SOUTHWESTERN WILLOW FLYCATCHER AND YELLOW-BILLED CUCKOO SURVEY AND MONITORING AT SELECT SITES IN SOUTHERN NEVADA, 2007 ANNUAL REPORT

Southwestern Willow Flycatcher (Charles Lohman)

Yellow-billed Cuckoo (Polly Sullivan)

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

Standardized presence/absence surveys and nest monitoring at select sites in southern Nevada were continued by the Nevada Department of Wildlife (NDOW) in 2007 for the federally endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*), and Endangered Species Act candidate species, the Western Yellow-billed Cuckoo (*Coccyzus americanus occidentalis*).

Southwestern Willow Flycatchers breed in dense native riparian habitats, and their recent population declines have been attributed to loss, fragmentation, alteration and/or degradation of breeding habitat, brood parasitism by Brown-headed Cowbirds (*Molothrus ater*), nest predation and loss of wintering habitat. Surveys were conducted at numerous sites in six different geographic areas, followed standardized protocols, and utilized playback recordings of willow flycatcher songs and calls. NDOW also assisted with color-banding activities at Key Pittman Wildlife Management Area. Over 181 hours were spent conducting surveys, resulting in the detection of 28 resident willow flycatchers, consisting of 24 paired birds and four singles. Seventeen nesting attempts were documented and 31 young were known to successfully fledge. All nests were constructed in Coyote Willow (*Salix exigua*). Only one incidence of cowbird parasitism was documented.

Yellow-billed Cuckoos breed in woodlands with clearings and dense shrub understory, usually associated with watercourses. The cuckoo has declined from much of its historic range in the western U.S, and these declines have been linked to pesticide use, loss of riparian habitat in nesting areas as a consequence of fragmentation, inundation by reservoirs, channelization, and urban development. Surveys were conducted at numerous sites in six different geographic areas, followed standardized protocols and utilized playback recordings of cuckoo calls. NDOW spent 120 hours conducting surveys resulting in zero cuckoo detections. No nests or young were detected or documented.

Management recommendations for both species include: continuation of survey and monitoring efforts at known breeding sites to assess life history parameters; develop new and cultivate existing partnerships with private landowners to identify and monitor willow flycatcher and cuckoo breeding territories on private lands, and encourage participation in Conservation Easements, Safe Harbor Agreements and Landowner Incentive programs; continue to manage for willow flycatchers and cuckoos on state and federal lands, promote habitat restoration and mitigate potentially harmful land use practices that may impact breeding habitats, including improper grazing, water diversion, and destruction of willow patches, cottonwood galleries and other riparian habitats; continue to coordinate and collaborate with other agencies and consultants to collectively achieve downlisting and delisting goals and objectives put forth in the Southwestern Willow Flycatcher Recovery Plan, and to preclude listing of the Yellow-billed Cuckoo.

SOUTHWESTERN WILLOW FLYCATCHER

Introduction

The southwestern willow flycatcher (*Empidonax traillii extimus*) (willow flycatcher) is a small passerine neotropical migratory bird that breeds in the riparian habitats of seven southwestern states including New Mexico, Arizona, California, Utah, Nevada, Colorado, and Texas (Sogge 1997), and winters in Central and South America. It is one of 10 species of *Empidonax* flycatchers found in North America, and one of possibly five subspecies of willow flycatcher (Figure 1). All *Empidonax* flycatchers are extremely difficult to distinguish by sight alone; however, the willow flycatcher can be distinguished by its distinctive "fitz-bew" song. Further identification of resident subspecies in a particular area is determined by presence of birds during specific breeding time periods.

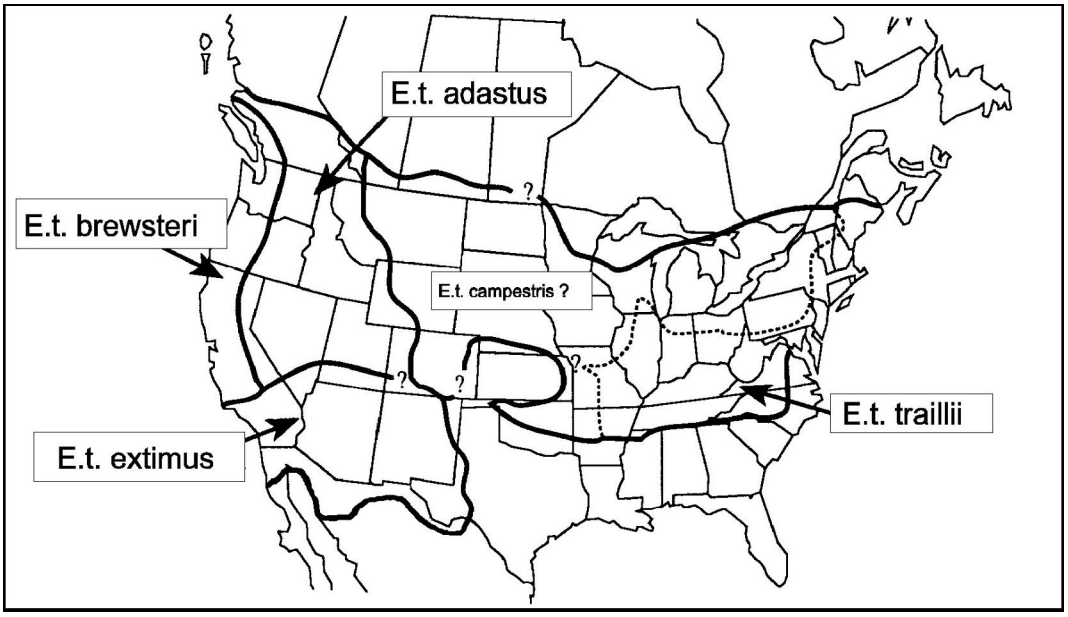

FIGURE 1. Breeding distribution of willow flycatcher (*Empidonax traillii*) subspecies. Adapted from Unitt (1987), Browning (1993), and Sogge et al. (1997).

Southwestern willow flycatchers typically arrive on their breeding territories by May or June and depart for wintering grounds in late August, resulting in an approximate 100-day breeding season. A breeding territory is often confirmed by the presence of a male singing from an exposed perch, and sometimes aggressively attacking other species intruding into its territory (Sogge et al 1997). Willow flycatchers do not appear to exhibit high nest fidelity, but do exhibit high site or territory fidelity. Dense vegetation near watercourses or inundated wetlands is required for nesting, thus the species is considered a riparian obligate breeder. In Nevada, preferred vegetation consists of willows (*Salix spp*.), cottonwoods (*Populus spp*.), tamarisk (*Tamarix spp.*), and Russian olive (*Eleagnus angustifolia*), among others. Preferred watercourses may include rivers, streams, springs or marshes. At some sites the water source may be ephemeral over the course of a year, but the habitat must support riparian vegetation during the breeding season.

The loss of riparian habitats, invasion of exotic plant species, brown-headed cowbird (*Molothrus ater*) (cowbird) brood parasitism, and loss of wintering habitats have contributed to the decline of this subspecies (McKernan & Braden 1999). The United States Fish & Wildlife Service

(FWS) listed the southwestern willow flycatcher as an endangered species under the Endangered Species Act of 1973 (ESA) as amended in March 1995 and designated critical habitat in July 1997. In 2002 the Southwestern Willow Flycatcher Recovery Plan was published, and the FWS re-initiated comments for additional critical habitat, with the final critical habitat designation published in November 2005. In Nevada, an 18.6 mile stretch of the Virgin River, from the Arizona/Nevada border to the upstream boundary of the Overton State Wildlife Management Area (WMA), was designated as critical habitat. Additional important habitat, including the lower Virgin River, Muddy River, Pahranagat National Wildlife Refuge (NWR), Key Pittman State WMA, and Overton WMA, were excluded as critical habitat under section 4(b)(3) of the ESA. According to this section, the benefits of excluding certain State or Federal Wildlife Areas or National Wildlife Refuge lands under appropriate management for southwestern willow flycatchers outweighs the benefits of their inclusion, as these lands are already managed for the conservation of the species. The flycatcher is also listed as state-endangered in Nevada, and as a species of conservation priority in the Nevada Wildlife Action Plan.

Since 1997 the Nevada Department of Wildlife (NDOW) has conducted standardized southwestern willow flycatcher surveys at select sites to accurately monitor and document details of the entire breeding and nesting process. NDOW and other agencies have conducted surveys in appropriate breeding habitat at sites throughout southern Nevada, including the Virgin and Muddy Rivers, Lake Mead, Pahranagat NWR, Ash Meadows NWR, Oasis Valley, Mormon Mesa and Meadow Valley Wash. These surveys are cooperatively conducted by various agencies and private consultants, including: the U.S. Geological Survey, Biological Resources Division (Colorado Plateau Field Station), San Bernardino County Museum, Stephen W. Caruthers Associates (SWCA), NDOW, and others. This report only represents data generated and collected by NDOW personnel at selected survey sites, which are listed and described below in the Survey Site Description section.

The focus of NDOW's southwestern willow flycatcher survey and monitoring efforts are to:

- coordinate with other agencies to identify and survey all potential breeding habitat;
- continue to conduct presence/absence surveys at selected sites monitored by NDOW since 1999;
- conduct nest searches and monitor found nests to determine and document nest success and productivity;
- provide a general site description for each survey area, including characterization of habitat attributes and vegetation measurements for each nest site;
- coordinate with SWCA to color band adult and fledgling willow flycatchers to enhance their long-term study of willow flycatcher movements.

Methods

Surveys

The survey protocol for the southwestern willow flycatcher, established by the FWS, was adapted from Sogge *et al*. (1997), with FWS revisions. A minimum of one tape-playback survey visit was conducted during each of three defined periods consisting of 15 May to 31 May, 1 June to 21 June, and 22 June to 17 July. Survey visits were separated by at least five days, and were conducted from one hour prior to sunrise to 10 am. Within appropriate habitat and at intervals of 30-40 m, willow flycatcher song (fitz-bew) and calls were broadcast acoustically. Following each broadcast, 1-2 minutes of listening commenced before moving to the next broadcast location. Once a territorial willow flycatcher was detected, nest search and/or nest monitoring was initiated.

Although the various subspecies of willow flycatcher occupy distinct breeding ranges, they are extremely difficult to distinguish by sight and sound, having similar songs and only subtle differences in color and morphology. This is problematic in terms of identifying breeding resident southwestern willow flycatchers on territories; they may be confused with migrating, singing individuals of the northern subspecies as they pass through Nevada during their migration. Therefore, willow flycatchers detected on the local breeding range between 15 June and 20 July, or birds observed outside of these dates, yet positively associated with nesting activities or nests found, were presumed to be resident southwestern willow flycatchers. Birds observed at the beginning of this time period, but not observed during subsequent site visits, or birds observed after 25 July, were considered migrants.

