit vocal responses, per methods described in Sogge et al. (1997). Two survey visits were completed between May 15 and 30, two were completed between June 1 and 15, and six were completed between June 16 and July 25. Surveys were separated by a minimum of five days whenever logistically possible.

Broadcast surveys were conducted adjacent to or within potentially suitable habitat using existing access routes whenever possible, including dirt roads, all-terrain vehicle (ATV) routes, trails, the riverbank and channel, and the edges of agricultural fields. Where access routes were not present, we flagged narrow trails into and through the dense riparian vegetation (see Figure 1). All survey transect routes were marked with pink surveyor's tape.

Field personnel used a portable CD player (various models used) connected to a Radio Shack 277-1008C mini amplified speaker. Surveyors stopped every 30-50 m and broadcasted flycatcher song (*fitz-bew*) and calls. Field personnel watched for responding flycatchers and listened for vocal detections for approximately one to two minutes before proceeding to the next survey station. Behavior of all flycatchers detected was recorded, as were numbers and interactions.

Wherever territorial or nesting flycatchers were detected, broadcast surveys were discontinued within a radius of 50 m, and attempts were made to determine the status of the territory and to locate an active nest. The presence of a Willow Flycatcher exhibiting territorial behavior at a site for one week or more during the study period, regardless of whether a possible mate was detected, constituted a territory (Koronkiewicz et al. 2004:48).

As requested by the Arizona Game and Fish Department, field personnel also recorded the presence of the Brown-headed Cowbird (*Molothrus ater*) and livestock. Cowbirds have potential to affect flycatcher populations by decreasing flycatcher productivity, and livestock have potential to substantially alter the vegetation in an area (USFWS 2002). All original field forms containing raw data of this nature were submitted to the BLM under separate cover and therefore are not included in this report. Blank copies of the field forms used are in Appendix I.

SITE DESCRIPTION

In order to document the seasonally dynamic vegetation structure and hydrology in riparian areas, field personnel completed site description forms (see Appendix I for an example) for each survey transect route at least three times throughout the survey season: early (mid May to mid June), mid season (mid June to mid July), and late (mid July to August). Vegetation composition (native vs. exotic) along survey transect routes was described using definitions of Sogge et al. (1997) and the Southwestern Willow Flycatcher Range-wide Database of the U.S. Geological Survey. Vegetation composition was defined as follows (Koronkiewicz et al. 2004:48):

1. native (more than 90% of the vegetation along a transect is native)
2. exotic (more than 90% of the vegetation is exotic/introduced)
3. mixed native (50–90% of the vegetation is native)
4. mixed exotic (50–90% of the vegetation is exotic/introduced).

Site description forms were submitted under separate cover and are not included in this report.

GEOGRAPHIC INFORMATION SYSTEM TECHNIQUES

A spatial representation of all seven survey transect routes was produced by having field personnel record start, stop, and intermediate waypoint UTM coordinates. All UTM coordinates were obtained in NAD 27 using a Garmin Rino 110 GPS unit with an accuracy of ≤ 7 m. All UTM coordinates were then downloaded (using Expert GPS[®] software) and plotted (using ArcView[®] 8.2 software) onto georeferenced, high-resolution aerial photographs to produce the maps of the study area (see Figure 1).

The total area of encompassed by flycatcher surveys was calculated using ArcView[®] 8.2 software and encompassed the effective area covered by broadcast surveys along the seven survey transects. The effective distance of the broadcasts in eliciting vocal responses from flycatchers was conservatively estimated at 50 m on either side of the transect (100 m total width of coverage). The total extent of "optimal" potentially suitable nesting habitat was likewise calculated with ArcView[®] 8.2 software. An ArcView[®] 8.2 personal geodatabase containing all survey transect routes, UTM coordinates of transect waypoints, flycatcher detections, "optimal" potentially suitable habitat polygons, survey coverage areas, and territory and nest locations is provided on a CD included at the back of this report.

YELLOW-BILLED CUCKOO AND YUMA CLAPPER RAIL DETECTIONS

The Yuma Clapper Rail is listed as federally endangered by the USFWS, and the Western Yellow-billed Cuckoo is a candidate for federal listing. Both species could potentially occur in the study area and are of concern to managing agencies. We did not survey (i.e. broadcast vocalizations) for these species but recorded all incidental detections.

BIRD-BANDING TECHNIQUES

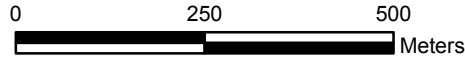
Throughout the 2004 study period, the Lower Colorado River Southwestern Willow Flycatcher study conducted by the BOR (Koronkiewicz et al. 2004) was banding flycatchers in areas adjacent to the study area of the current project. The current project benefited from the BOR study; in addition to banding birds for the BOR study, banding technicians captured and banded adult and nestling flycatchers in our study area, using mist nets and unique color bands. Banding was conducted on a time-available, non-systematic basis, and no attempt was made to band all flycatchers in the study area for this project. The 2004 banding results are provided here (Appendix III), courtesy of the Flagstaff office of SWCA[®] and the Boulder City office of the BOR, Lower Colorado River Region. Refer to Chapter 3 of Koronkiewicz et al. (2004) for a detailed description of banding protocol and techniques.

