

2006

**SOUTHWESTERN WILLOW FLYCATCHER AND YELLOW-BILLED CUCKOO
2006 SURVEY AND MONITORING REPORT FOR
SELECT SITES IN SOUTHERN NEVADA**

NEVADA DEPARTMENT OF WILDLIFE

**Southern Region
Wildlife Diversity Program**

**Program Activities Report
January 1, 2006 through December 31, 2006**

Received
So. Nevada Field Office

APR 4 2007

Las Vegas, NV

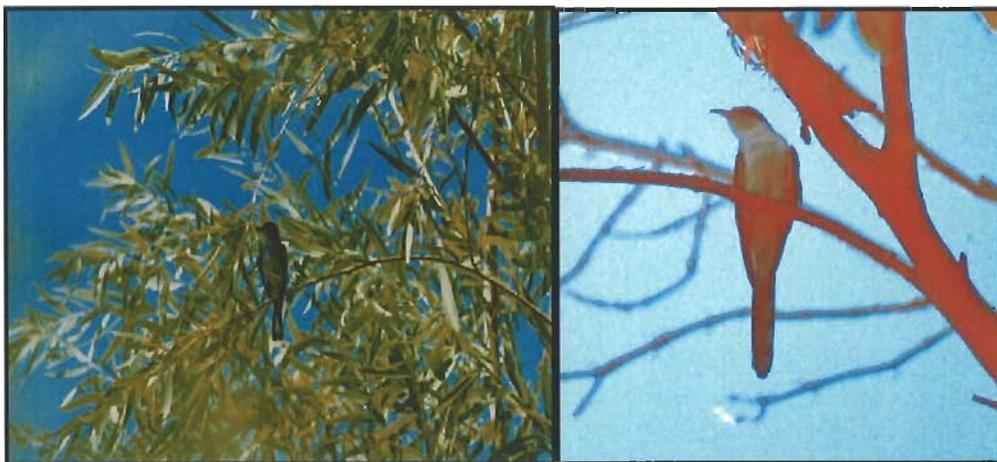


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TABLE OF CONTENTS

Executive Summary.....	3
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SOUTHWESTERN WILLOW FLYCATCHER

Introduction.....	4
Methods.....	6
Study Site Descriptions.....	8
Results.....	13
Discussion.....	18
Management Recommendations.....	23

YELLOW-BILLED CUCKOO

Introduction.....	24
Methods.....	25
Study Site Descriptions.....	27
Results.....	31
Discussion.....	32
Management Recommendations.....	35

Literature Cited.....	36
-----------------------	----

TABLES

Table 1. Location, site names and geographic information for each willow flycatcher site surveyed in 2006.....	13
Table 2. 2006 resident Southwestern Willow Flycatcher survey summary for all survey and monitoring sites.....	14
Table 3. Overall willow flycatcher survey results for the period 2001-2006.....	15
Table 4. 2006 new banded and recaptured/re-banded willow flycatchers.....	16
Table 5. Willow Flycatcher nesting habitat analysis for active nest sites in 2006.....	17
Table 6. Status of potential willow flycatcher sites historically monitored by NDOW 1999-2006.....	19
Table 7. Location, site names and geographic information for each cuckoo site surveyed in 2006.....	31
Table 8. 2006 cuckoo survey summary for all sites, including survey hours, number of birds, and whether cuckoos have been detected at each site in previous years.....	31
Table 9. Number of Yellow-billed Cuckoos detected at potential cuckoo sites historically monitored by NDOW, 2000-2006.....	33

FIGURES

Figure 1. Breeding distribution of willow flycatcher (<i>Empidonax traillii</i>) subspecies.....	4
Figure 2. 2006 Willow flycatcher survey areas.....	9
Figure 3. Breeding distribution of the Yellow-billed Cuckoo.....	24
Figure 4. 2006 Yellow-billed Cuckoo survey areas.....	28

APPENDICES

Appendix A	Avifauna Summary
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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 2006 for the federally endangered Southwestern Willow Flycatcher (*Empidonax traillii extimus*), and ESA 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 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 233 hours were spent conducting surveys, resulting in the detection of 20 resident willow flycatchers, consisting of 16 paired birds and four singles. Twelve nesting attempts were documented and 17 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 areas, followed standardized protocols and utilized playback recordings of cuckoo calls. NDOW spent 132 hours conducting surveys resulting in four cuckoo detections at one survey area. 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.

The willow flycatcher is one of 10 species of *Empidonax* flycatchers found in North America, and the Southwestern Willow Flycatcher is 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.