Nest Monitoring

Once resident territorial willow flycatchers were documented, nest searches and nest monitoring were initiated, following the Southwestern Willow Flycatcher Nest Monitoring Protocol (Rourke et al. 1999), a modification of the Breeding Biology Research and Monitoring Database (BBIRD) field protocol (Martin et al. 1997). Nests were located by systematically searching each area and/or observing adults returning to nests. Once evidence of nesting activity was documented, the number of visits was increased and each nest was monitored throughout the remaining breeding season to more accurately document details of the entire nesting process, including clutch size, nestlings produced, number of fledglings, or nest failure. A mirror pole was used to determine nest contents during the nest monitoring period.

According to the nest monitoring protocol, a nest could have been considered successful if one of the following four conditions was met: 1) one or more young confirmed visually fledging from the nest or located near the nest; 2) adult willow flycatchers seen feeding fledglings; 3) parents behaved as if dependent young were nearby (defensive behavior and/or adults agitated) when the nest was empty; or 4) nestlings observed in the nest within two days of the estimated fledge date (based on the assumption of fledging at 10 days). The nest monitoring protocol indicates that meeting one of the first two conditions is preferable and recommends any necessary follow-up surveys to visually confirm fledglings. In addition, for the purposes of this report, only fledglings actually observed were counted towards the total young fledged from each nest, resulting in a conservative estimate (Koronkiewicz et. al. 2006). Simple nest success was calculated using the ratio of successful nests to total nests observed.

Nest failure was assumed if any of the following was documented: 1) nest was abandoned prior to egg laying (abandoned); 2) nest was deserted with eggs remaining (deserted); 3) nest fledged no flycatcher young but contained cowbird eggs or young (parasitized); 4) nest was found empty or destroyed more than two days prior to the estimated fledge date (depredated); 5) nest was destroyed due to weather (weather); or 6) entire clutch was incubated unsuccessfully for more than 20 days (infertile).

Presence and number of brown-headed cowbirds was also recorded for each survey visit. No cowbird trapping effort was conducted in 2007.

Color Banding

NDOW assisted SWCA in uniquely banding birds at Key Pittman WMA as part of SWCA's on-going study of flycatcher movements and life history. Adult and fledgling willow flycatchers were captured in mist nests, using an active targeted approach by luring the birds into the nets via broadcasting conspecific vocalizations, or by a passive approach without acoustic broadcasts. Nestlings (8-10 days old) were banded only if removal/replacement of the nestling would not

endanger the nest, nest plant or nestlings. Once in hand the birds were measured, sexed, aged and banded. Adults received a colored, numbered U.S. federal aluminum band on one leg and a unique color combination on the other leg. Nestlings and fledglings were banded with a colored, numbered federal band and a non-unique additional band on the other leg. This approach aided in identifying a returning bird as a nestling/fledgling from a previous year, should it return in a subsequent year. If observed in subsequent years, these birds were then recaptured as adults and re-banded with a unique combination.

Methods for observing and recording resighted banded bird (banded in a previous year) data followed the SWCA Southwestern Willow Flycatcher Resight Protocol (SWCA unpubl.). Observations, via binoculars, of resighted banded birds were noted, including the order and color of the bands on the respective legs, and location and confidence levels for the observations. For a resight to receive a 100 percent confidence rating, the full band combination on both legs would have to be observed twice. Resights consisting of only one leg and/or only part of the color combination observed received a lower confidence rating. The confident resight information is then used to identify individual birds and provide a history of flycatcher movements, survivorship and site fidelity.

Habitat and Vegetation

Habitat characteristics and vegetation components were identified and/or measured and recorded on standardized forms (Appendix B) for each survey site. Variables recorded included average canopy height, percent canopy cover, presence of surface water or saturated soil, distance to water, nest height, and vegetation species associated with nest location. Additionally, predominant vegetation was categorized into four general habitat types:

1. monotypic high-elevation willow -- entirely or almost entirely native broadleaf plants including high elevation willow
2. native broadleaf dominant -- mixed native and exotic plants (mostly native)
3. mixed native exotic -- mixed exotic and native plants (mostly exotic)
4. monotypic exotic – entirely or almost entirely exotic/introduced plants

Avifauna Summary

While conducting the standardized endangered bird surveys, field notes were also recorded for observations or detections of other bird species, including location, number and ages of individuals and breeding behaviors. This information is presented in Appendix A.

Survey Site Descriptions

Ten different areas were surveyed and/or monitored for willow flycatchers by NDOW in 2007. A brief summary of each location follows, and additional information, including geographic coordinates and elevations can be found in Table 1. Each survey site or transect was mapped and geographically defined via UTM coordinates for the start and stop points of each transect, or in the form of a polygon collected using a Trimble GeoExplorer 3 handheld global positioning system (GPS). Survey area boundaries were estimated based on coordinates collected in the field and digital orthoquad (DOQ) aerial photos. Survey data were recorded on standardized datasheets and all survey and nest monitoring data were entered into the NDOW Southwestern Willow Flycatcher database.

Ash Meadows-Bradford Spring

This site consists of a patch of coyote willows (*Salix exigua*) adjacent to Bradford Spring, with a cattail marsh adjacent to the willow patch. The spring and outflow stream was located near the

west side of the patch. The central area and path into the patch was mostly flooded throughout the season. The coyote willow canopy height averaged 5.5 m. This site has been consistently surveyed since 1999, with the exception of 2003-2004.

Ash Meadows-Carson Slough

This site is located in the northwest corner of the Ash Meadows National Wildlife Refuge. The slough was highly disturbed in the past due to intensive peat removal and ranching. Suitable flycatcher habitat at this site consists of large stands of screwbean mesquite *(Prosopis pubescens)*, and tamarisk (*Tamarix chinensis)*. These stands are interrupted by large saltbush *(Atriplex spp.)* scrublands. Water sources consist of small flowing tributaries from nearby springs that began to dry as the survey season progressed.

In the fall of 2000, a fire occurred to the northeast area of this site but was contained approximately 60 m from the survey area and did not appear to affect any of the potential breeding habitats. In August 2004, a second lightning fire burned the northwest part of the refuge, which included the known flycatcher territories (the flycatchers had already vacated the area for the season). As a result, two new transects were established in 2005 adjacent to the historic fire-damaged territories. The north transect was about 0.6 mi long, and follows a small stream bordered by tamarisk, honey mesquite (*Prosopis glandulosa*) and sparse screwbean mesquite. The south transect traverses through a few patches of tamarisk (20 or more grouped together) with nearby screwbean mesquite with a few honey mesquites. Average canopy height was 6 m, and distance to surface water or saturated soil was 150 m. This site has been consistently surveyed since 1999, but with changes to the transect locations due to 2004 fire.

Ash Meadows-Forrest Spring

This site is part of the original Ash Meadows-Point of Rocks site initiated in 1999, and is located west of Point of Rocks Spring. The first portion of the transect consists of dense screwbean mesquite along with tamarisk and an understory of Russian knapweed (*Centaurea repens*). The transect intersects Forrest Spring and proceeds southwest through patches of wild grape and coyote willow, and is surrounded by a marsh with cattail (*Typha sp*) and bulrush (*Scirpus sp*). Another transect follows the major vegetation northwest of Forrest Spring and continues south to a patch of coyote willow. Average canopy height was 6.1 m, and this site remained wet throughout the season. This site has been consistently surveyed since 1999, with the exception of 2003-2004.

Ash Meadows-Longstreet Spring

The Longstreet Spring site is located immediately south of Rogers Spring and Carson Slough. The survey area consists of a mixed stand of coyote willow and screwbean mesquite, with an average canopy height of 6 m. A large spring exists to the east of the survey area and feeds a drainage ditch that follows a fence to the west. The willow patch follows the drainage ditch for about 800 m. Hydrological conditions did not change during the survey period resulting in continuous moist soil adjacent to the water source and drier soil occurring farther from water. This site was surveyed in 2000, and then not again until 2005.

Corn Creek

This site is located approximately 20 miles northwest of Las Vegas and three miles east of Highway 95, within the Desert National Wildlife Range. The habitat includes three ponds (an upper pond and two lower ponds) surrounded by marsh reed (*Phragmites sp*) and cattail. The upper pond (40 ft wide x 60 ft long) is fed by nearby Corn Creek springs. An irrigation ditch flows from the upper pond to the lower ponds (20-30 ft in diameter). Several species of trees,

both native and introduced, dominate the area, including cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*), honey mesquite, Russian olive (*Eleagnus angustifolia*), elm (*Ulmus Americana*), black locust (*Robinia pseudoacacia*) and fruiting mulberry (*Morus alba*). Several species of fruit trees, including apple, apricot, and pecan are also present. A horse and mule pasture is adjacent to the forested area to the southeast. Average canopy height was 16.2 m, and distance water was 0 m. This site was first surveyed in 2004.

Crystal Springs

The site is located in Lincoln County, near the intersection of Highway 375 and Highway 318, south of Key Pittman WMA. The habitat consists of spring-fed riparian with two man-made ponds. Cottonwoods occupy the overstory (24-27 m), while black willow constitutes the midstory(15-18 m). There is pasture land adjacent to this site; however, cattle have been excluded since 2003. Extensive Russian olive occurred at this site until 2003, when it was mostly removed, and replaced with native coyote willow, ash and cottonwood. Additional Russian olive removals and habitat rehabilitation efforts have occurred 2004-2007. This site was first surveyed for flycatchers in 2002, at which time a pair was observed nesting. It has been surveyed each year since, with the exception of 2006. No additional activity has been documented.

Moapa Valley-Warm Springs Ranch

This site is located on private property nine miles north of the town of Glendale, on Warm Springs Road near State Route 168. Survey transects were established along two waterways, including a drainage area to the west and the Muddy River to the east. Considerable water and dense vegetation including tamarisk was located at the east area, while dense mesquite occurred with tamarisk at the west area. Willow, tamarisk, and honey mesquite canopy heights ranged from 5 to 8 meters, with palms (*Washingtonia spp.*), ash, and Fremont cottonwoods ranging from 15 to 30 m high. The wetland vegetation was primarily cattail, sedge and bulrush, surrounded by a wet meadow. This site has been consistently surveyed since 2000.