Figure 1. Willow Flycatcher Survey Results, 2004 Virgin River near Mesquite, NV

Map 01 of 04

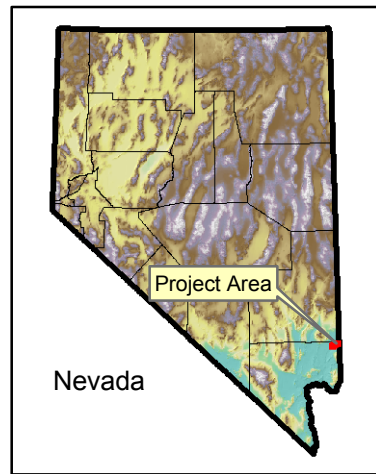
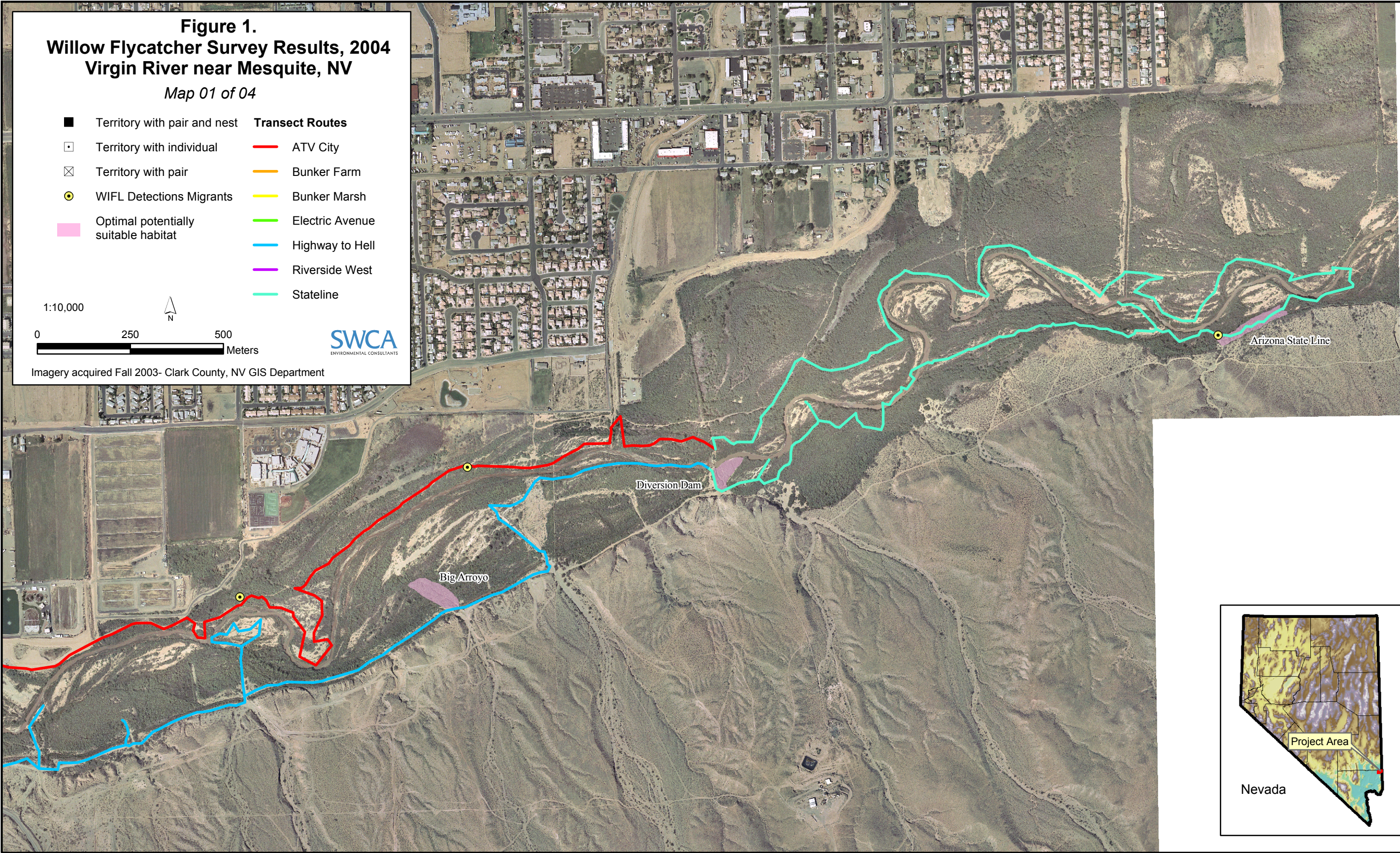
- | | |
|--|------------------------|
| ■ Territory with pair and nest | Transect Routes |
| □ Territory with individual | — ATV City |
| ⊗ Territory with pair | — Bunker Farm |
| ⊙ WIFL Detections Migrants | — Bunker Marsh |
| ■ Optimal potentially suitable habitat | — Electric Avenue |
| | — Highway to Hell |
| | — Riverside West |
| | — Stateline |

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Imagery acquired Fall 2003- Clark County, NV GIS Department



Nevada

Figure 1. Willow Flycatcher Survey Results, 2004 Virgin River near Mesquite, NV

Map 02 of 04

- | | |
|--|------------------------|
| ■ Territory with pair and nest | Transect Routes |
| □ Territory with individual | — ATV City |
| ⊗ Territory with pair | — Bunker Farm |
| ⊙ WIFL Detections Migrants | — Bunker Marsh |
| ■ Optimal potentially suitable habitat | — Electric Avenue |
| | — Highway to Hell |
| | — Riverside West |
| | — Stateline |