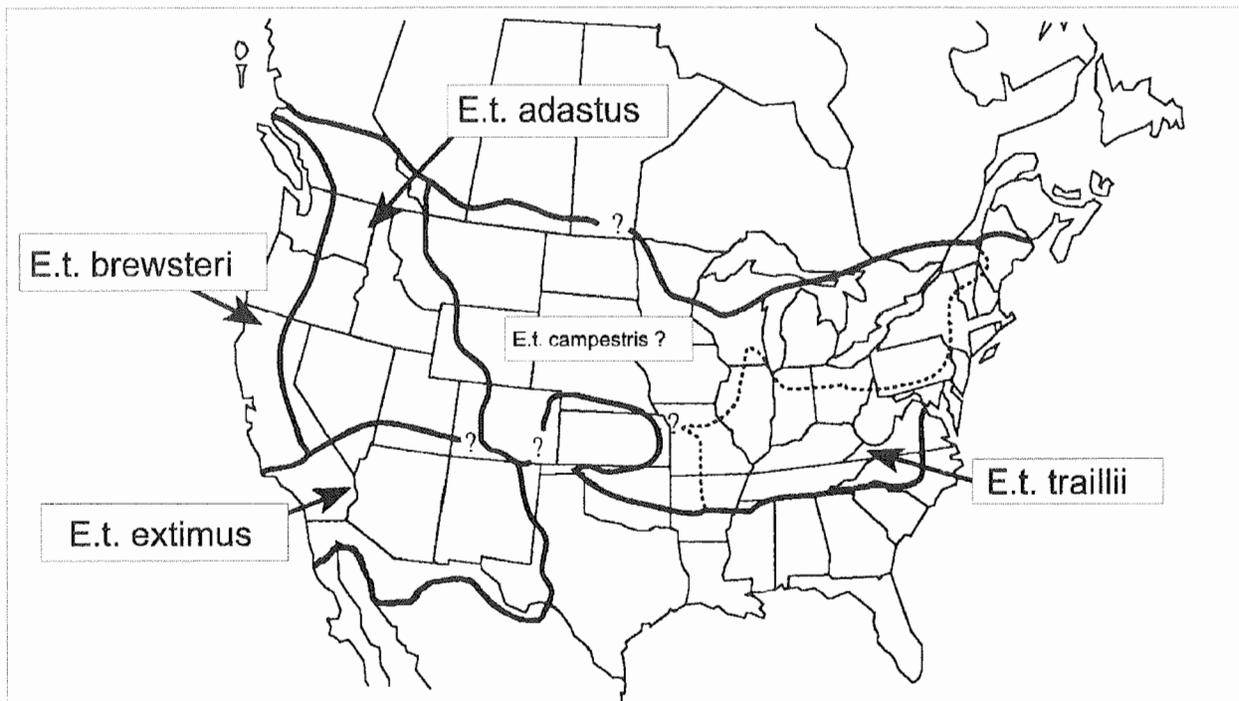


Figure 1. Breeding distribution of willow flycatcher (*Empidonax traillii*) subspecies. Adapted from Unitt (1987), Browning (1993), and Sogge et al. (1997).

Southwestern Willow Flycatchers typically arrive on their breeding territories by May or June and depart for wintering grounds in late August, resulting in a short, approximately 100-day breeding season. A breeding territory is often easily 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, Pahranaagat 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 more carefully 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, Pahranaagat 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 purpose and objectives 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 to be 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 via a handheld MP3 player and mini amplified speaker. Following each broadcast, 1-2 minutes of listening commenced before moving to the next broadcast location. Once a territorial willow flycatcher was detected, nest searches and/or nest monitoring would begin.

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, as they may be confused with migrating, singing individuals of the northern subspecies as they pass through our area 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 during 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).

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).

Simple nest success was calculated using the ratio of successful nests to total nests observed. The Mayfield (1961, 1975) method was also used to calculate nest success expressed as the estimated proportion of nests from which eggs hatch. This method calculates daily nest survival to correct for possible bias resulting from destruction of nests before discovery (Mayfield 1975, Johnson 1979), thus the sampling unit of interest was not the nest as used in the proportional simple estimate, but instead the number of days the nest was exposed to hazards of predation, parasitism, foul weather, etc. The following formula was used for the Mayfield analysis:

$$P=[1-(N_u/E)]^h$$

where N_u is the number of failed nests, E is the number of total exposure days, and h is the nesting period for willow flycatchers. Only active nests, known to contain at least one egg were included in the analysis, and exposure days were determined by counting the number of days beginning when an egg was first observed and ending on the day the young fledged from the nest. If the exact date of fledging or depredation was unknown, half the time between the last observed active date and the subsequent empty/depredated nest date was added (Gardali 2006 and Koronkiewicz et al 2006). A combined nesting period of 27.1 days (based on the averages of 2.6 days, 12 days and 12.5 days for egg laying, incubation, and nestling stages, respectively) for willow flycatchers was used for the Mayfield calculations (Rourke et al. 1999).

Presence and number of Brown-headed Cowbirds was also recorded for each survey visit. No cowbird trapping effort was conducted in 2006.

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 nets, 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