Moapa Valley-Pump Station

This site is adjacent to the Warm Springs Ranch Site, immediately to the southeast, and follows the Muddy River from the Warm Springs Road bridge, for about 1200 m. Most of the vegetation along the river is tamarisk and arroweed, with a few stands of cottonwood and tall honey mesquite are located nearby. This site has been consistently surveyed since 2000.

Oasis Valley-South

This site is located just south of the Beatty city limits, on the east side of U.S. Highway 95. This site, also referred to as the Narrows, consists of a small strip of riparian habitat along the Amargosa River. Vegetation is patchy and mainly composed of large cottonwoods, coyote willow, tamarisk, and cattail patches. In 2006, water was present in the streambed in mid-June, but was dry by the end of the survey period, with only small patches of running water throughout. This site has been consistently surveyed since 1999.

Pahranagat Valley-Key Pittman (Nesbitt Lake)

This site is located in Pahranagat Valley, on the Key Pittman Wildlife Management Area, adjacent to Highway 318. The site consists of 12 coyote willow patches, with an average canopy height of 7 m, located on the western edge of Nesbitt Lake. At the beginning of the survey period, the patches were inundated 60-100 percent. As the season progressed, the water slowly receded and by mid August standing water was 1-21 m away from the patches. Beginning in 2004, cattle were allowed to graze on the management area from early July through the end of

the survey season in August. A fencing project was initiated in 2006 to keep the cattle out of the willow patches, and will be completed by the spring of 2008. This site has been consistently surveyed since 1999.

Other Sites not surveyed

Four sites that had been surveyed in previous years were not monitored in 2007 due to lack of access/permission. The Oasis Valley—Springdale site was located on private property and was first surveyed in 2001. In 2005, new landowners asked us to discontinue surveys on the property. Pahranagat Valley—North, was located on private property and was surveyed between 1999 and 2001. Since 2002 access has been denied at this site. Two main sections of the lower Meadow Valley Wash were not monitored due to denied access by Union Pacific Railroad. The habitat in this section of the wash was significantly altered by a major flood event in January 2005.

TABLE 1. Location, site names and geographic information for each willow flycatcher site surveyed in 2006.

Location	Site Name	TRS	UTM	Elev. (ft)
Ash Meadows NWR	Bradford Spring	T18S R50E S11	562556 E 4028559 N	2,252
Ash Meadows NWR	Carson Slough	T17S R50E S9 and S16	558621 E 4037696 N	2,230
Ash Meadows NWR	Forrest Spring	T18S R51E S7 & T18S R50E S12	564535 E 4028184 N	2,252
Ash Meadows NWR	Longstreet Spring	T17S R50E S22	560394 E 4035829 N	2,240
Desert NWR	Corn Creek	T17S R59E S34	647170 E 4033583 N	2,920
Pahranagat Valley	Key Pittman	T4S R60E S23 & 27	656667 E 4158686 N	3,834
Pahranagat Valley	Crystal Springs	T5S R60E S10	656020 E 4155105 N	3,800
Moapa Valley	Warm Springs Ranch	T14S R65E S15 & 16	704520 E 4065220 N	1,750
Moapa Valley	Pump Station	T14S R65E S15 & 16	705927 E 4065109 N	1,750
Oasis Valley	South	T12S R47E S7	522073 E 4083766 N	3,250

Results

Survey Effort and Detections

Ten areas were surveyed for willow flycatchers by the Nevada Department of Wildlife in 2007. One seasonal Conservation Aid spent 181.86 hours surveying and monitoring the 10 areas encompassing nearly 16 linear kilometers (Table 2). During the 2007 survey season, a total of 28 adult resident flycatchers were detected at three areas. The total was comprised of twelve pairs and four single flycatchers; all twelve of the pairs attempted to nest. Occupied areas included Ash Meadows –Bradford Spring, Moapa Valley – Warm Springs Ranch, and Pahranagat Valley—Key Pittman Wildlife Management Area, however, no breeding was recorded at Warm Springs Ranch.

TABLE 2. 2007 resident Southwestern Willow Flycatcher survey summary for all sites.

Survey Site	Survey Hours[1]	# Adults	# Pairs	# Territories	Nesting Attempts
Ash Meadows—Bradford Sp	9.75	2	1	1	1
Ash Meadows—Carson Slough	24.75	0	0	0	0
Ash Meadows—Forrest Sp	6.26	0	0	0	0
Ash Meadows—Longstreet Sp	2.75	0	0	0	0
Desert NWR—Corn Creek	6.2	0	0	0	0
Pahranagat Valley—Key Pittman	67.25	25	11	13	15
Pahranagat Valley---Crystal Springs	8.6	0	0	0	0
Moapa Valley—Warm Sp Ranch	36.0	1	0	1	0
Oasis Valley	10.5	0	0	0	0
Total	*181.86*	*28*	*12*	*15*	*16*

1--Total hours includes nest monitoring

The four unpaired willow flycatchers established territories and sang throughout much of the breeding season. One unpaired resident was detected at Moapa Valley—Warm Springs, and the other three occupied three different patches at Pahranagat Valley—Key Pittman.

Eleven migrant willow flycatchers were recorded in 2007. Three single migrants were detected one time at Ash Meadows – Carson Slough on 4 June. Two occupied mesquite/tamarisk groves, and the third was detected in a 90 m long, 6-7.5 m tall coyote willow patch. At Pahranagat Valley – Key Pittman on 12 June, a single willow flycatcher called "fitz-bew" in a cottonwood at the south shoreline. Also on 21 Aug, a migrant was observed on phragmites vegetation. A pair of migrating flycatchers was detected on 8 Aug at Oasis Valley – Torrance Ranch during a yellow-billed cuckoo survey. Additional cuckoo surveys in mid to late Aug documented single migrant birds at Corn Creek, Pahranagat Valley--Crystal Springs, Moapa Valley – Warm Springs Ranch, and Oasis Valley – South.

Nest Monitoring

Sixteen nests or nesting attempts were documented at only two of the ten surveyed sites (Ash Meadows—Bradford Spring and Pahranagat Valley—Key Pittman) in 2007. Twelve of the 16 nests were determined to contain willow flycatcher eggs and were used in calculating simple nest success and productivity. Ten nests successfully fledged young resulting in a simple nest success rate of 83 percent.

At least 42 eggs were laid, based on eggs observed and/or observed fledglings; however the actual number of eggs may have been higher than observed due to possible predation in-between nest monitoring visits. Of the 42 known eggs, 31 known fledglings were produced for a fledgling success rate of 73.8 percent. Average clutch size in 2007 (based only on nests with at least one egg) was 3.5 eggs/nest, and average number of fledglings produced was 2.6 young/nest. Three nests in 2007 produced four fledglings.

Twelve pairs attempted to nest in 2007. Nine females each had one successful nesting attempt; two females had two nesting attempts; and one female had three nesting attempts. Ultimately all but two re-nesting females were eventually successful in fledging young. All nest failures in 2007 were attributed to depredation. In all, five nests (31 percent) experienced depredation of at least one egg or fledgling. In addition, one of the successful nests also experienced desertion; that is, the nest fledged at least one flycatcher, yet at least one flycatcher egg was deserted and addled later in the nesting process. For a more detailed chronology of events at

each occupied territory, see the Site Specific Summary section. Overall historic survey results including total numbers of birds, pairs, nests and other data for all active sites since 2001 are presented in Table 3.

TABLE 3. Overall survey results for the period 2001-2007, including number of adults, pairs, nests, incidence of brown-headed cowbird parasitism, abandoned and/or depredated nests, eggs, fledglings, successful nests, and mean number of fledglings per successful nest, including a 6-year mean for all parameters, for all active sites monitored by NDOW.

Year	'01	'02	'03	'04	'05	'06	'07	7 Yr Mean
Total # Adults	18	22	13	16	18	20	28	19.3
Total # Pairs	5	10	4	7	8	8	12	7.7
Total # Nests	7	13	6	12	12	12	16	11.1.0
BHCO Parasitism	0	2	2	1	1	1	1	1.1
Aband./Depred. Nests	2	3	4	1	2	6[1]	8	3.7
# Eggs	17	28	17	21	27	26	39	25.0
# Fledglings	10	14	3	10	7	17	31	13.1
# Successful Nests	5	8	1	4	3	7	10	5.4
Avg. # Fledg/Suc Nest	2.0	1.8	3.0	2.5	2.3	2.4	3.1	--

[1]Two of these six nests were also successful in fledging at least one willow flycatcher

Brown-headed cowbirds were detected at all sites surveyed in 2007 with the exception of Pahranagat Valley—Crystal Springs, however brood parasitism was only documented at one nest in 2007. Despite the parasitism, the pair's second nest was ultimately successful in fledging three willow flycatchers. No known cowbirds were fledged from any of the willow flycatcher nests. In 2007, numbers of observed cowbirds fluctuated considerably between survey days; ranging from 1 to 17 cowbirds.

Color Banding

Five new birds consisting of four nestlings from one nest and one new adult were banded in 2007 at Key Pittman by SWCA personnel. Additionally, 2 previously banded birds were captured and re-banded as adults. Table 4 summarizes the 2007 new banding information.

TABLE 4. 2007 new banded and recaptured/re-banded willow flycatchers. Source: SWCA.

2007 Capture Location	Initial Band Date	2007 Age[1]	Sex[2]	Federal Band #	Current Color Combo[3]	Old Color Combo[3]	Obs. Status[4]
Key Pittman	7/21/05	3Y	M	2320-31683	EE:BO(M)	EE:UB	R (5/24/07)
Key Pittman	6/27/07	L	U	2360-59779	EE:UB	N/A	N
Key Pittman	6/27/07	L	U	2360-59780	UB:EE	N/A	N
Key Pittman	6/27/07	L	U	2360-59781	EE:UB	N/A	N
Key Pittman	6/27/07	L	U	2360-59782	UB:EE	N/A	N
Key Pittman	5/23/07	AHY	M	2370-40187	RB(M):PU	N/A	N
Key Pittman	7/3/05	3Y	M	2320-31694	EE:BK(M)	EE:UB	R (5/24/07)

1 Age in 2007: L = nestling, AHY = 2 years or older, 3Y = 3 years, 4Y = 4 years; 2 Sex: F = female, M = male, U = unknown
3 Color-band Codes: EE = electric yellow federal band, PU = pumpkin federal band, (M) = metal pin-striped band, UB = unbanded, B = light blue, O = orange, R = red, W = White, Z = gold, K = black. Color band designations for right and left legs are separated with a colon; combinations are read from top to bottom of leg; 4 Observation Status Codes: N = new capture, R = recapture followed by date recaptured/re-banded.