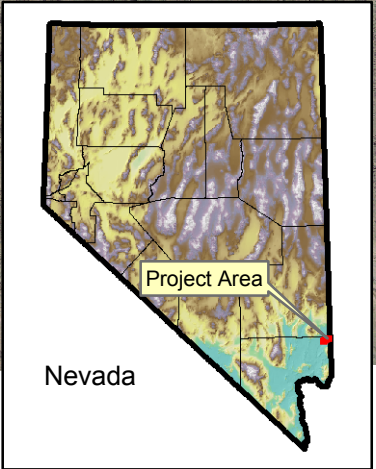
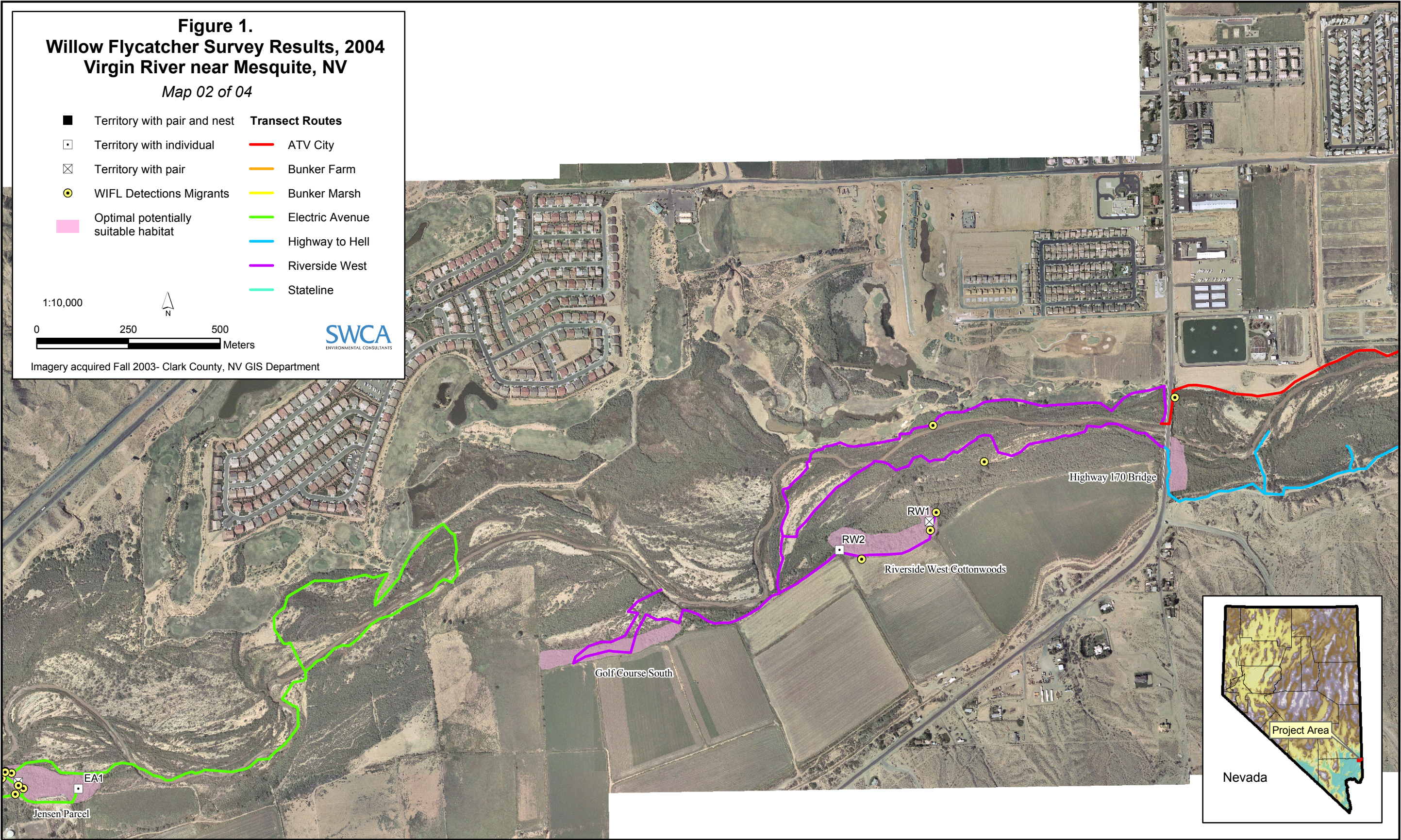
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Nevada

Figure 1. Willow Flycatcher Survey Results, 2004 Virgin River near Mesquite, NV

Map 03 of 04

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|--|------------------------|
| ■ Territory with pair and nest | Transect Routes |
| □ Territory with individual | — ATV City |
| ⊗ Territory with pair | — Bunker Farm |
| ⊙ WIFL Detections Migrants | — Bunker Marsh |
| ■ Optimal potentially suitable habitat | — Electric Avenue |
| | — Highway to Hell |
| | — Riverside West |
| | — Stateline |

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Imagery acquired Fall 2003- Clark County, NV GIS Department