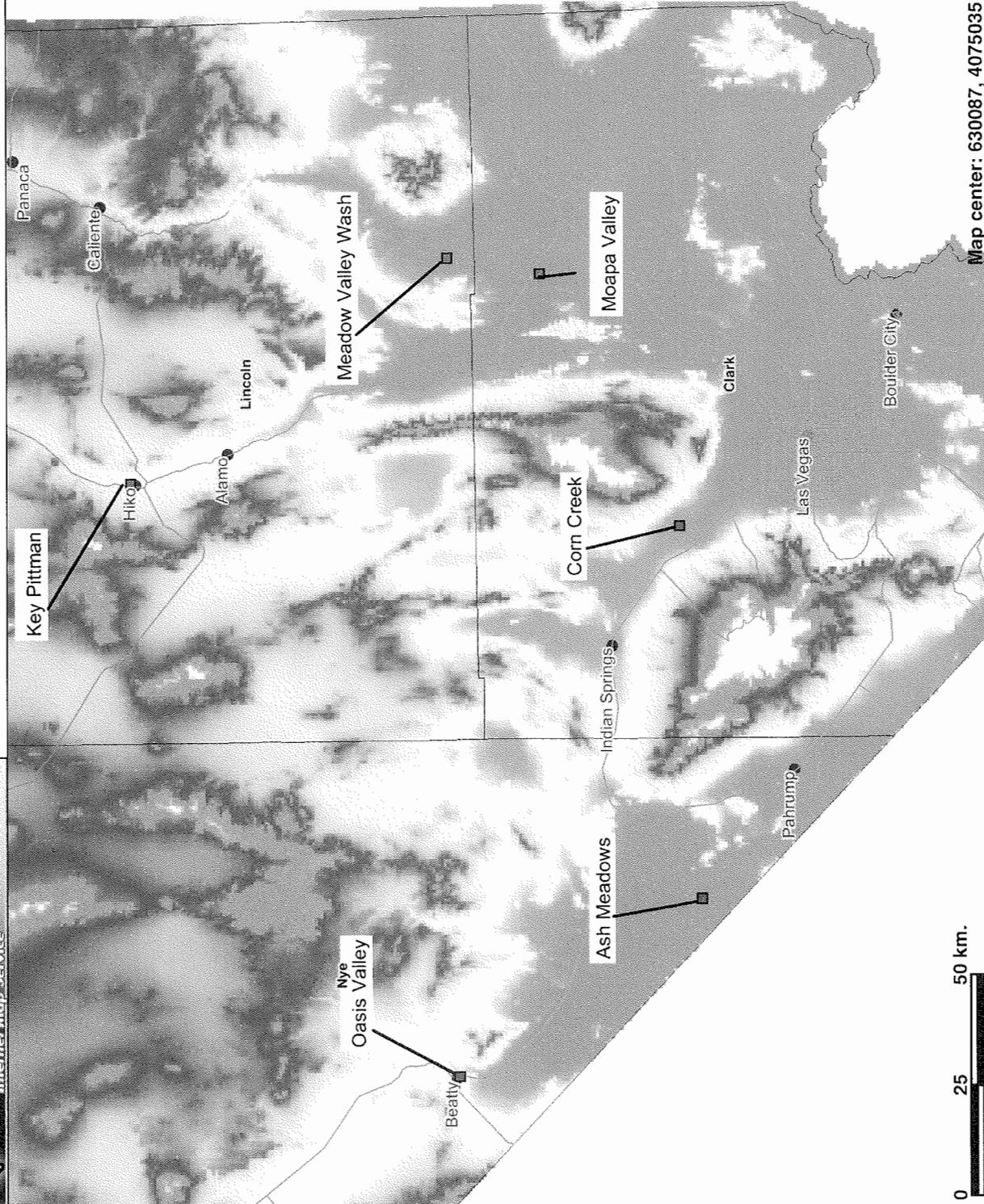
Avifauna Summary

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

Eleven different areas were surveyed and/or monitored for willow flycatchers by NDOW in 2006 (Figure 2.) 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

Figure 2. 2006 WIFL Survey Areas



Map center: 630087, 4075035

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

Notes: Locations may be approximate.

- Legend**
- 2006 Southwestern Willow Flycatcher Survey and Monitoring Sites
 - Nevada Roads
 - Counties
 - Cities 1:1 Million

Scale: 1:1,377,910

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 zigzags 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.

USFWS 4a-e (formerly known as Lower Meadow Valley Wash – Mile 12.5 & Mile 14)

A flood major event occurred in Meadow Valley Wash the first week of January 2005 which destroyed all of the vegetation east of the stream. As a result of flood-damage repairs and security concerns, Union Pacific Railroad denied access to the area in 2005 and 2006, unless accompanied by a paid flagger/escort. Although most of the suitable flycatcher habitat was destroyed by the flood and repair work, at the request and coordination of the USFWS, certain portions of the wash were surveyed on a limited basis. Previous sites known as Lower Meadow Valley Wash—Mile 12.5 and Mile 14 were combined and renamed USFWS 4a-e. Pre-flood, these areas were dominated by tamarisk, honey mesquite, black and coyote willow, cottonwood, ash and arrow weed (*Pluchea sericea*). Due to access issues and loss of habitat, it is unknown if these sites will be surveyed in subsequent years.

USFWS 2a-e

This site was also surveyed on a limited basis in 2006 at the request and coordination of the USFWS. Meadow Valley Wash flows along transect: at 2a 70 ft distant, 2b 510 ft away, 2c 25 ft away, 2d 20 ft away, 2e 0 ft away. Predominate vegetation included cottonwood, coyote and black willow. Due to access issues and loss of habitat, it is unknown if these sites will be surveyed in subsequent years.

USFWS 5a-c

This site was also surveyed at the request and coordination of the USFWS in 2006. Due to re-channalization following the flood event, the soil at these sites, at the time of the survey, was very dry, with no flowing or standing water was observed, therefore making this area unsuitable as flycatcher breeding habitat. Vegetation was predominately tamarisk. Surveys were discontinued after one visit, due to unsuitability of the habitat.

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 arrowweed, 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 was 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 2007. This site has been consistently surveyed since 1999.

Other Sites not surveyed

Two sites that had been surveyed in previous years were not monitored in 2006 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. The second site, Pahrnagat Valley—North, was located on private property and was surveyed between 1999 and 2001. Since 2002 access has been denied at this site.

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 Spr	T17S R50E S22	560394 E 4035829 N	2,240
Desert NWR	Corn Creek	T17S R59E S34	647170 E 4033583 N	2,920
Pahrnagat Valley	Key Pittman	T4S R60E S23 & 27	656667 E 4158686 N	3,834
Meadow Valley Wash	USFWS 4a-e	T12S R65E S13, 23, 25 & 36, T13S R65E S1	707987 E 4086301 N	1,850
Meadow Valley Wash	USFWS 2a-e	T5S R66E S15 & 27	N/A	1,850
Meadow Valley Wash	USFWS 5a-c	T14S R66E S22	714791 E 4065721 N	
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

Eleven areas were surveyed for willow flycatchers by the Nevada Department of Wildlife in 2006. One seasonal field person spent 233.4 hours surveying and monitoring the 11 areas encompassing more than 16 linear kilometers (Table 2). During the 2006 survey season, a total of 20 adult resident flycatchers were detected at three areas. The total was comprised of eight pairs and four single flycatchers; all eight of the pairs attempted to nest. Occupied areas included Ash Meadows –Bradford Spring, Ash Meadows—

Forrest Spring and Pahrnagat Valley—Key Pittman Wildlife Management Area, however, no breeding occurred at Forrest Spring.

TABLE 2. 2006 resident Southwestern Willow Flycatcher survey summary for all sites.