Several previously banded birds were resighted in 2007 by both SWCA and NDOW, including five resights that were positively verified at Key Pittman and one at Ash Meadows—Bradford Spring. Additional NDOW resights were recorded, however, observability was difficult as the birds moved quickly and frequently hid behind vegetation from the surveyor. As a result, usually only one leg was observed at a time and confidence was low for all of the observations, therefore they are not presented here. Resighted birds that could not be positively identified all occurred at Pahranagat Valley—Key Pittman.

Habitat and Vegetation Characteristics

Predominant vegetation at the two sites where nesting occurred was classified as native broadleaf plants (monotypic high-elevation willow). Habitat measurements for all nest sites were combined for an average of 2.8 m for nest height (range 1.3 m to 5.1 m) and 6.1 m for overall canopy height (range 5.0 m to 7.8 m) for all nest sites. Percent canopy cover averaged 92.2 percent in 2007. It should be noted that the averages stated above are for only areas where nesting occurred. Habitat measurements for the two survey sites where nesting occurred are shown in Table 5.

TABLE 5. Southwestern Willow Flycatcher nesting habitat analysis for active nest sites in 2007.

Site	Avg.Nest Height (m)	Avg. Canopy Height (m) (At Nest)	Avg. Canopy Cover (%) (At Nest)	Dominant Species*
Ash Meadows--Bradford Sp	2.3	5.9	88.6	Coyote willow
Pahranagat Valley--Key Pittman	2.9	6.1	92.4	Coyote willow

All 16 nests (100 percent) were constructed in coyote willow in 2007. Both sites where nesting occurred were either inundated or had water/saturated soil within 0 m; at Bradford Spring, most of the patch was flooded the entire breeding season, and at Key Pittman, the willow patches were 50-100 percent inundated at the start of the season, with water 1-20 m away by August.

Presence of livestock or recent sign was observed at four of the 10 sites surveyed in 2007, including: Corn Creek, Key Pittman, Warm Springs Ranch, and Oasis Valley.

Avifauna Summary

A total of 127 different bird species were observed and/or heard during the endangered bird surveys in 2007. A detailed list of all bird species, their occurrence and breeding status can be found in Appendix A.

Site Specific Summaries for Areas with Resident Willow Flycatchers

Pahranagat Valley—Key Pittman: At Key Pittman WMA, three single willow flycatchers were observed and 11 flycatcher pairs constructed a total of 15 different nests, produced a total of 42 eggs; nine of which were lost, and 31 young fledged. Of the 15 nests, seven were destroyed and/or depredated by unknown species, and nine produced fledglings. Prior to 2007, the number of coyote willow patches occupied by pairs and unmated summer residents ranged from three to 11, out of 12 total patches. Historically, this equates to an occupancy rate of 23.0 to 84.6 percent. In 2007 the occupancy was 100 percent at the available flycatcher habitat at Pahranagat Valley—Key Pittman.

The pair at Patch #1 constructed three nests. After its initial discovery, the first nest was discovered empty and destroyed on the next site visit. The second nest located was empty, and later disappeared. The third nest contained three eggs, all of which hatched and three young successfully fledged.

The pair located in Patch #2 constructed a nest and was successful in fledging four willow flycatchers. The Patch #3 pair's first nesting attempt resulted in four eggs by 19 June, and four successful fledglings. The pair at Patch #4 constructed a nest by 19 June and laid four eggs, discovered on 26 June. By 10 July, the nest contained four one-day old hatchlings, which successfully fledged. At Patch #5, a single resident willow flycatcher was heard calling "fitz-bew" in early June, and in late June the flycatcher also called "weo". No 'whitts', indicating nest defense, were heard, nor was a second bird, nest or fledglings ever located. The unmated resident willow flycatcher remained at the patch for 50 days from 5 June to 24 July. Patch #6 was occupied by two pairs of willow flycatchers. The southern pair had constructed a nest by 19 June and laid three eggs by 3 July, resulting in young which fledged successfully. The northern pair's nest was located on 24 June, which eventually contained three eggs. After 17 July, the nest had two eggs and one on the ground. On 24 July the nest was empty and no eggs were located on the ground. The unsuccessful nest may have been predated, as barn owl feathers were found near the nest area. The seventh pair at Patch #7 constructed one nest, in which 3 eggs were found. All three successfully hatched and fledged.

The pair at Patch #8 constructed two nests. The first nest was 80 percent completed when discovered on 30 May. The 12 June survey revealed that the original nest was complete, but a second new nest had been built directly on top of it, effectively becoming a double-decker nest. The nest remained empty until it was destroyed by 19 June. A possible explanation is that a brown-headed cowbird laid an egg(s) in the original nest. Willow flycatchers are known to rebuild atop cowbird eggs, also known as egg burial (Koronkiewcz, pers comm). A second nest about 9 m away from the double decker nest was found on 26 June with four eggs. Three eggs produced fledglings and one egg (addled) remained in the nest for the remainder of the season. It is possible that the three fledglings were predated since they were not seen nor heard during the remainder of the season. No parental defense whitts were heard either. Several (16) raven feathers were on the ground near the nest location.

The pair occupying Patch #9A (the portion of the patch south of the concrete diversion channel) constructed one nest containing three eggs by 3 July. All three eggs developed into fledglings. A flycatcher pair, located in Patch #9B to the north of the channel, built one nest with three eggs by 19 June. On 26 June the nest had only one egg. No eggs or shells were found on the ground. The nest was either predated by an unknown predator or brown-headed cowbirds removed the two eggs. The remaining egg did successfully produce a fledgling.

Patch #10 was occupied by a single willow flycatcher for 71 days during the breeding season from 22 May to 31 July. The flycatcher pair at Patch #11 constructed two nests. The first nest was empty when found on 5 June. A week later the nest was gone (destroyed), but a second nest was discovered on 24 July containing two eggs. Two nestlings were seen from 31 July to 7 August. The survey on 14 August found the patch to be quiet with no adults defending nestlings/fledglings nor fledglings moving about. It is possible the nestlings/fledglings were predated. A single resident willow flycatcher occupied Patch #12 from 30 May to 26 June, a total of 28 days.

Ash Meadows—Bradford Spring: The pair at Bradford Spring constructed only one nest. By late June the nest contained three willow flycatcher eggs and two weeks later three nestlings about eight days old. By mid-July, the nest was empty with three fledglings in the area. On or about 13 August, the flycatchers vacated Bradford Spring.

Moapa Valley---Warm Springs Ranch: A single un-banded willow flycatcher was first observed in a cottonwood near the fish dam on the south side of the property on 18 May. Four weeks later the bird had moved approximately 460 m to a willow patch. This flycatcher remained in the area for 36 days from 18 May to 22 June. Later in the season, a single willow flycatcher migrant was seen on 17 August.

No other resident willow flycatcher activity was documented at the other monitored sites in 2007.

Discussion

Survey Effort and Detections

Ten sites were surveyed in 2007 compared to 12 sites in 2006. Historically 20 different sites have been surveyed for willow flycatchers, although not all necessarily have been surveyed each year. Table 6 summarizes the 1999-2007 status of all historically monitored willow flycatcher sites.

As revealed in Table 6, Key Pittman continues to be the most consistent and productive site monitored by NDOW. Similar suitable habitat located just south of this site, on the Pahranagat National Wildlife Refuge, which was surveyed and monitored by SWCA (Flagstaff), also has consistently reported relatively high numbers of flycatchers and high productivity in recent years (McLeod et al. 2005 and Koronkiewicz et al 2006). The privately held River Ranch, located in the same valley, in the past also supported high numbers of willow flycatchers; however access for survey and monitoring continues to be denied.

Following the 2004 fire at Ash Meadows Carson Slough, no willow flycatchers had been documented along the newly established transects adjacent to the fire area during 2005 and 2006. However, in 2007 three migrant flycatchers were documented on 4 June. One migrant was on the north transect (north of the burn), and two migrants were on the south transect (south of the burn). There has been renewed activity detected at both nearby Forrest and Bradford Springs, following a period of inactivity and non-survey. Forrest and Bradford Springs were not impacted by the fires and these sites, and others at Ash Meadows, will continue to be monitored closely in future years.

Some of the sites that have never had a documented resident willow flycatcher continue to be monitored due to past detections of migrant willow flycatchers, presence of suitable habitat, and/or simultaneous monitoring for yellow-billed cuckoos (*Coccyzus americanus*). These sites include: Moapa Valley Pump Station, Oasis Valley—South, and Ash Meadows—Longstreet Spring. Several other sites that may have only been surveyed one or two seasons were likely deemed to consist of unsuitable habitat and therefore surveys were discontinued, or were located on private land where access is no longer granted. These sites include: Pahranagat Valley—Crystal South, Clover Creek, Beaver Dam, Meadow Valley Wash USFWS 2a-e and 5a-c, and Ash Meadows—Crystal reservoir and ALC.

TABLE 6. Status of potential willow flycatcher sites historically monitored by NDOW, 1999-2006. X=surveys conducted, no willow flycatchers documented; R=resident willow flycatchers documented (does not denote success or failure); M=migrant willow flycatchers documented, but no residents; --=location not surveyed in that year.

Location	'99	'00	'01	'02	'03	'04	'05	'06	'07
PV—Key Pittman	R	R	R	R	R	R	R	R	R
PV—River Ranch	R	R	R	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]
PV—Crystal Springs	--	--	--	R	X	X	M	--	X
PV—Crystal South	--	--	--	X	--	--	--	--	--
Clover Creek	X	--	--	--	--	--	--	--	--
Beaver Dam	X	X	--	--	--	--	--	--	--
MVW 12-14/USFWS[2]	--	X	--	M	--	--	X	X	--
MVW USFWS 2a-e	--	--	--	--	--	--	--	X	--
MVW USFWS 5a-c	--	--	--	--	--	--	--	X	--
Moapa Warm Springs	--	X	X	M	R	R	R	X	RM
Moapa Pump Station	--	X	X	X	X	X	X	X	X
Corn Creek	--	--	--	--	--	M	M	X	X
Location	'99	'00	'01	'02	'03	'04	'05	'06	'07
Oasis—South	X	X	X	X	X	X	M	X	X
Oasis—Springdale	--	--	M	X	X	M	--[1]	--[1]	--[1]
AM—Carson Slough	R	R	R	R	R	R	X[3]	X[3]	M
AM—Bradford	R	R	X	X	--	--	X	R	R
AM—Forrest	R	X	M	X	--	--	R	R	X
AM—Longstreet	--	X	--	--	--	--	X	X	X
AM—Crystal Res	--	X	--	--	--	--	--	--	--
AM—ALC	X	--	--	M	--	--	--	--	--

1— access denied by landowners; 2—Formerly Lower Meadow Valley Wash Miles 12.5 and 14, renamed USFWS 4a-e post flood in 2005; 3—A fire destroyed the historic sites in 2004 resulting in new transects being established for 2005-06 in different locations. PV=Pahranagat Valley; MVW=Meadow Valley Wash; AM=Ash Meadows.