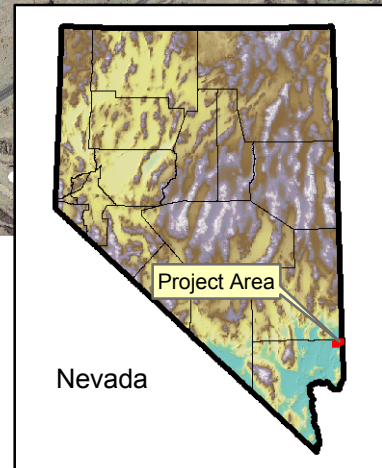
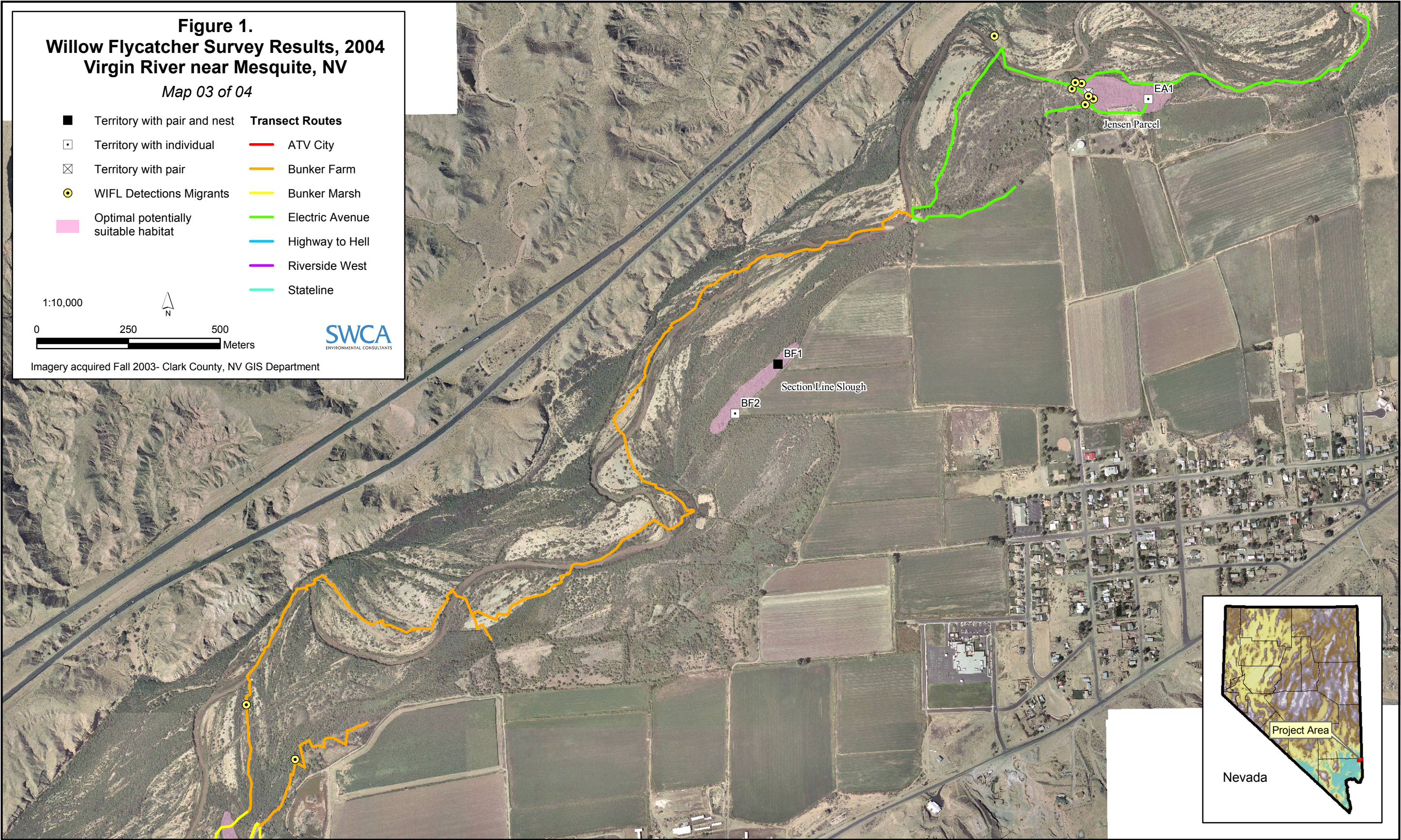


Figure 1. Willow Flycatcher Survey Results, 2004 Virgin River near Mesquite, NV

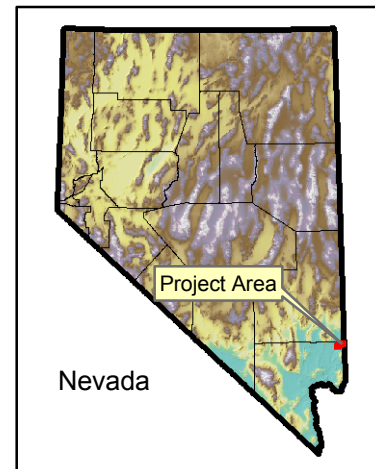
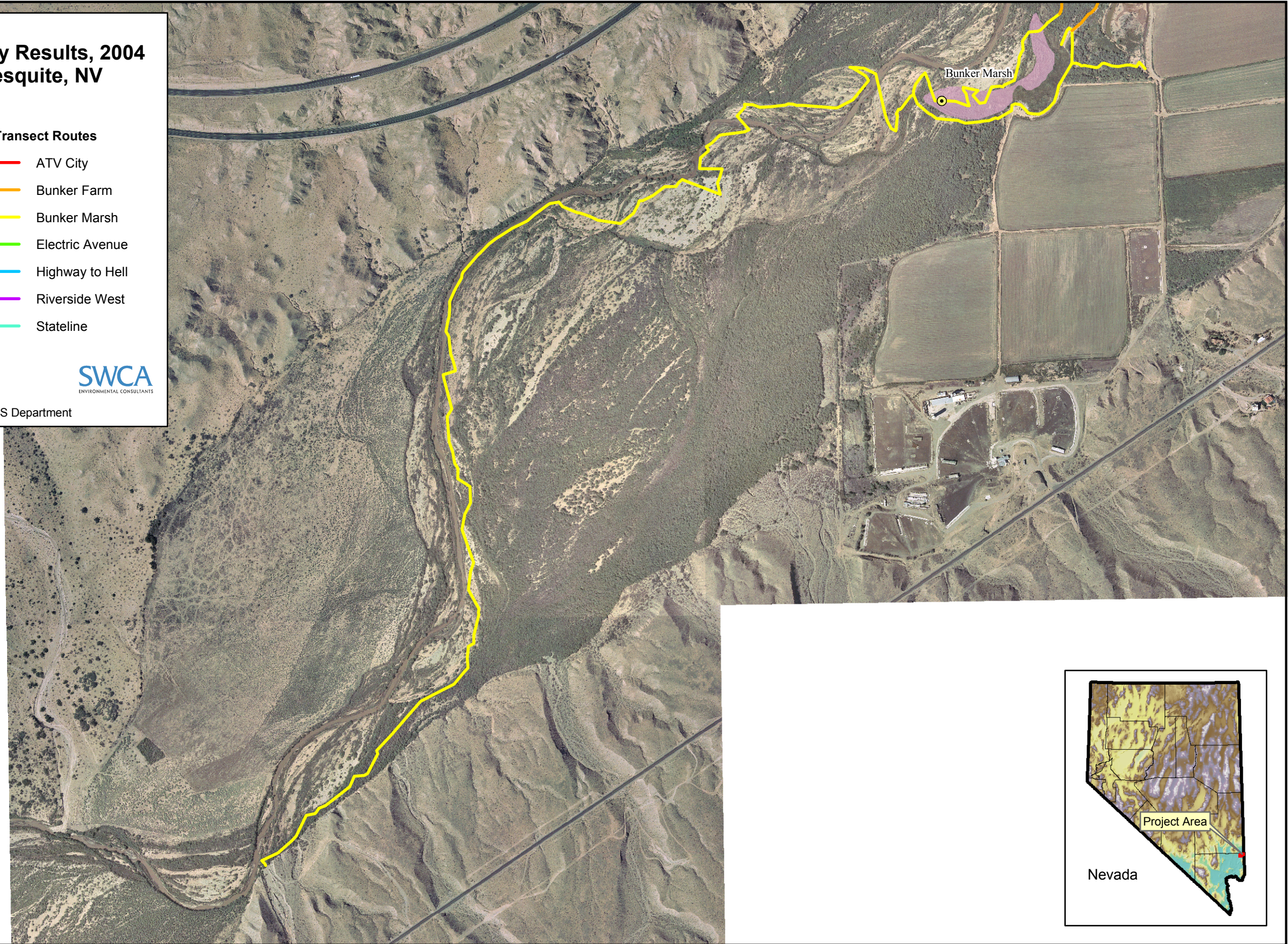
Map 04 of 04