Survey Site	Survey Hours ¹	# Adults	# Pairs	# Territories	Nesting Attempts
Ash Meadows—Bradford Sp	11.6	2	1	1	1
Ash Meadows—Carson Slough	34.0	0	0	0	0
Ash Meadows—Forrest Sp	8.95	1	0	1	0
Ash Meadows—Longstreet Sp	2.0	0	0	0	0
Desert NWR—Corn Creek	12.25	0	0	0	0
Pahrnagat Valley—Key Pittman	73.25	17	7	10	11
Moapa Valley—Pump Station	12.25	0	0	0	0
Moapa Valley—Warm Sp Ranch	37.5	0	0	0	0
Oasis Valley	15.25	0	0	0	0
Meadow Valley Wash—USFWS 2a-e	12.2	0	0	0	0
Meadow Valley Wash—USFWS 4a-e	12.1	0	0	0	0
Meadow Valley Wash—USFWS 5a-c	2.0	0	0	0	0
<i>Total</i>	<i>233.4</i>	<i>20</i>	<i>8</i>	<i>12</i>	<i>12</i>

1--Total hours includes nest monitoring

Only three migrant willow flycatchers were recorded in 2006. A single migrant bird was detected one time at Warm Springs Ranch on 16 June, and a pair of migrating flycatchers was detected on 15 June at the Oasis Valley site. Another single male willow flycatcher was first observed at the Ash Meadows—Forrest Spring site on 22 May, and remained unmated at that site until 26 June (a total of 36 days). For the purpose of this report, this bird was considered a resident single since he remained at the site during a portion of the 15 June-20 July time period; however, we were technically unable to determine if this bird was truly a resident or a migrant.

Nest Monitoring

A total of 12 nests or nesting attempts were documented at only two of the 12 surveyed sites (Ash Meadows—Bradford Spring and Pahrnagat Valley—Key Pittman) in 2006. Ten of the 12 nests were determined to contain willow flycatchers eggs and were used in calculating simple nest success and productivity (this includes one nest never located but known to fledge young, and one nest located after the young had fledged). Seven nests successfully fledged young for a simple nest success rate of 70 percent. Mayfield (1975) nest success was lower at only 53 percent. This computed Mayfield nest success was based on three failed nests and 128 exposure days in 2006.

At least 26 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 26 known eggs, 17 known fledglings were produced for a fledgling success rate of 65 percent. Average clutch size in 2006 (based only on nests with at least one egg) was 2.6 eggs/nest, and average

number of fledglings produced was 1.7 young/nest. One nest in 2006 produced four fledglings.

Eight pairs attempted to nest in 2006. One female attempted one nest which failed, after which the pair left the area; four females each had one successful nesting attempt; two females had two nesting attempts; and one female had 3 nesting attempts. Ultimately all re-nesting females were eventually successful in fledging young. All nest failures in 2006 were attributed to depredation. In all, six nests (50 percent) experienced depredation of at least one egg or fledgling, however, two of these nests also successfully fledged at least one flycatcher. In addition, two 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 2001-2006, 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	2001	2002	2003	2004	2005	2006	6 Yr Average
Total # Adults	18	22	13	16	18	20	17.8
Total # Pairs	5	10	4	7	8	8	7.0
Total # Nests	7	13	6	12	12	12	12.0
BHCO Parasitism	0	2	2	1	1	1	1.2
Aband./Depred. Nests	2	3	4	1	2	6 ¹	3.0
# Eggs	17	28	17	21	27	26	22.6
# Fledglings	10	14	3	10	7	17	10.2
# Successful Nests	5	8	1	4	3	7	4.7
Avg. # Fledg/Suc. Nest	2.0	1.8	3.0	2.5	2.3	2.4	--

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

Brown-headed Cowbirds were detected at all sites surveyed in 2006, however brood parasitism was only documented at one nest in 2006 (Ash Meadows—Bradford Spring). Despite the parasitism, this nest was ultimately successful in fledging one willow flycatcher. No known cowbirds were fledged from any of the willow flycatcher nests. In 2006, numbers of observed cowbirds fluctuated considerably between survey days; ranging from 1 to 100 cowbirds. The high of 100 birds was observed one time at Corn Creek, where the large flock was observed in association with some horses in a nearby pasture. More commonly cowbird numbers ranged from 1-17 at each site.

Color Banding

Five new birds were banded in 2006 at Key Pittman by SWCA personnel. Three fledglings were banded at patch #3 and two new adults (second year) were banded,

one each, at patches #1 and #8. Three additional banded adults were recaptured and re-banded. Two of these birds were recaptured at patch #2 and the third at patch #9B (may actually have been patch #7). NDOW personnel were not always present during banding activities. Table 4 summarizes the 2006 new banding information.

TABLE 4. 2006 new banded and recaptured/re-banded willow flycatchers. All occurred at Pahranaagat Valley—Key Pittman.

Location	Initial Band Date	2006 Age ¹	Sex ²	Federal Band #	Current Color Combo ³	Old Color Combo ³	Obs. Status ⁴
Patch 3	8/1/06	L	U	2370-40101	PU:UB	N/A	N
Patch 3	8/1/06	L	U	2370-40100	UB:PU	N/A	N
Patch 3	8/1/06	L	U	2370-40102	PU:UB	N/A	N
Patch 1	8/6/06	SY	F	2370-40082	PU:OK(M)	N/A	N
Patch 8	8/5/06	SY	M	2370-40081	PU:OO(M)	N/A	N
Patch 2	6/25/04	3Y	M	2320-31604	KR(M):EE	UB:EE	R (8/1/06)
Patch 2	6/26/03	4Y	F	2320-31463	EE:WB(M)	EE:UB	R (8/1/06)
Patch 9B ⁵	7/5/05	SY	M	2320-31692	EE:ZW(M)	EE:UB	R (8/5/06)

¹ Age in 2006: L = nestling, SY = second year/2 years old, 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.

⁵ This capture was recorded as Patch 9B, however, UTM's indicate it was in the vicinity of Patch #7. NDOW personnel were not present during this capture.

All three of the recaptured/re-banded birds were first banded at nearby Pahranaagat NWR as nestlings. The four-year old female was banded in 2003 but had not been observed since, and the three-year old male was banded in 2004 and also had not been observed since that year. The second year male was banded in 2005.

Several previously banded birds were resighted in 2006, 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 occurred at Ash Meadows—Bradford Spring, and Pahranaagat Valley—Key Pittman.

Habitat and Vegetation Characteristics

Predominant vegetation at the two sites where nesting occurred were classified as native broadleaf plants (monotypic high-elevation willow), whereas most of the other non-breeding sites fell into one of the three other classifications. Habitat measurements for all nest sites were combined for an average of 2.6 m for nest height (range 1.6 m to 5.3 m) and 6.2 m for overall canopy height (range 5.3 m to 7.5 m) for all nest sites. Percent canopy cover averaged 94.4 percent in 2006. 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 2006.