The 2007 survey results for willow flycatchers conducted by NDOW showed an increase in bird activity on all fronts, including number of adults, pairs, nests, egg and fledglings, compared to previous years. Between 2001 and 2006 the numbers of adults, pairs, and nests varied slightly but remained relatively constant, except in 2003 when a decrease on all fronts was observed. However, in 2007 the number of adults increased 40 percent over 2006 (20 to 28).

Nest Monitoring

In 2007 nesting was documented at the same two survey areas as in 2006. A total of 16 nesting attempts were made, one at Ash Meadows—Bradford Spring and 15 at Pahranagat Valley---Key Pittman. The combined 83 percent simple nest success rate reported in the results section is slightly higher than the 70 percent rate in 2006 and significantly higher than the 25 percent observed in 2005. The number of fledglings increased 82 percent (17 to 31), average clutch size increased, and the average number of fledglings/nest increased 59 percent (1.7 to 2.7).

Average clutch size for nests with eggs increased 35 percent in 2007 over 2006 (2.6 to 3.5 eggs/nest), In addition, combined fecundity increased from 2.4 fledglings per successful nest in 2006 to 3.1 in 2007. This value was the highest recorded since initiation of the project in 1999,

slightly exceeding the 3.0 value recorded in 2003. Obstacles affecting successful reproduction, including predation and addled eggs continue to be documented. Fifty percent of the nests in 2006 and 2007 experienced some form of predation, compared to 58 percent in 2005. The source of predation was not positively determined for any of the occurrences in 2007. Suspected predators of willow flycatcher eggs and nestlings include gopher snake, common kingsnake, Cooper's hawk, red-tailed hawk, great horned owl, western screech-owl, yellow-breasted chat and Argentine ants, as well as other snakes, lizards, chipmunks, weasels, raccoons, ring-tailed cats, foxes and domestic cats (USFWS 2002). In a report by the Arizona Game and Fish Department (1999), brown-headed cowbirds were observed to be nest predators, ejecting eggs or nestlings without depositing their own eggs. Thus, while brood parasitism may not occur, cowbirds may still be accountable for nest failure by predation.

Parasitism by cowbirds has been documented every year since 1999, with the exception of 2001. Over the previous years, known cowbird parasitism has remained low, although nest predation/abandonment has increased slightly. Despite the detection of cowbirds at nearly all survey sites in 2007, only one incidence of parasitism was probable (the double-decker nest at Key Pittman), resulting in a rate (0.06 percent) much lower than the recommended 20-30% threshold which should trigger the initiation of cowbird control efforts (Smith et al. 2000).

Nesting territories at Key Pittman in 2007 were found in similar areas as in previous years, although nest placement varied within those territories. This is typical as studies have shown that flycatchers appear to exhibit site/territory fidelity but not nest fidelity. Nest placement within certain habitat is predictable for certain bird species based on vegetation distribution (Arizona Game & Fish Department 1999).

Color Banding

Although color banding is not routinely conducted at all sites surveyed by NDOW each year, NDOW personnel have assisted SWCA with color banding activities at NDOW sites as requested. Color banding and resight data enhances our knowledge of life history parameters such as annual survivorship of adults and young, site fidelity, seasonal and between-year movements and population structure (McLeod et al. 2005). Although recent confidence levels have been low for resighted banded birds at all sites, capture and re-banding of young birds have shown an influx of birds originally banded at Pahranagat NWR, moving to and nesting at Key Pittman WMA (Koronkiewicz pers comm.)

Habitat and Vegetation Characteristics

Canopy cover densities for nests found in 2007 (82.8 – 95.6 percent) fell within the high end of the known established range of 50-100 percent. Average nest height in 2007 of 2.8 m is also comparable, and is on the upper end of the range of 2-7 m reported in the Recovery Plan (2002). The 2007 results for nest height, canopy height and canopy cover are all similar to NDOW results from previous years, and comparable to results of other willow flycatcher monitoring efforts. Nest distance to water varied among sites and across the last few years, however, most sites were within the expected distance to water during critical time periods.

Based on information from the current study, it appears willow flycatchers prefer dense patches of coyote willow for breeding habitat. This habitat type is easy to enhance, as the willows will quickly propagate given an adequate amount of water and protection of the saplings from grazing. For example, patches of coyote willow at Key Pittman have expanded to a size capable of supporting multiple nesting flycatchers, within a five-year time frame (Bart Tanner, NDOW, pers. comm.). In fact, NDOW has documented an increased number of flycatchers at

Key Pittman in the past few years from 1999 to 2002, with a drop in 2003 and then another increase through 2007 (6, 9, 14, 17, 7, 9, 12, 17 and 25 individuals for years 1999-2007, respectively). Some willow patches that were no more than one-tenth of an acre supported nesting willow flycatchers.

NDOW has been working with private landowners and federal partners to manage grazing at sites where willow flycatchers occur. At Key Pittman WMA, efforts have been made to reduce grazing pressures on willow flycatcher habitat while still accommodating management efforts designed to benefit waterfowl and upland game. In the mid 1990's cattle numbers were reduced from 100 to 75, and the season of grazing was reduced by two months, from 1 April thru 31 August to 30 June thru 31 August. This grazing regime has continued each year through the 2007 season. In 2006 a fencing project was initiated at Key Pittman to further reduce possible habitat destruction by cattle. This project is scheduled to be completed in 2008. The Department has continuously monitored flycatcher nesting status at this site since 1999, and during this period the Department has documented an expansion of the willow habitat as well as increasing number of flycatchers, nesting pairs, and number of nests.

Management Recommendations
Based on the results of recent coordinated southwestern willow flycatcher surveys and nest monitoring in Nevada and surrounding states, and in consultation with the Nevada Department of Wildlife's Wildlife Action Plan (2006), the following recommendations are put forth:

1. Continue to conduct surveys and nest monitoring at known breeding sites to assess life history parameters such as nest success, productivity, nest parasitism and depredation, as well as possible habitat loss or impacts. Investigate and locate new previously unknown territories in suitable habitat, or potential habitat. The results from these and other survey efforts in other states will contribute to achieving downlisting and delisting goals and objectives put forth in the Southwestern Willow Flycatcher Recovery Plan (2002).

2. Continue to maintain federal and state cooperation and collaborative funding for continued statewide surveys in Nevada.

3. Continue to develop new and cultivate existing partnerships with private landowners to identify and monitor willow flycatcher breeding territories on private lands. Encourage participation in Conservation Easements, Safe Harbor Agreements and Landowner Incentive Programs.

4. Continue to manage for willow flycatchers on state and federal lands and mitigate potentially harmful land use practices that may impact breeding habitats, including improper grazing, water diversion, and destruction of willow patches and other riparian habitats. Complete the fencing project at Key Pittman in 2008.

5. Encourage landowners to apply livestock grazing prescriptions in balance with the ability of the native riparian vegetation to regenerate and maintain itself.

6. Promote native habitat restoration while avoiding impacts to existing nest territories that may occur in invasive salt cedar, allowing for natural transitioning of nesting pairs from exotic to natural vegetation.

7. Pursue conservation protection for designated critical southwestern willow flycatcher habitat in Nevada.

8. Continue monitoring brown-headed cowbird numbers and incidents of parasitism at survey areas to determine if future cowbird trapping and removal efforts are warranted.

YELLOW-BILLED CUCKOO

Introduction

The yellow-billed cuckoo (*Coccyzus americanus*) (cuckoo) is a medium sized neotropical migrant that historically bred throughout most of western North America from British Columbia to Mexico, as well as in most of the eastern United States (Hughes 1999). The range of the western subspecies (C. a. occidentalis) has significantly contracted in recent decades, and now only breeds in isolated areas in Idaho, California, Utah, Arizona, and Nevada (Figure 2). The cuckoo winters primarily in South America.

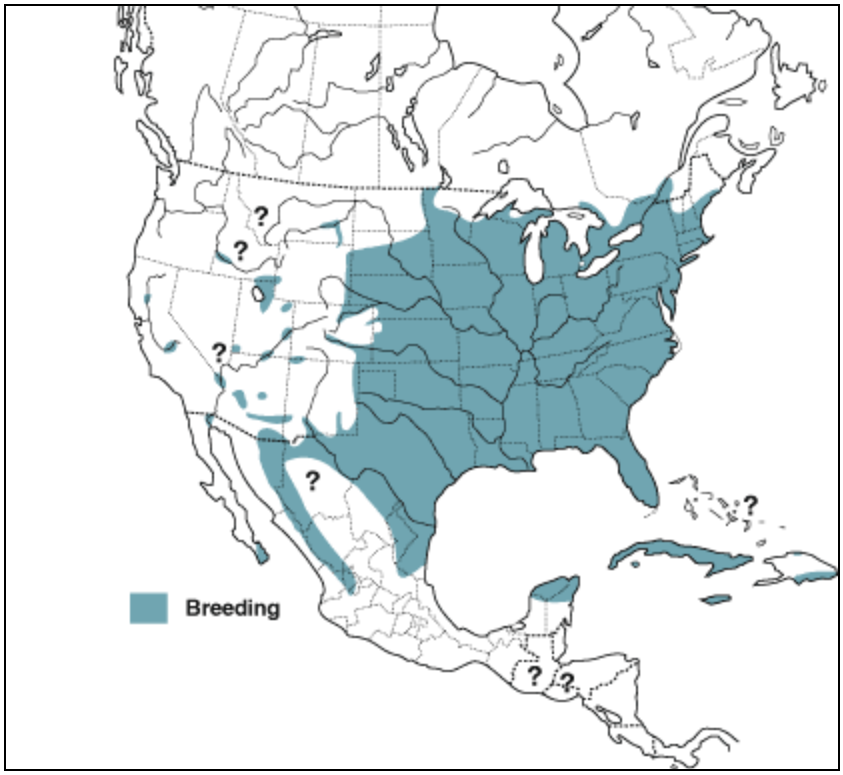

FIGURE 2. Breeding distribution of the Yellow-billed Cuckoo.
Source: Birds of North America, online 2006.