- | | |
|--|------------------------|
| ■ Territory with pair and nest | Transect Routes |
| □ Territory with individual | — ATV City |
| ⊗ Territory with pair | — Bunker Farm |
| ⊙ WIFL Detections Migrants | — Bunker Marsh |
| ■ Optimal potentially suitable habitat | — Electric Avenue |
| | — Highway to Hell |
| | — Riverside West |
| | — Stateline |



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Imagery acquired Fall 2003- Clark County, NV GIS Department



RESULTS

SITE SELECTION

Nine areas estimated to constitute "optimal" potentially suitable habitat for nesting flycatchers were identified within the study area and mapped (Figure 1). These areas, comprising 10.6 ha, are qualitatively described in Table 1. Most of this habitat (9.0 ha; 85%) was associated with abandoned meander channel features in low-lying portions of the floodplain. Most of this habitat (6.7 ha; 63%) was also private property.

BROADCAST SURVEYS

A total of 262.3 person-hours were expended on broadcast surveys covering 264 ha (653 acres) of potential flycatcher habitat.

Six flycatcher territories were detected: one with an active nest (BF1), two with confirmed pairs (no nest detected, but possible; EA1 and RW1), and three that were apparently occupied by single flycatchers (BF2, EA2, and RW2; Table 2, see also Figure 1). Two territories (BF1 and BF2) were located on BLM property, and the remaining four territories (EA1, EA2, RW1, and RW2) were on private property. Two of the territories on private property (RW1 and RW2) were at the old Mesquite East site studied by McKernan and Braden (2001:21).

A total of nine resident flycatchers were detected in the study area: three on BLM property and six on private property. An additional 20 migrant flycatchers were detected between May 15 and June 15, primarily on private property.

All territories and all resident flycatchers were associated with willow- or native-dominated habitat in abandoned meander channels in low-lying portions of the floodplain (Table 1; see also Figure 1). Half of the migrant flycatcher detections (10; 50%) were also associated with willow-dominated, abandoned meander channels.

Table 1. Description, Extent, and Ownership of Areas of Optimal Potential Flycatcher Nesting Habitat Identified in the Virgin River Study Area At and Near Mesquite, Nevada, Summer 2004.

Site Number ¹	Site Name ¹	Site Description	Site Ownership				Total Area	
			BLM		Private/Municipal		ha	acres
			ha ²	acres	ha	acres		
1	Arizona State Line	Old meander channel dominated by willows.	0.5	1.3	0.0	0.0	0.5	1.3
2	Diversion Dam	Diversion ditch and impounded shoreline dominated by willows.	0.4	0.9	0.0	0.0	0.4	0.9
3	Big Arroyo	Mesic area bordering a low-lying arroyo channel dominated by willows.	0.6	1.4	0.0	0.0	0.6	1.4
4	Highway 170 Bridge	Irrigation return ditch outflow through low-lying area dominated by willows.	0.2	0.5	0.4	1.1	0.6	1.6
5	Riverside West Cottonwoods	Old meander channel with man-made dam; cottonwood overstory and willow/tamarisk understory.	0.0	0.0	1.9	4.6	1.9	4.6
6	Golf Course South	Old meander channel dominated by willows with some tamarisk; occasionally inundated by agricultural runoff.	0.0	0.0	1.6	4.0	1.6	4.0
7	Jensen Parcel	Old meander channel dominated by willows, occasionally inundated.	0.0	0.0	1.8	4.5	1.8	4.5
8	Section Line Slough	Old meander channel dominated by willows with some tamarisk.	0.7	1.6	0.5	1.3	1.2	2.9
9	Bunker Marsh	Old meander channel dominated by willows and cattails.	1.5	3.7	0.5	1.3	2.0	5.0
Grand Total			3.9	9.4	6.7	16.8	10.6	26.2

1. Site numbers and names are from Figure 1.

2. ha = hectares.