Site	Avg. Nest Height (m)	Avg. Canopy Height (m) (At Nest)	Avg. Canopy Cover (%) (At Nest)	Dominant Species*
Ash Meadows--Bradford Sp	2.1	6.1	92.5	Coyote willow
Pahranagat Valley--Key Pittman	2.6	6.3	94.6	Coyote willow

All 11 nests (100 percent) were constructed in coyote willow in 2006. 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 60-100 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 five of the 12 sites surveyed in 2006, including: Corn Creek, Key Pittman, Warm Springs Ranch, Oasis Valley, and USFWS 4a-e.

Avifauna Summary

A total of 119 different bird species were observed and/or heard during the endangered bird surveys in 2006. 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 WMA: At Key Pittman WMA, three single willow flycatchers were observed and seven flycatcher pairs constructed a total of 11 different nests (only 10 were located), produced a total of 26 eggs; ten of which were lost, and 16 young fledged. Of the 11 nests, four were destroyed and/or depredated by unknown species, and six produced fledglings.

The first 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 contained one willow flycatcher egg, which later disappeared and the nest was abandoned. The third nest contained three eggs, of which one hatched and a bird successfully fledged, one egg disappeared, and one was deserted and thus addled. The second pair located in patch #2 obviously constructed a nest and were successful in fledging three willow flycatchers; however, even with the assistance of SWCA bird banders, this nest was never located during the survey and monitoring period. Patch #3 was claimed by the third pair at Key Pittman and their first nest progressed to two nestlings and one willow flycatcher egg by 27 June. On the next visit, the two nestlings were missing and presumed predated, yet one egg remained. During the subsequent visit the remaining egg was discovered broken, but a second nest containing three eggs was located, which ultimately resulted in three successful fledglings. The fourth pair at patch #4 constructed a nest and laid two eggs, discovered on 11 July. By 18 July the eggs were missing, presumed predated, the nest was filled with debris, and the pair

1	⊗ X	7	✓
	3 nest ✓		9 _B
2	✓	8	10
		17	
3	X ✓	9	11 ✓
		6	

apparently left the area, as they were not located again. At patch #5, a single willow flycatcher was heard 'fitz-bewing' on two occasions in late-June and late-July. No 'whitts', indicating nest defense, were heard, nor was a second bird, nest or fledglings ever located. Patch #6 was initially occupied by one willow flycatcher, however this bird moved to and paired with a bird at patch #7. This fifth pair at patch #7 constructed one nest, in which 3 eggs were found. All three successfully hatched and fledged. The pair occupying patch #9a (the portion of the patch south of the concrete diversion channel) constructed two nests. The first nest, which was never observed to contain eggs, was eventually destroyed. The second nest contained four eggs resulting in four successful fledglings. A single flycatcher, located in the #9b portion of the patch to the north of the channel, remained unmated in the patch for 43 days. Patch #10 was occupied by a single willow flycatcher for 36 days during the breeding season. A single willow flycatcher occupied patch #11 from 31 May to 18 July (49 days). Late in the season a pair formed and in late-August one adult, two fledglings and an empty nest were discovered.

Ash Meadows—Forrest Spring: A single male flycatcher was first noted at this site on 22 May. He remained unpaired until June 26, a total of 36 days, at which time he vacated the area.

Ash Meadows—Bradford Spring: The pair at Bradford Spring constructed only one nest. By mid-June the nest contained two willow flycatcher eggs and a week later also contained one Brown-headed Cowbird egg. One willow flycatcher successfully fledged from the nest, and the remaining willow flycatcher egg was addled and eventually predated. The cowbird egg remained addled in the nest throughout the monitoring period.

No other resident willow flycatcher activity was documented at the other monitored sites in 2006.

Discussion

Survey Effort and Detections

Twelve sites were surveyed in 2006 compared to 13 sites in 2005. Historically 20 different sites have been surveyed for willow flycatchers, although not all necessarily have been surveyed each year. Table 6 summarizes the 1999-2006 status of all historically monitored willow flycatcher sites.

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
PV—Key Pittman	R	R	R	R	R	R	R	R
PV—River Ranch	R	R	R	-- ¹				
PV—Crystal Springs	--	--	--	R	X	X	M	--
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
Moapa Pump Station	--	X	X	X	X	X	X	X
Corn Creek	--	--	--	--	--	M	M	X
Oasis—South	X	X	X	X	X	X	M	X
Oasis—Springdale	--	--	M	X	X	M	-- ¹	-- ¹
AM—Carson Slough	R	R	R	R	R	R	X ³	X ³
AM—Bradford	R	R	X	X	--	--	X	R
AM—Forrest	R	X	M	X	--	--	R	R
AM—Longstreet	--	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.

As revealed by the table above, 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 Pahrnagat 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 have been documented along the newly established transects adjacent to the fire area. However, 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: Pahrnagat Valley—Crystal South, Clover Creek, Beaver Dam, Meadow Valley Wash USFWS 2a-e and 5a-c, and Ash Meadows—Crystal reservoir and ALC.

The 2006 survey results for willow flycatchers conducted by NDOW were fairly consistent with the 2005 survey results. Over the past six years, the numbers of adults, pairs, and nests varied slightly but remained relatively constant, except in 2003 when a decrease on all fronts was observed. Number of adults increased 11 percent in 2006 over 2005 (18 to 20), and number of fledglings increased 143 percent (7 to 17). However, it is important to view these increases in the context of the small sample sizes involved.