Yellow-billed cuckoos are very secretive birds and have unique reproductive characteristics involving a very rapid breeding cycle. Generally, cuckoos arrive at their breeding grounds late in the season and both adults quickly build a stick nest in a tree or large shrub. Eggs are laid (usually 2-3) and both adults share incubation duties that last 9-11 days, followed by the young fledging approximately 7-9 days after hatching. Typically, the average time required for egg laying to fledging is 17 days. The altricial young are usually fully feathered within two hours of hatching (Hughes 1999). Cuckoos have also been known to participate in communal nesting behavior and are sometimes assisted by apparently unrelated helper males that can supply the young with up to 40 percent of their food, allowing the dominant pair to possibly raise a second brood. Adults and young depart for wintering grounds when the young are about 3-4 weeks old.

The cuckoo diet consists of mostly caterpillars, cicadas, grasshoppers and other potential crop-destroying insects. As a result, cuckoos may exhibit irruptive behavior by moving into areas where cicada outbreaks are underway, to capitalize on the available food source (Laymon

2001). Cuckoos usually time egg laying with outbreaks of insects to ensure an adequate food supply for them and their young.

The cuckoo inhabits woodlands with clearings and dense shrub understory, usually associated with watercourses. Throughout the southwest during the breeding season, cuckoos seem to prefer desert riparian corridors consisting of cottonwood and dense mesquite thickets. Cuckoos utilize large home ranges, varying in size between 5 and 20 ha, however smaller than average home ranges have been observed in Nevada (Halterman 2002). In Nevada, the cuckoo has been documented in the western and southern portions of the state including: along the Carson River, Lahontan Valley and the Fallon area (Alcorn 1988); at Beaver Dam Wash, Pahranagat Valley and Meadow Valley Wash, and; along the Lower Virgin River, Las Vegas Valley, Corn Creek and Moapa Valley (Alcorn 1988, NDOW 2000-2006). The only known cuckoo nest records in Nevada are from Warm Springs Ranch in Moapa Valley in 2001 (NDOW 2000-2006).

The cuckoo has declined from much of its historic range in the western U.S. and southern British Columbia (Laymon and Halterman 1987). The early decline of the species in the west has been linked to pesticide use on both the breeding and wintering grounds as well as loss of riparian habitat in nesting areas as a consequence of fragmentation, inundation by reservoirs, channelization, and urban development (Gaines and Laymon 1984; Laymon and Halterman 1987). The cuckoo was petitioned for listing as an endangered species under the Endangered Species Act of 1973 (ESA) in February of 1998 (Suckling et al. 1998). The U.S. Fish and Wildlife Service (FSW) found the petition to be warranted, but precluded by higher priority listing actions. Consequently, the yellow-billed cuckoo was added to the candidate species list on 18 July, 2001 (USFWS 2001).

Breeding season surveys for cuckoos have been conducted by NDOW, other agencies and private consultants at various sites to determine distribution and breeding status of cuckoos in suitable riparian areas of Southern Nevada. NDOW personnel have conducted these surveys since 2000, and other cooperators conducting similar surveys included San Bernardino County Museum, Stephen W. Caruthers Associates (SWCA), and others. This report only represents data generated and collected by NDOW personnel at selected survey sites, which are listed and described below in the Survey Site Description section.

Methods

Surveys

Yellow-billed cuckoo survey protocols were adapted from methods developed by Halterman *et. al.* (2002), with revisions in 2005. Surveys consisted of walking along suitable habitat, stopping every 100 m and playing a recording of cuckoo calls, followed by listening for a response. Yellow-billed cuckoo “kowlp” calls were broadcast acoustically via handheld MP3 player and mini amplified speaker. The speaker or other playback equipment must be capable of projecting undistorted sound at least 100 m. Upon arriving at each call station the surveyor remained quiet for 1-2 minutes to acclimate to surrounding noises and listen for incidental spontaneous cuckoo calls. The contact call was then played once, followed by 1-2 minutes of listening, and then the process was repeated four more times for a total of a minimum of five playbacks per station before advancing 100 m to the next call station. Habitat patches 200 m in width or larger would require additional transects to adequately cover the entire area. Although the cuckoo repertoire consists of several calls and songs including the “kowlp”, “buzz”, “knocker” and “coo” calls, only the “kowlp” was used for breeding surveys and never the “coo*”* call since it was previously believed that only unmated males coo and that this may suppress responses of

possible nearby mated cuckoos. Once a bird was detected, broadcasts were discontinued to avoid harassment, which may negatively affect nest success.

Each transect was to be surveyed a minimum of three times between 15 June and late August. Five surveys are recommended, if time allows. Each site visit was ideally separated by 10-14 days in order to ensure survey coverage during the different breeding/nesting cycle stages. Surveys were to be conducted between sunrise and 1200 and were discontinued if the ambient air temperature rose above 100° F, winds exceeded eight mph or loud rainy conditions existed.

Typically, cuckoos present during broadcast surveys will respond in one of three ways: 1) the bird may quietly fly in towards the broadcast location and then vocalize as it gets closer to the observer; 2) the bird may fly in without any vocalizations, or; 3) the bird may respond with a vocalization from a distance without flying in. Information regarding breeding status can sometimes be determined by a combination of behavior and vocalizations. Currently, it is believed that a bird that flies in and then vocalizes with the "coo*"* call or is very interested in the broadcast recording is usually an unmated bird. Occasionally constantly cooing unmated males may follow the surveyor for long distances necessitating early termination of the survey. A bird that responds with any other call, does not fly in or does not respond further, may be either mated or breeding status is unknown (Halterman *et al* 2002, *revised 2005)*. Differentiating the sex of cuckoos is extremely difficult and methods for determining male and female cuckoos are currently being developed by experts (Halterman pers. comm.). Detailed field notes on calls and behaviors of each bird detected were recorded. Beginning in 2006, for the purpose of this report, numbers of cuckoo detections were reported instead of number of birds, due to the difficulty associated with determining exact numbers of birds due to their secretive nature.

Nest Finding/Nest Monitoring

Once mated cuckoos were detected via specific calls and behaviors, an attempt was made to locate and monitor any possible nests. Locating nests by searching and observing is easiest during the nest building process; however, this should be performed only by experienced, trained personnel to avoid possible nest abandonment. If the surveyor is patient and discreet, nests may be located by observing adults returning to the nest to feed young. Once located, active nests should only be approached or checked while the adults are absent from the area.

Habitat and Vegetation

Habitat characteristics and vegetation components were identified and/or measured and recorded on standardized forms (Appendix C) for each survey site, including; average canopy height, percent canopy cover, and distance to water. Additionally, predominant vegetation was categorized into four general habitat types:

1) monotypic high-elevation willow - entirely or almost entirely native broadleaf plants including high elevation willow
2) native broadleaf dominant - mixed native and exotic plants (mostly native)
3) mixed native exotic - mixed exotic and native plants (mostly exotic)
4) monotypic exotic – entirely or almost entirely exotic/introduced plants

Avifauna Summary

While conducting the standardized endangered bird surveys, field notes were also recorded for observations or detections of other bird species, including location, number and ages of individuals and breeding behaviors. This information is presented in Appendix A.

Study Site Descriptions

Ten different areas were surveyed and/or monitored for yellow-billed cuckoos by NDOW in 2007. A brief summary of each location follows, and additional information, including geographic coordinates and elevation can be found in Table 7. Each survey site or transect was mapped and geographically defined via UTM coordinates for the start and stop points of each transect, or in the form of a polygon collected using a Trimble GeoExplorer 3 handheld global positioning system (GPS). Survey area boundaries were estimated based on coordinates collected in the field and digital orthoquad (DOQ) aerial photos. Survey data were recorded on standardized datasheets, all and survey and nest monitoring data were entered into the NDOW yellow-billed cuckoo database.

TABLE 7. Location, site names and geographic information for each cuckoo site surveyed in 2006.

Location	Site Name	TRS	UTM	Elev. (ft)
Desert NWR	Corn Creek	T17S R59E S34	647170 E 4033583 N	2,920
Pahranagat Valley	Crystal Spr	T5S R60E S10	656103 E 4155324 N	3,800
Moapa Valley	Warm Springs Ranch	T14S R65E S15 & 16	704520 E 4065220 N	1,750
Moapa Valley	Pump Station	T14S R65E S15 & 16	705927 E 4065109 N	1,750
Oasis Valley	South	T12S R47E S7	522073 E 4083766 N	3,250
Oasis Valley	Angel Ladies	T11S R47E S33	524272 E 4088364 N	3,430
Oasis Valley	Torrance Ranch	T11S R47E S9	524520 E 4095253 N	3,665
Oasis Valley	Springdale	T10S R47E S31	521648 E 4098258 N	3,840
Meadow Valley Wash	Mile 39-40 & 42-44	T7S R66E S1 T6S R66E S36 T6S R66E S14 & 23	718766 E 4136101 N-715487 E 4145580 N	3,500
Meadow Valley Wash	Mile 48-56	T5S R66E S28 & 24 to T4S R66E S35	714350 E 4150127 N-716703 E 4160765 N	3,885-4,300

Corn Creek

This site is located approximately 20 miles northwest of Las Vegas and three miles east of Highway 95, within the Desert National Wildlife Range. The habitat includes three ponds (an upper pond and two lower ponds) surrounded by marsh reed (*Phragmites sp*) and cattail. The upper pond (40 ft wide x 60 ft long) is fed by nearby Corn Creek springs. An irrigation ditch flows from the upper pond to the lower ponds (20-30 ft in diameter). Several species of trees, both native and introduced, dominate the area, including cottonwood (*Populus fremontii*), black willow (*Salix gooddingii*), honey mesquite, Russian olive (*Eleagnus angustifolia*), elm (*Ulmus Americana*), black locust (*Robinia pseudoacacia*) and fruiting mulberry (*Morus alba*). Several species of fruit trees, including apple, apricot, and pecan are also present. A horse and mule

pasture is adjacent to the forested area to the southeast. Average canopy height was 16.2 m, and distance to water was 0 m. This site was first surveyed for cuckoos in 2005.

Crystal Springs

The site is located in Lincoln County, near the intersection of Highway 375 and Highway 318, south of Key Pittman WMA. The habitat consists of spring-fed riparian with two man-made ponds. Cottonwoods occupy the overstory, while black willow constitutes the mid-story. There is pasture land adjacent to this site; however, cattle have been excluded since 2003. Extensive Russian olive occurred at this site until 2003, when it was mostly removed, and replaced with native coyote willow, ash and cottonwood. Additional Russian olive removals and habitat rehabilitation efforts have occurred 2004-2007. This site was first surveyed for cuckoos in 2001, and at the time two mated birds were detected.