Table 2. Willow Flycatcher Detection Results for Survey Transects along the Virgin River At and Near Mesquite, Nevada, from May 15 to July 25, 2004

Visit	Dates	Flycatcher Survey Transects ^a							Summary by Visit				
		1	2 ^b	3	4 ^c	5	6	7	Nests (n)	Resident Individuals (r)	Number Pairs (p)	Number Territories (t)	Number Migrants (m)
1	May 17-27	1m	0	1m	7m	0	0	0	0	0	0	0	9
2	May 27-31	0	1m	0	6m	0	0	0	0	0	0	0	7
3	June 3-10	1m	1m	0	0	0	3r, 1p, 2t, 1m	0	0	3	1	2	3
4	June 11-15	0	0	0	0	0	3r, 1p, 2t	1m	0	3	1	2	1
5	June 16-22	0	0	0	0	0	1r, 1t	0	0	1	0	1	0
6	June 23-27	0	3r, 1p, 2t	0	0	0	2r, 2t	0	0	5	1	4	0
7	June 28–July 4	0	3r, 1p, 2t	0	0	0	1r, 1t	0	0	4	1	3	0
8	July 6-12	0	3r, 1p, 2t, 1n	0	0	0	0	0	1	3	1	2	0
9	July 13-16	0	2r, 1p, 1t, 1n	0	0	0	0	0	1	2	1	1	0
10	July 18-25	0	0	0	0	0	0	0	0	0	0	0	0
Summary ^c									1	6^c	2^c	4^c	20

NOTES: The following abbreviations are used: r = resident individuals, p = pairs, t = territories, n = nests, and m = migrants.

a. Survey transects are as follows (alphabetical order): 1 = ATV City, 2 = Bunker Farm, 3 = Bunker Marsh, 4 = Electric Avenue, 5 = Highway to Hell, 6 = Riverside West, and 7 = Stateline.

b. Flycatchers in the two territories detected along the Bunker Farm survey transect responded to the broadcast vocalizations on 27 June (territories were located >100 meters east of the transect), after which date broadcast surveys in the area were terminated. Visits to the territories on 27 June and subsequent dates confirmed their presence, status, and the number of resident flycatchers. An active nest containing two newly-hatched young was discovered in the northeastern-most territory (BF1) on 7 July; it contained two approximately 6-day-old nestlings on 12 July that were later banded on 16 July; the pair were also banded on 16 July.

c. These numbers do not include the two territories (three resident individuals but only one pair) within the Electric Avenue survey transect on the Kelley Jensen parcel that we did not receive permission to enter.

YELLOW-BILLED CUCKOO AND YUMA CLAPPER RAIL DETECTIONS

No cuckoos or clapper rails were seen or heard in the study area. However, an unknown number of clapper rail residents were detected in the large cattail marshes supported by golf course irrigation runoff at the Mesquite West site being monitored in the BOR's Southwestern Willow Flycatcher study (personal communication, Mary Anne McLeod, SWCA[®], Flagstaff office, July 2004). A checklist of all bird species detected in the study area and in adjacent areas has been included in Appendix II.

DISCUSSION

The 10.6 ha of "optimal" potentially suitable habitat identified in the study area contained all six territories detected yet constituted only about 1% of the total riparian habitat present (all types including suitable and unsuitable). Most of the "optimal" potentially suitable habitat was within or in association with abandoned meander channels of the Virgin River, a finding that confirms the importance of those relict floodplain features to the Southwestern Willow Flycatcher.

Abandoned meander channels occur in low-lying areas where the active river channel was formerly located; therefore, the soil surface in these areas is much closer to the water table. Floods inundate these depressions periodically, and runoff from adjacent agricultural irrigation also tends to collect in them, resulting in their tendency to exhibit moist or saturated soil conditions. These conditions promote the development, growth, and perpetuation of willow- or native-dominated riparian cover types that are the "optimal" potentially suitable habitat for nesting Southwestern Willow Flycatcher. The locations of "optimal" potentially suitable habitat identified in this report will likely change with time due to the dynamic nature of floodplain geomorphology and riparian vegetation succession.

LITERATURE CITED

- Alcorn, J. R. 1988. *The Birds of Nevada*. Fallon, Nevada: Fairview West Publishing.
- American Ornithologists' Union. 1998. *Check-list of North American Birds*, 7th ed. American Ornithologists' Union, Washington D.C.
- Braden, G. T., and R. L. McKernan. 1998. Observations on nest cycles, vocalization rates, the probability of detection, and survey protocols for the Southwestern Willow Flycatcher. Submitted to the U.S. Bureau of Reclamation, Boulder City, Nevada.
- Koronkiewicz, T. J., M. A. McLeod, B. T. Brown, and S. W. Carothers. 2004. Southwestern Willow Flycatcher surveys, demography, and ecology along the Lower Colorado River and tributaries, 2003. Annual report prepared by SWCA Environmental Consultants, Flagstaff, Arizona. Submitted to U.S. Bureau of Reclamation, Boulder City, Nevada.
- McKernan, R. L., and G. Braden. 2001. Status, distribution, and habitat affinities of the Southwestern Willow Flycatcher along the Lower Colorado River: Year 5 – 2000. Final report prepared by the San Bernardino County Museum, Redlands, California. Submitted to the Lower Colorado River Region, U.S. Bureau of Reclamation, Boulder City, Nevada.
- Phillips, A. R., J. Marshall, and G. Monson. 1964. *The Birds of Arizona*. Tucson: University of Arizona Press.
- Ryser, F. A., Jr. 1985. *Birds of the Great Basin: A Natural History*. Reno: University of Nevada Press.
- Sogge, M. K., R. M. Marshall, S. J. Sferra, and T. J. Tibbits. 1997. A Southwestern Willow Flycatcher natural history summary and survey protocol. Technical Report USGS/NAUCPRS/NRTR-97/12. U.S. Geological Survey, Colorado Plateau Field Station, Flagstaff, Arizona.
- Sogge, M. K., and R. M. Marshall. 2000. A survey of current breeding habitats. In *Status, Ecology, and Conservation of the Southwestern Willow Flycatcher*, ed. D. M. Finch and S. H. Stoleson. General Technical Report RMRS-GTR-60. U.S. Forest Service, Rocky Mountain Research Station, Ogden, Utah.
- U.S. Fish and Wildlife Service (USFWS). 2002. Final recovery plan Southwestern Willow Flycatcher (*Empidonax traillii extimus*). U.S. Fish and Wildlife Service, Southwestern Willow Flycatcher Recovery Team Technical Subgroup, Albuquerque, New Mexico.