Nest Monitoring

In 2006 nesting occurred at only two of the survey sites compared to three in 2005. Of the 12 nesting attempts, one nest (nest 2A at patch #2 Key Pittman) known to fledge young was never located, and a second nest (11A at patch #11) was not located until after new fledglings were located on that territory late in the breeding season. The combined 70 percent simple nest success rate (25 percent in 2005) reported in the results section included these two nests as successful. The combined Mayfield nest success estimate for 2006 (53 percent) was lower than the simple proportional nest success, however, this difference is reasonable to expect, since the simple proportional calculation usually overestimates the true nest success because long-lived nests are more likely to be included in the sample than short lived nests. Another way to view this is that there is a potential positive bias in calculating success based on the raw proportion of nests if your sample contains nests that are lost quickly (less likely to be found) and nests found during the nestling stage (more likely to succeed having made it that far) (Gardali 2006). Confidence intervals were not constructed for this analysis due to small sample size (N should be >20), and therefore these results should be viewed cautiously until a larger data set is available. More frequent nest visits during nest monitoring (currently monitored once/week) would improve the precision of the Mayfield estimates by more accurately determining number of exposure days.

Nesting territories at Key Pittman in 2006 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).

Average clutch size for nests with eggs decreased only slightly from 2.7 eggs per nest in 2005 to 2.6 eggs/nest in 2006. However, combined fecundity increased slightly to 2.4 fledglings per successful nest in 2006. This value is fairly consistent with results from the previous five years when fledglings per successful nests ranged from a low of 1.8 in 2002 to a high of 3.0 in 2003 for all sites combined. Obstacles affecting successful reproduction, including predation and addled eggs continue to be documented. Fifty percent of the nests in 2006 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 2006. 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 all the survey sites in 2006, only one incidence of parasitism was documented in 2006, resulting in a rate much lower than the recommended 20-30% threshold which should trigger the initiation cowbird control efforts (Smith et al. 2000).

The parasitized nest at Ash Meadows—Bradford Spring eventually contained two willow flycatcher eggs and one cowbird egg. One willow flycatcher successfully fledged from this nest while the remaining willow flycatcher and cowbird eggs eventually addled. The majority of early research had shown that in most cases of nest parasitism the result is either complete nest failure or the successful rearing of only cowbird chicks (Brown 1988, Whitfield 1990, Whitfield and Strong 1995 Sogge 1995b, and Sferra et al. 1997). Although in recent years there has been an increase in the number of incidences of willow flycatchers successfully fledging from parasitized nests (Koronkiewicz pers comm.), it was previously believed that once a willow flycatcher nest is parasitized, it has almost no chance of producing willow flycatcher young (Sogge 1997).

Color Banding

Although color banding is not routinely conducted at all sites surveyed by NDOW each year, NDOW personnel has 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 Pahrhagat NWR, moving to and nesting at Key Pittman WMA (Koronkiewicz pers comm.)

Habitat and Vegetation Characteristics

Canopy cover densities for nests found in 2006 (92.5-94.6 percent) fell within the high end of the known established range of 50-100 percent. Average nest height in 2006 (2.6 m) is also comparable, but on the low end of the range of 2-7 m reported in the Recovery Plan (2002). The 2006 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 2006 (6, 9, 14, 17, 7, 9, 12, and 17 individuals for years 1999-2006, 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 2006 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 2007. 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.

At the Oasis Valley—South site, the riparian habitat has improved in the area, primarily due to the removal of approximately 900 burros between 1995-1996 by the Bureau of Land Management, although a few burros still remain. In 2006 NDOW discovered unauthorized tree cutting and thinning of underbrush at this site. An investigation revealed that the Beatty Improvement District was trying to make the area appear more "park-like". The USFWS and NDOW intervened and no further habitat destruction has occurred.

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. Ensure that the fencing project at Key Pittman is completed in 2007.
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 3). The cuckoo winters primarily in South America.

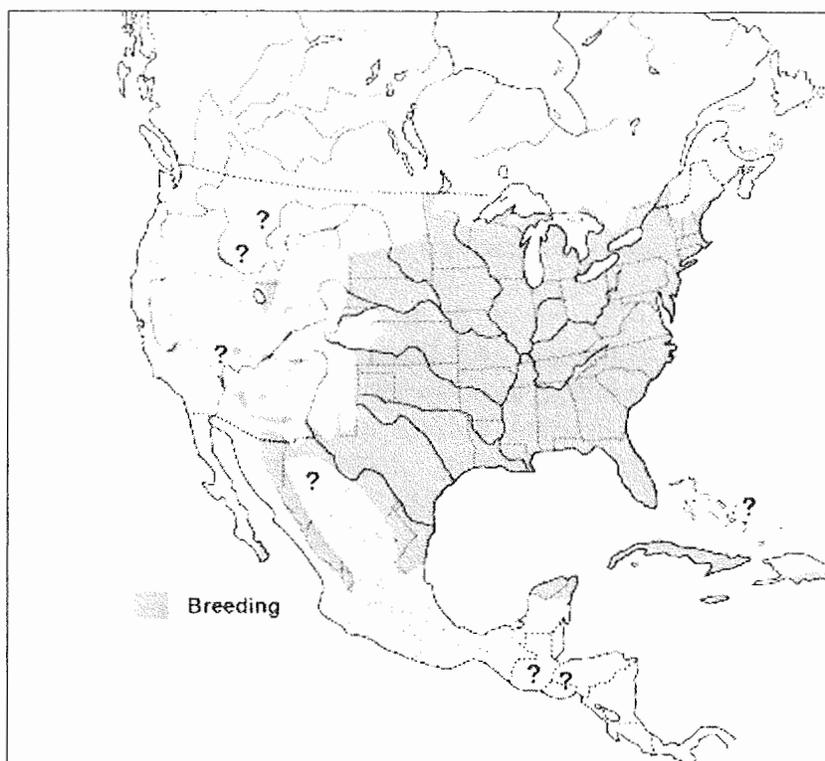


Figure 3. Breeding distribution of the Yellow-billed Cuckoo.
Source: Birds of North America, online 2006.

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, Pahranaagat 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 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 suppresses 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 8 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 preformed 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.