Meadow Valley Wash- Mile 39-40, 42-44,

This survey transect is located along State Route 317 starting with a point survey at Mile 37 near Elgin, Nevada, where a cuckoo was observed in 2001. The survey begins again at Mile 39 and proceeds north to a location where a railroad bridge crosses over the paved road. Vegetation consists of a riparian corridor along a creek with water supplied primarily from springs, and consists of a few patches of coyote willow and galleries of cottonwoods and black willow. A major flood event destroyed Mile 39-40 transect in January 2005 except for a small stand of trees at Mile 40. Transect Mile 42-44 was also damaged, however, five or six stands of trees are possibly still suitable for cuckoos. Because of the damage done to these sites by the floodwaters, new sites were explored to the north along SR 317, between Mile 48-56. In July 2005, lightning-caused wildfires occurred along both sides of Kane Springs Road and reached and burnt a small portion of the Mile 37 point survey area. Portions of this transect have been surveyed since 2000.

Meadow Valley Wash – Mile 48-56

Due to the damage to transect Miles 39-40 and 42-44 caused by the floodwaters in January 2005, Mile 48-56 was investigated and surveyed to determine habitat suitability for continued surveys. Five locations were chosen where the Meadow Valley Wash flows through or is adjacent. Location 1 at Mile 48 was approximately 120 m long with a railroad tressel at the north end. It includes a ranch with a small peach orchard on the west side of the stream, with cottonwoods occurring throughout the area. Location 2 was a point survey at Mile 50 at a gallery of cottonwoods. Location 3 includes the Longhorn Cattle Co. ranch and associated cottonwood and ash trees. Pastures are located on either side of the road, and periodically contain cattle. Horses were always present in pastures at or near the ranch houses. Location 4 was the “45 mph” zone, which includes Mile 55 and consists of cottonwoods and black willow. Location 5 includes the Rainbow Canyon Ranch near Mile 56. Pasture exists along the entire transect on the east side and the area consists of cottonwood, black willow, elm, and some scattered Russian olive. All surveys are conducted from the road due to the suitable habitat occurring on private property. Additional suitable habitat exists on these private parcels, but is too far away from the road to be adequately surveyed without access. This site has been surveyed since 2005.

Moapa Valley-Warm Springs Ranch

This site is located on private property nine miles north of the town of Glendale, on Warm Springs Road near State Route 168. Survey transects were established along two waterways, including a drainage area to the west and the Muddy River to the east. Considerable water and dense vegetation including tamarisk was located at the east area, while dense mesquite

occurred with tamarisk at the west area. Willow, tamarisk, and honey mesquite canopy heights ranged from 5 to 8 meters, with palms (*Washingtonia spp.*), ash, and Fremont cottonwoods ranging from 15 to 30 m high. The wetland vegetation is primarily cattail, sedge and bulrush, surrounded by a wet meadow. This site has been consistently surveyed since 2000.

Moapa Valley-Pump Station
This site is adjacent to the Warm Springs Ranch Site, immediately to the southeast, and follows the Muddy River for about 1200 m. Most of the vegetation along the river is tamarisk and arrow weed, with a few stands of cottonwood and honey mesquite are located nearby. This site has been consistently surveyed since 2000.

Oasis Valley-South
This site, also referred to as the Narrows, is located just south of the Beatty city limits on the east side of U.S. Highway 95. It consists of a small strip of riparian habitat along the Amargosa River. Vegetation is patchy and mainly composed of large cottonwoods, coyote willow, tamarisk, and cattail patches. In 2007 water was present in the streambed in mid-June, but was dry in early-August near the end of the survey period. No patches of running/standing water were observed. This site was been consistently surveyed since 2000.

Oasis Valley-Angels Ladies
Angel Ladies is private property located about three miles north of Beatty on Highway 95. Vegetation is mostly cottonwoods 7.5 – 18 m tall and honey mesquite 3 – 4.5 m tall. A small orchard with apple and peach trees exists near the south end. At the north end is a swimming pool fed by a small stream 2 – 3 inches deep by 1 - 3 feet wide. This is a new site first surveyed in 2007.

Oasis Valley-Torrance Ranch
This ranch, now owned by The Nature Conservancy, is located off of Oleo Road (Mi 67 north of Beatty on Highway 95). The majority of the vegetation consists of 18 – 21 m tall black willow, with cottonwood understory 15 -18 m tall and 6 – 15 m tall elm and pine. Water flows through a sedge marsh along the east side of the transect. This is a new site first surveyed in 2007.

Oasis Valley-Springdale
Springdale is located 12 miles north of Beatty along U.S. Highway 95. The property is scattered with large deciduous trees including ash and cottonwood. All trees are over 14 m in height. Since access to this private property has been denied in recent years, a spot survey was conducted from the highway in 2007.

Other Sites not surveyed
Four sites that had been surveyed via transect in previous years were not monitored in 2007 due to lack of access/permission or other reasons. The Oasis Valley—Springdale site was located on private property and was first surveyed in 2001. New landowners in 2005 asked us to discontinue surveys on the property. Crystal—South and Pahranagat Valley North—River Ranch were also located on private property and access has not been granted since 2002 and 2001 respectively. The Beaver Dam area was initially surveyed in 2000-01, but has not been checked since.

Results

Survey Efforts and Detections

Over 120 hours were spent surveying a total of ten sites for cuckoos by NDOW in 2007, resulting in no cuckoo detections at any of the sites. Nevertheless, efforts are tabulated in Table 8.

TABLE 8. 2007 cuckoo survey summary for all sites, including number of detections, and whether cuckoos have been detected at each site in previous years.

Survey Site	Survey Hours	# of Detections	Previous Detection? (Year)
Corn Creek	8.5	0	Y ('03, 04)
Crystal Spring	11.75	0	Y ('01)
MVW 37, 39-40, 42-44	15.5	0	Y ('01)
MVW 48-56	17.15	0	Y ('05)
Oasis—South	10.5	0	Y ('00, 01, 03, 05)
Oasis--- Angel Ladies	3.75	0	
Oasis---Torrance Ranch	6.35	0	
Oasis---Sprindale	2.5	0	
Moapa—Pump Station	9.9	0	Y ('01, 02, 05)
Moapa—Warm Sp Ranch	34.5	0	Y ('00--05)
Total	*120.4*	*0*	

Despite the lack of cuckoo detections at the NDOW survey sites in 2007, an Audubon Society member reported a cuckoo in her Las Vegas backyard on 4 July.

Nest Finding/Monitoring

No cuckoo nests were located or confirmed during surveys conducted in 2007.

Habitat and Vegetation Characteristics

Predominant vegetation at all of the sites surveyed for cuckoos consisted of cottonwood, black willow, mesquite, ash, tamarisk and palms, and all the sites were classified as mixed native and exotic plants (mostly native). Common to all the sites were cottonwood trees and nearby water sources. Average combined canopy height for all the sites was 22 m. Presence of livestock or recent sign was observed at all sites surveyed except Moapa Valley—Pump Station and Oasis Valley sites Torrance Ranch and Springdale.

Avifauna Summary

A total of 127 different bird species were observed and/or heard during the endangered bird surveys in 2007. A detailed list of all bird species, their occurrence and breeding status can be found in Appendix A.

Discussion

Survey Effort and Detections

Ten sites were surveyed in 2007, compared to only eight sites in 2006. Historically 14 different sites have been surveyed for cuckoos, although not all necessarily have been surveyed each year. In previous years, cuckoo survey results were reported as the number of birds detected and were further categorized as 'mated' or 'unmated' based on accepted interpretations of behaviors and vocalizations, at that time. Beginning in 2006, cuckoo survey results were presented as 'cuckoo detections' rather than attempting to enumerate exact numbers of birds. In addition, mated/unmated breeding status is no longer strictly applied based on behaviors and

vocalizations, and if there is any doubt, breeding status is recorded as 'unknown'. These changes were made based on new information gleaned through recent yellow-billed cuckoo research (Halterman pers comm.). Table 9 summarizes the 2000-2007 status of all historically monitored cuckoo sites.

TABLE 9. Number of yellow-billed cuckoos detected at potential cuckoo sites historically monitored by NDOW, 2000-2007. 2000-2005 numbers reported include mated and unmated birds; 2006-7 numbers indicate detections only and may not be indicative of actual numbers of birds.

Location	'00	'01	'02	'03	'04	'05	'06[3]	'07[3]
Corn Creek	--	--	--	1	1	0	0	0
Crystal Spring	--	2	0	0	0	0	0	0
Crystal South	1	0	1	--[1]	--[1]	--[1]	--[1]	--[1]
Pahranagat North	8	5	--[1]	--[1]	--[1]	--[1]	--[1]	--[1]
MVW 12.5/14	--	--	--	--	--	0	0	--
MVW 37, 39-40	0	1	--	--	0	0	0	0
MVW 48-56	--	0	--	--	0	1	0	0
Moapa Pump Station	0	4	1	0	0	3	0	0
Moapa Warm Springs	9[2]	12	1	1	3	2	5[3]	0
Oasis South	1	2	0	1	0	1	0	0
Oasis Springdale	--	2	0	0	0	0	--[1]	--[1]
Beaver Dam	0	0	--	--	--	--	--	--
Total	*19*	*28*	*3*	*3*	*4*	*7*	*5*[3]	*0*

1—Access denied by landowners; 2—Only year and location nests were located. 4 total nests; 3—Bird detections rather than individual birds -- indicates survey not conducted in that year.

As indicated by the table above, cuckoo numbers/detections have dramatically declined at sites monitored by NDOW in southern Nevada since 2000 and 2001. Similar trends have also been observed by cooperators conducting cuckoo surveys at other southern Nevada sites during the same time period (San Bernardino County Museum annual reports 2001-2006). Additionally, there have been no reports of nesting or confirmed breeding at any of these sites since 2000.

As with all species, especially secretive ones like the cuckoo, presence/absence surveys cannot confirm absence of the species, but rather may indicate a failure to detect. Studies have shown via surveys conducted at sites where the population is known that when following the three survey protocol 95 percent of the time at least one cuckoo will be detected, leaving a 5 percent chance of cuckoos being present at the site but not detected during the survey (Laymon 1998). Additionally, cuckoos appear to have a low fidelity to breeding sites, resulting in the possible absence of pairs on known breeding sites in some years, and presence of breeding birds on previously vacant sites in other years (Gaines and Laymon 1984).