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Wildlife Biologists..... Corina Burkhart
..... Ana Cerro
..... Thomas Sharp, M.S.
GIS Specialist..... Tyson Schreiner

APPENDIX I:

FIELD FORMS USED TO RECORD DATA

SWFL SURVEY AND DETECTION FORM

Site Name (specific to patch) _____ Date _____

Observer(s) _____ UTM Zone _____

Start Time _____ UTM E 0 _____ N _____	Stop Time _____ UTM E 0 _____ N _____
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Intermediate Waypoints	
UTM E 0 _____ N _____	UTM E 0 _____ N _____
UTM E 0 _____ N _____	UTM E 0 _____ N _____
UTM E 0 _____ N _____	UTM E 0 _____ N _____
UTM E 0 _____ N _____	UTM E 0 _____ N _____
UTM E 0 _____ N _____	UTM E 0 _____ N _____
UTM E 0 _____ N _____	UTM E 0 _____ N _____
UTM E 0 _____ N _____	UTM E 0 _____ N _____

SWFL Detections		
UTM E 0 _____ N _____	Banded? Y N U	Pair? Y N Nest Found? Y N
Comments _____		
UTM E 0 _____ N _____	Banded? Y N U	Pair? Y N Nest Found? Y N
Comments _____		
UTM E 0 _____ N _____	Banded? Y N U	Pair? Y N Nest Found? Y N
Comments _____		
UTM E 0 _____ N _____	Banded? Y N U	Pair? Y N Nest Found? Y N
Comments _____		

Survey Summary			
Total survey hours _____	# SWFLS found _____	Est. # Pairs _____	Est. # Territories _____
Playbacks used? Y or N Cowbirds Detected? Y or N If Y, approx # _____			
Sign of Livestock? Y or N If yes, explain _____			

Additional Comments _____

SWFL SURVEY AND DETECTION FORM – Additional Detections

Site Name (specific to patch) _____ Date _____

Observer(s) _____

SWFL Detections

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

UTM E 0 _____ N _____ Banded? Y N U Pair? Y N Nest Found? Y N
 Comments _____

APPENDIX II:

BIRD SPECIES DETECTED DURING SURVEYS FOR SOUTHWESTERN WILLOW FLYCATCHERS, MAY 15–JULY 25, 2004

This annotated checklist identifies the bird species that were detected along the Virgin River within or adjacent to the study area, Clark County, Nevada, during surveys for Southwestern Willow Flycatchers.

Presumed status is based on Ryser (1985), Alcorn (1988), and/or our field observations. *Relative abundance* categories are modified after Phillips et al. (1964); abundance of a given species is based on our field observations. Common names and phylogenetic order conform to ornithological standards established by the American Ornithologists' Union (1998) and subsequent revisions.

Presumed Status

Resident.....Species apparently occurs in the area throughout the spring and summer nesting season, probably nesting.

Migrant.....Species apparently passes through the area during migration, probably not nesting.

Unknown.....The presumed status is in question because insufficient information existed for evaluation of status.

Relative Abundance

Abundant.....Species is easily detected in large numbers (>50) on a daily basis.

Common.....Species is easily detected on a daily basis, but not in large numbers (5–50).

Fairly CommonSpecies regularly detected in small numbers (2–4) on a daily basis.

Uncommon.....Species regularly detected in very small numbers, although not necessarily every day.

RareSpecies detected irregularly in very small numbers.

Table II-1. Bird Species Detected along the Virgin River At and Near Mesquite, Nevada, during Surveys for Southwestern Willow Flycatchers from May 15 to July 25, 2004

Common Name	Presumed Status	Relative Abundance
Canada Goose	Resident on golf courses	Uncommon
Mallard	Resident	Fairly Common
Cinnamon Teal	Unknown	Rare
Ring-necked Pheasant	Introduced Resident	Rare
Gambel's Quail	Resident	Common
Northern Bobwhite	Introduced Resident	Rare
Pied-billed Grebe	Resident	Uncommon
Eared Grebe	Migrant	Rare
American White Pelican	Migrant	Rare
Great Blue Heron	Resident	Fairly Common
Snowy Egret	Unknown	Uncommon
Green Heron	Resident	Uncommon
Black-crowned Night-Heron	Resident	Uncommon
White-faced Ibis	Migrant	Uncommon
Turkey Vulture	Resident	Fairly Common
Northern Harrier	Migrant	Rare
Cooper's Hawk	Resident	Uncommon
Red-tailed Hawk	Resident	Uncommon
American Kestrel	Unknown	Rare
Peregrine Falcon	Unknown	Rare
Virginia Rail	Resident	Uncommon
American Coot	Resident	Uncommon
Killdeer	Resident	Fairly Common
Black-necked Stilt	Migrant	Uncommon
Spotted Sandpiper	Resident	Uncommon
California Gull	Migrant	Rare
Caspian Tern	Migrant	Rare
Rock Pigeon	Introduced Resident	Common
Eurasian Collared-Dove	Introduced (Resident?)	Rare
White-winged Dove	Unknown	Rare
Mourning Dove	Resident	Abundant
Budgerigar	Introduced (Resident?)	Rare
Greater Roadrunner	Resident	Uncommon

Table II-1. Bird Species Detected along the Virgin River At and Near Mesquite, Nevada, during Surveys for Southwestern Willow Flycatchers from May 15 to July 25, 2004