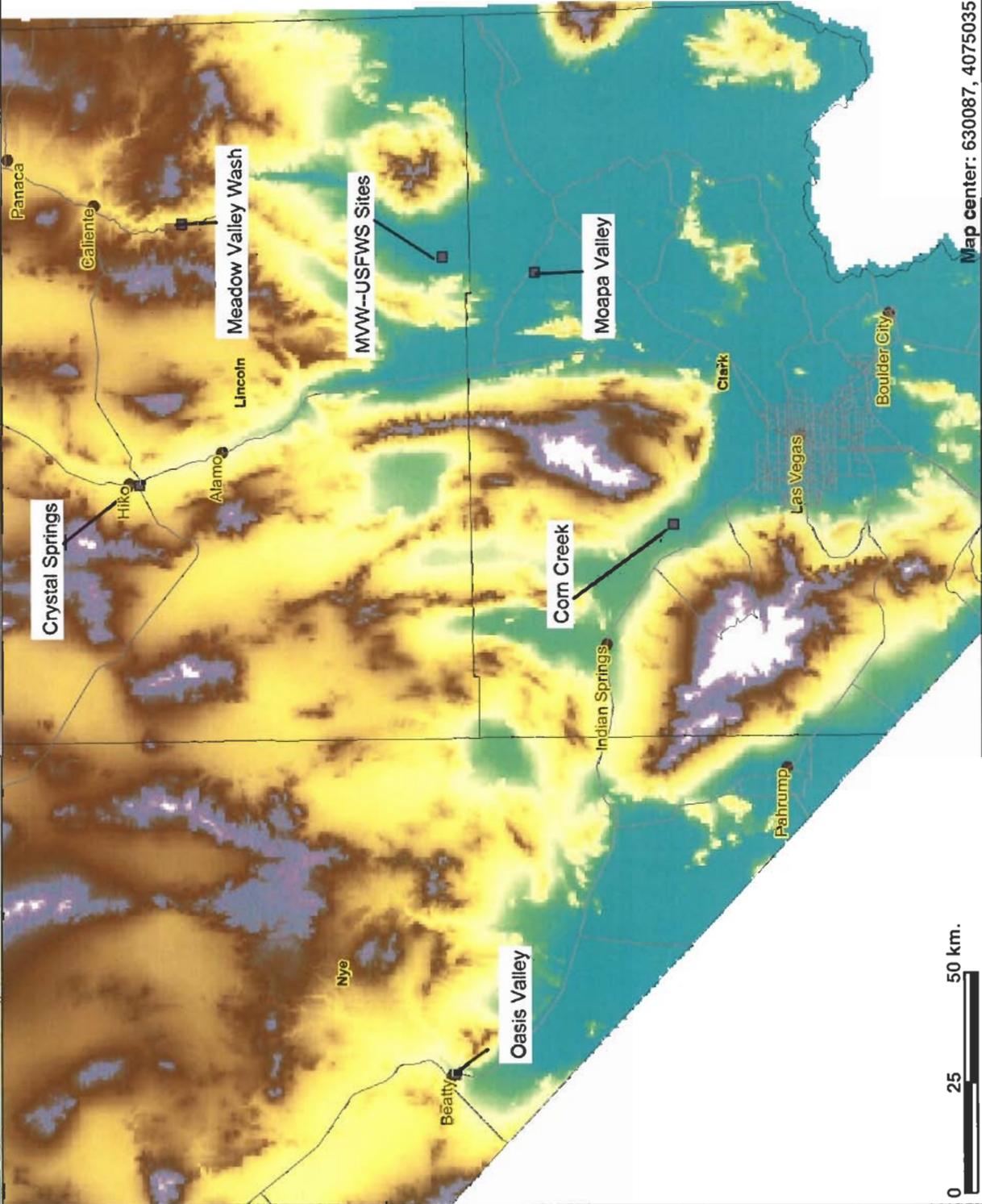
Study Site Descriptions

Eight different areas were surveyed and/or monitored for Yellow-billed Cuckoos by NDOW in 2006 (Figure 4.) 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.

Corn Creek

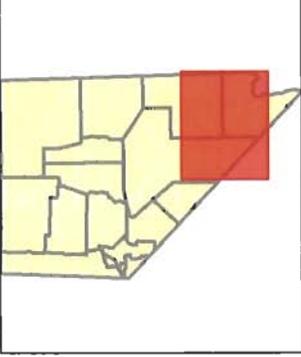
This site is located approximately 20 miles northwest of Las Vegas and three miles east of Highway 95, within the Desert National Wildlife Range. The habitat includes three ponds (an upper pond and two lower ponds) surrounded by marsh reed (*Phragmites sp*) and cattail. The upper pond (40 ft wide x 60 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.

Figure 4. 2006 YBCU Survey Area



Notes: Locations may be approximate.

This map is a user generated static output from an internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.



- Legend**
- 2006 Yellow-billed Cuckoo Survey and Monitoring Sites
 - Nevada Roads
 - Counties
 - Cities 1:1 Million

Scale: 1:1,377,910

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 midstory. 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 removed, and replaced with native coyote willow, ash and cottonwood. Additional Russian olive removals and habitat rehabilitation efforts have occurred 2004-2006. This site was first surveyed for cuckoos in 2001, and at the time two mated birds were detected.

USFWS 4a-e (formerly known as Lower Meadow Valley Wash – Mile 12.5 & Mile 14)

A flood major event occurred in Meadow Valley Wash in January 2005 which destroyed all of the vegetation east of the stream. As a result of flood-damage repairs and security concerns, Union Pacific Railroad denied access to the area in 2005 and 2006, unless accompanied by a paid flagger/escort. Although most of the suitable cuckoo habitat was destroyed by the flood and repair work, at the request and coordination of the USFWS, certain portions of the wash were surveyed on a limited basis. Previous sites known as Lower Meadow Valley Wash—Mile 12.5 and Mile 14 were combined and renamed USFWS 4a-e. Pre-flood, these areas were dominated by tamarisk, honey mesquite, black and coyote willow, cottonwood, ash and arrow weed (*Pluchea sericea*).

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 occurred in January 2005 which destroyed portions of SR 317, approximately 70 beaver ponds between Elgin and Caliente along the stream and destroyed Mile 39-40 transect 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 are 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 from the Warm Springs Road bridge, 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, located just south of the Beatty city limits, on the east side of U.S. Highway 95, 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 was been consistently surveyed since 2000.

Other Sites not surveyed

Four sites that had been surveyed in previous years were not monitored in 2006 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 Pahrnagat 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.