Despite the above mentioned consideration regarding cuckoo detectability, these breeding birds have dramatically declined in the western states (Roberson 1980, Gaines and Laymon 1984, Laymon and Halterman 1987b, Huges 1999). Although no one cause can be singled out in regard to the decline, habitat fragmentation and loss, and decreased habitat quality appear to be the leading threats facing the cuckoo in the West. Pesticide use may also be significant, as the result is a decrease in insects, which constitute the bird's major food source, however, this possible hypothesis warrants further research.

Nest Finding/Monitoring

Yellow-billed cuckoo nests are difficult to locate due to the elusive behavior of the birds, the dense habitat which they utilize, large home ranges (up to 100 acres if available) and their relatively short breeding season. Nest construction takes two to four days (Halterman, et. al. 2000), and with an average of only 17 days from egg laying to fledging of young, the window of opportunity for locating a nest is limited. In addition, cuckoos seemed to prefer nesting in the tops of canopies, they are so wary around the nest that if there is any intruder (i.e. surveyor) nearby, they are not likely to go near the nest, and nest abandonment is always a possibility. Studies have shown it takes a birder with cuckoo experience an average of 4-person days to locate a single nest (Laymon 1998). Despite these challenges Halterman (2001) stated that it is important to confirm breeding at southern Nevada sites, as cuckoos found in California and Arizona may utilize substantially different habitat types.

Habitat and Vegetation Characteristics

Habitat conditions and vegetation components did not significantly change at the surveyed sites since 2005. As a result of the major flood event in 2005 some habitat patches in Meadow Valley Wash were impacted or destroyed, and alternate sites north of this location are still being evaluated for cuckoo use. Unfortunately, much of southern Nevada's riparian habitat is privately owned, and it has been difficult for biologists to acquire access to these areas in recent years, resulting in reduced ability to survey all suitable cuckoo habitat in Nevada.

Cattle and horses have grazed intermittently at the Moapa Valley sites over the past years. In the winter of 2000, cattle and horses were removed from the area several months before the cuckoo breeding season and as a result the meadow grasses were 0.5-1.0 m high, and provided substantial habitat for grasshoppers, one primary prey source for cuckoos (Bent 1940). In the winter of 2001, cattle and horse grazing was reintroduced to the Moapa Valley sites and continued through the spring of 2007, and apparent grasshopper numbers declined. Grazing at other sites consisted of cattle at various locations in Meadow Valley Wash, a few burros at Oasis Valley –South and Oasis Valley—Torrance Ranch and five horses at Crystal Springs observed on one survey date.

Management Recommendations

Based on the results of recent coordinated yellow-billed cuckoo surveys and nest monitoring in Nevada and surrounding states, and in consultation with the Nevada Department of Wildlife's Wildlife Action Plan (2006), the following recommendations are put forth:

1. Continue to conduct cuckoo surveys and nest monitoring at known breeding sites to assess life history parameters such as nest success, productivity, as well as possible habitat loss or impacts. Continue to identify, survey and monitor new areas of potential cuckoo breeding habitat. Special emphasis will be placed on locating additional potential habitat in Oasis Valley and in Lincoln County in 2007.

2. Continue to maintain federal and state cooperation and collaborative funding for continued statewide surveys in Nevada.

3. Continue to develop new and cultivate existing partnerships with private landowners to identify and monitor cuckoo breeding activities on private lands. Encourage participation in Conservation Easements, Safe Harbor Agreements and Landowner Incentive programs.

4. Continue to manage for cuckoos on state and federal lands and mitigate potentially harmful land use practices that may impact breeding habitats, including; improper grazing, water diversion, and destruction of cottonwood stands and other riparian habitats. Encourage landowners to apply livestock grazing prescriptions in balance with the ability of the native riparian vegetation to regenerate and maintain itself.

5. Pursue conservation protection for known cuckoo breeding habitat in Nevada. Large riparian corridors with tall stands of cottonwood, ash, and black willow along with dense understories need to be protected from any future loss, and management strategies intended to expand and replace suitable habitat should be implemented. Management strategies should include emphasis on both overstory and midstory vegetation layers in order to protect both nesting and foraging habitats.

6. Restore cottonwood overstory through sapling planting and the restoration of natural channel scouring processes in sites of appropriate potential.

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APPENDIX A

Aviafauna Summary Table

Appendix A. 2007 Avifauna summary for all Southwestern Willow Flycatcher and Yellow-billed Cuckoo Survey Sites. X—Occurance, P—Pair, N—Nesting, F—Fledged young.

Species	Corn Creek	Ash Meadows	Key Pittman	Crystal Springs	Oasis Valley	Moapa Valley	Meadow Valley
Abert's Towhee		X				X,P	
American Avocet			X,P				
American Coot			X,P,N,F				
American Kestrel						X,P,F	X,P
American Robin							X,P,N,F
American Wigeon			X,P				
Ash-throated Flycatcher	X,P	X,P	X	X	X		X,P
Barn Owl			X			X	X
Barn Swallow	X,P						
Belted Kingfisher			X	X			X
Bell's Vireo		X		X		X	
Bewick's Wren		X,P	X,P		X	X	X
Black Phoebe	X		X		X	X	X,P
Black-chinned Hummingbird		X		X	X		X
Black-crowned Night Heron			X, P				
Black-headed Grosbeak		X					
Black-necked Stilt			X				
Black-tailed Gnatcatcher	X	X,P					
Black-throated Sparrow		X					
Blue Grossbeak	X,P,N	X,P,N	X,P,N		X,P,N	X,P,N	X,P,N
Blue-gray Gnatcatcher		X			X		
Blue-winged Teal			X,P				X
Bonaparte's Gull			X				
Brewer's Sparrow			X	X			
Brown-crested Flycatcher						X,P	
Brown-headed Cowbird	X,P	X,P	X, P		X,P	X,P	X,P
Bufflehead			X,P				
Bullock's Oriole	X,P,N,F	X,P	X,P,N,F	X,P	X,P	X	X
Canada Goose			X, P, F				
Canyon Wren							X
Chipping Sparrow	X			X		X	
Cinnamon Teal			X,P				
Chukar							X,P,F
Common Goldeneye			X,P				
Common Loon			X				
Common Raven	X,P	X	X,P,N,F	X,P	X,P		X,P
Common Yellowthroat	X	X,P,N	X,P,N,F	X	X,P,N,F		X,P,N,F
Cooper's Hawk	X	X	X	X	X	X	X
Crissal Thrasher		X				X	
Double-crested Cormorant			X				
Eared Grebe			X,P				
European Starling	X		X				
Eurasian-collared Dove					X	X,P	
Gadwall			X,P				
Gambel's Quail		X,P,F	X,P,F		X,P,F	X, P, F	
Golden Eagle		X	X				X

Species	Corn Creek	Ash Meadows	Key Pittman	Crystal Springs	Oasis Valley	Moapa Valley	Meadow Valley
Gray Flycatcher		X					
Great Blue Heron	X	X	X	X		X	X
Great Egret			X	X			
Great Horned Owl	X		X,P,N,F	X	X	X	
Greater Roadrunner	X	X	X				
Great-tailed Grackle	X,P	X,P	X,P		X,P	X,P	
Green Heron	X			X	X		X
Green-winged Teal			X,P				
Horned Lark	X,P					X,P	
House Sparrow	X,P				X		X,P
Housefinch			X,P	X	X	X,P	X,P
Killdeer			X			X	
Ladder-backed Woodpecker				X		X,P	X,P
Lark Sparrow	X,P		X,P		X	X	
Lazuli Bunting				X,P			X,P
Least Sandpiper			X				
Lesser Goldfinch	X		X	X,P		X	X,P
Lesser Nighthawk		X		X	X	X	
Lesser Scaup			X				
Lesser Yellowlegs			X				
Loggerhead Shrike		X	X		X	X	
Long-billed Dowitcher			X				
Long-eared Owl			X,F				X
MacGillivray's Warbler		X		X	X		X
Mallard			X,P	X,P		X,P	X,P,N,F
Marsh Wren			X,P,N				
Mourning Dove	X,P	X,P	X,P	X,P	X,P,F	X,P	X,P
Northern Flicker (Red-shafted)						X	X
Northern Harrier		X,P,N	X,P,N		X		X
Northern Mockingbird	X	X	X	X,P,F	X	X	
Northern Parula			X				
Northern Pintail			X				
Northern Rough-winged Swallow	X		X,P	X	X	X, P	X
Northern Shoveler			X,P				
Osprey			X			X	
Peregrine Falcon			X				
Phainopepla	X,P	X				X,P,N,F	X
Pied-billed Grebe			X				
Redhead			X,P				
Red-tailed Hawk			X	X		X	
Red-winged Blackbird	X	X,P,N,F	X,P,N,F	X,P		X,P	X
Ring-billed Gull			X,P				
Ring-necked Duck			X,P				
Ring-necked Pheasant						X	
Rock Dove	X						
Rock Wren					X		

Species	Corn Creek	Ash Meadows	Key Pittman	Crystal Springs	Oasis Valley	Moapa Valley	Meadow Valley
Rose-breasted Grosbeak					X,P	X	
Ruby-crowned Kinglet					X		
Ruddy Duck			X,P				
Sage Thrasher			X				
Savannah Sparrow				X			X
Say's Phoebe			X	X			X
Scrub Jay							X
Snowy Egret				X			
Song Sparrow		X	X,P,N,F		X,P		X,P
Sora			X				
Spotted Sandpiper	X		X				
Summer Tanager					X	X	X,P,N
Townsend's Warbler					X		
Tree Swallow			X				
Turkey Vulture	X		X	X		X	X
Verdin	X	X,P,N,F		X	X	X,P	
Vermilion Flycatcher						X, P,N, F	
Violet-green Swallow	X,P		X,P				X,P
Virginia Rail		X,P	X,P			X	
Western Grebe			X				
Western Kingbird	X,P,N,F	X,P,N	X,P,N	X,P,N	X,P	X,P	X
Western Meadowlark		X,P				X,P	
Western Sandpiper			X				
Western Tanager	X	X		X,P	X	X	
Western Wood-Pewee	X,P	X	X	X,P		X	X
White-crowned Sparrow			X,P	X,P			
White-faced Ibis		X	X,P,N,F	X	X		
White-throated Swift		X			X	X	
Willow Flycatcher (SW)		X,P,N,F	X, P, N,F	X	X	X	
Wilson's Phalarope			X,P				
Wilson's Warbler		X,P	X,P	X			
Yellow Warbler	X,P	X,P	X,P,N	X,P	X		X,P,N
Yellow-breasted Chat	X	X,P,N	X,P	X	X	X,P,N	X
Yellow-headed Blackbird		X	X,P,N,F	X			
Yellow-rumped Warbler	X		X				