Common Name	Presumed Status	Relative Abundance
Barn Owl	Resident	Uncommon
Great Horned Owl	Resident	Rare
Lesser Nighthawk	Resident	Common
White-throated Swift	Unknown	Rare
Black-chinned Hummingbird	Resident	Fairly Common
Anna's Hummingbird	Migrant	Rare
Rufous Hummingbird	Migrant	Rare
Ladder-backed Woodpecker	Resident	Fairly Common
Hairy Woodpecker	Migrant	Rare
Olive-sided Flycatcher	Migrant	Rare
Western Wood-Pewee	Migrant	Uncommon
Willow Flycatcher	Migrant	Uncommon
Southwestern Willow Flycatcher	Resident	Uncommon
Black Phoebe	Resident	Fairly Common
Say's Phoebe	Resident	Uncommon
Ash-throated Flycatcher	Resident	Fairly Common
Western Kingbird	Resident	Fairly Common
Loggerhead Shrike	Resident	Rare
Bell's Vireo	Resident	Common
Plumbeous Vireo	Migrant	Uncommon
Common Raven	Resident	Common
Northern Rough-winged Swallow	Resident	Common
Cliff Swallow	Resident	Common
Verdin	Resident	Fairly Common
Bewick's Wren	Resident	Common
Marsh Wren	Resident	Rare
Blue-gray Gnatcatcher	Resident	Fairly Common
Black-tailed Gnatcatcher	Resident	Uncommon
American Robin	Resident	Uncommon
Northern Mockingbird	Resident	Uncommon
Crissal Thrasher	Resident	Uncommon
European Starling	Introduced Resident	Fairly Common
Lucy's Warbler	Resident	Common

Table II-1. Bird Species Detected along the Virgin River At and Near Mesquite, Nevada, during Surveys for Southwestern Willow Flycatchers from May 15 to July 25, 2004

Common Name	Presumed Status	Relative Abundance
Yellow Warbler	Resident	Common
Yellow-rumped Warbler	Migrant	Fairly Common
Ovenbird	Migrant	Rare
MacGillivray's Warbler	Migrant	Uncommon
Common Yellowthroat	Resident	Common
Wilson's Warbler	Migrant	Fairly Common
Yellow-breasted Chat	Resident	Common
Western Tanager	Migrant	Fairly Common
Abert's Towhee	Resident	Common
Black-throated Sparrow	Resident	Rare
Song Sparrow	Resident	Common
White-crowned Sparrow	Migrant	Rare
Rose-breasted Grosbeak	Migrant	Rare
Black-headed Grosbeak	Migrant	Fairly Common
Blue Grosbeak	Resident	Common
Lazuli Bunting	Migrant	Uncommon
Indigo Bunting	Resident	Uncommon
Red-winged Blackbird	Resident	Fairly Common
Western Meadowlark	Resident	Uncommon
Yellow-headed Blackbird	Resident	Rare
Great-tailed Grackle	Resident	Fairly Common
Brown-headed Cowbird	Resident	Common
Bullock's Oriole	Unknown	Rare
House Finch	Resident	Uncommon
Lesser Goldfinch	Resident	Uncommon
House Sparrow	Introduced Resident	Common

APPENDIX III:

**WILLOW FLYCATCHERS BANDED ON OR NEAR BLM-ADMINISTERED LANDS
ALONG THE VIRGIN RIVER NEAR MESQUITE, NEVADA**

Banders from the Flagstaff office of SWCA Environmental Consultants (Jennifer Brown and Nora Camberos) netted and banded eight resident Southwestern Willow Flycatchers at three sites on or adjacent to BLM-administered lands along the Virgin River near Mesquite, Nevada. This task was not directly a part of this study and was not included in this contract. These birds were banded in association with the Southwestern Willow Flycatcher population and demography study being funded by the U.S. Bureau of Reclamation (BOR) in order to provide more information on the migration, movements, recruitment, and site fidelity of flycatchers along the Lower Colorado River.

Table III-1. Willow Flycatchers Banded On or Adjacent to BLM-administered Lands along the Virgin River At and Near Mesquite, Nevada, in June and July, 2004

Location	Date Banded	Federal Band #	Color Combination ¹	Age ²	Sex ³	Territory ⁴	Notes
Electric Avenue (Jensen parcel) ⁵	June 4	2320-31492	EE:RG(M)	3Y	F	EA1	Exhibited brood patch on capture date. Captured with existing fed. band and plastic color combo, both of which were replaced. Old fed. band was 2140-66503, color combo Zs:G(HP)Y(HP). Bird originally banded as nestling at BOR Mesquite West study site in 2002.
Electric Avenue (Jensen parcel) ⁵	June 4	2320-31491	GK(M):EE	AHY	M	EA1	Probable mate of above female.
Electric Avenue (Jensen parcel) ⁵	June 4	2320-31654	EE:KY(M)	AHY	M	EA2	Male not confirmed to be paired.
Riverside West Cottonwoods	June 10	2320-31494	EE:OG(M)	AHY	U	RW1	Probable male based on behavior; the old BOR Mesquite East study site (Braden and McKernan 2001).
Bunker Farm	July 16	2320-31632	RZ(M):EE	SY	F	BF1	Paired with male below.
Bunker Farm	July 16	2320-31473	EE:OKO(M)	SY	M	BF1	Paired with female above. Originally banded as nestling at BOR Mesquite West study site in 2003.
Bunker Farm	July 16	2320-31630	UB:EE	L	U	BF1	Nestling of above pair.
Bunker Farm	July 16	2320-31631	UB:EE	L	U	BF1	Nestling of above pair.

Notes: All banding codes and data conform to the system used by Koronkiewicz et al. (2004).

1. Color combination codes: EE = electric yellow federal band, Zs = gold federal band, O = orange, K = black, Z = gold, R = red, G = green, (M) = metal pin striped band, (HP) = half plastic bands/bands cut to half the height of a full plastic band, UB = unbanded. Color combinations are read as the bird's left leg and right leg, top to bottom; two letters designate every band; color band designations for right and left legs are separated by a colon.

2 Age in 2004: L = nestling, SY = 2 years, AHY = 2 years or older, 3Y = 3 years.

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

4 Territory codes: see Figure 1.

5 These three flycatchers were banded before Mr. Jensen told us to cease gathering data on his property.