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
Pahranaagat Valley	Crystal Spr	T5S R60E S10	656103 E 4155324 N	3,800
Meadow Valley Wash	USFWS 4a-e	T12S R65E S13, 23, 25 & 36, T13S R65E S1	707987 E 4086301 N	1,850
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
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

Results

Survey Efforts and Detections

Over 132 hours were spent surveying a total of eight sites for cuckoos by NDOW in 2006, resulting in four adult cuckoo detections at only one location: Moapa Valley Warm Springs Ranch. A non-NDOW survey conducted at this same site later in the season resulted in an additional cuckoo detection (Table 8).

TABLE 8. 2006 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	12.25	0	Y ('03, 04)
Crystal Spring	13.25	0	Y ('01)
MVW 37, 39-40, 42-44	16	0	Y ('01)
MVW 48-56	20.55	0	Y ('05)
USFWS 4a-e	12.1	0	Y ('01)
Oasis—South	15.25	0	Y ('00, 01, 03, 05)
Moapa—Pump Station	10.25	0	Y ('01, 02, 05)
Moapa—Warm Sp Ranch	33	5	Y ('00–05)
<i>Total</i>	<i>132.65</i>	<i>5</i>	

The cuckoos were only briefly observed on two days in 2006. On 16 June four birds were heard and/or observed at two different general areas on the Warm Springs Ranch. The first two cuckoos were heard cooing, indicating unmated birds. Although these two birds were not visually observed, the cooing calls were coming from distinctly different areas resulting in a high confidence of two birds. Later that morning two additional birds were observed and heard calling near a different portion of the transect. The first bird was heard cooing, while a second bird flew in while knocking. Eventually the two birds flew off together. The cooing indicated another unmated bird, while the knocking suggested a mated bird, based on previously held beliefs relating to cuckoo behavior and calls. The other observation occurred on 24 June when a non-NDOW surveyor observed one cuckoo at one of the same locations as the previous NDOW detection. Subsequent visits to these sites were unsuccessful in re-locating the cuckoos.

Nest Finding/Monitoring

No cuckoo nests were located or confirmed during surveys conducted in 2006.

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 Crystal Spring and Meadow Valley Wash 37, 39-40, 42-44.

Avifauna Summary

A total of 119 different bird species were observed and/or heard during the endangered bird surveys in 2006. A detailed list of all bird species, their occurrence and breeding status can be found in Appendix A.

Discussion

Survey Effort and Detections

Eight sites were surveyed in 2006, the same number as in 2005. 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. 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 2000-2006 status of all historically monitored cuckoo sites.

TABLE 9. Number of Yellow-billed Cuckoos detected at potential cuckoo sites historically monitored by NDOW, 2000-2006. 2000-2005 numbers reported include mated and unmated birds; 2006 numbers indicated detections only.

Location	'00	'01	'02	'03	'04	'05	'06 ³
Corn Creek	--	--	--	1	1	0	0
Crystal Spring	--	2	0	0	0	0	0
Crystal South	1	0	1	-- ¹	-- ¹	-- ¹	-- ¹
Pahrnagat North	8	5	-- ¹				
MVW 12.5/14	--	--	--	--	--	0	0
MVW 37, 39-40	0	1	--	--	0	0	0
MVW 48-56	--	0	--	--	0	1	0
Moapa Pump Station	0	4	1	0	0	3	0
Moapa Warm Springs	9 ²	12	1	1	3	2	5 ³
Oasis South	1	2	0	1	0	1	0
Oasis Springdale	--	2	0	0	0	0	-- ¹
Beaver Dam	0	0	--	--	--	--	--
<i>Total</i>	<i>19</i>	<i>28</i>	<i>3</i>	<i>3</i>	<i>4</i>	<i>7</i>	<i>5³</i>

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 2001-2005). 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 can not 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 and other endangered birds. Pesticide use may also be significant, as the result is a decrease in insects which constitute the bird's major food source.

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. Add to this that cuckoos seemed to prefer nesting in the tops of canopies, and that 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 that nest abandonment is always a possibility, the task of locating a nest becomes even more difficult. 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, highly coveted riparian habitat is usually privately owned, and it has been difficult to acquire access to these areas in recent years, resulting in reduced ability to survey all suitable cuckoo habitat in Nevada.

At the Oasis Valley—South site, the riparian habitat has improved in the area, primarily due to the removal of approximately 900 burros between 1995 and 1996 by the Bureau of Land Management, although a few burros still remain. In 2006 NDOW discovered unauthorized tree cutting and thinning of underbrush at this site. An investigation revealed that the Beatty Improvement District was trying to make the area appear more “park-like”. The USFWS and NDOW intervened and no further habitat destruction has occurred.

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 2005. Throughout the 2002-05 survey seasons’ meadow grasses were substantially grazed and apparent grasshopper numbers declined. In 2006 cattle grazing continued at this site and also at various locations in Meadow Valley Wash. No other sites had appreciable grazing pressures, with the exception of a few burros at Oasis Valley South.

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. 2006 Avifauna summary for all Southwestern Willow Flycatcher and Yellow-billed Cuckoo Survey Sites

Species	Corn Creek	Ash Meadows	Key Pittman	Crystal Springs	Oasis Valley	Moapa Valley	Meadow Valley
Aberts Towhee		X				X,P,N,F	X
American Coot			X,P,N,F	X,P,F			
American Kestral	X				X	X	
American Robin				X,P,N,F			X
American Tree Sparrow		X					X,P,N,F
American White Pelican			X				
Ash-throated Flycatcher	X,P	X		X	X		X,P,N,F
Barn Owl	X		X		X		
Barn Swallow			X,P,F				
Belted Kingfisher			X	X			X
Bell's Vireo	X	X,P	X		X		X
Bewick's Wren		X,P,N,F	X,P,F	X	X	X	X,P
Black Phoebe	X		X	X,P	X	X,P	X,P,N,F
Black-chinned Hummingbird	X		X,P	X	X,P		X
Black-crowned Night Heron	X		X, F				
Black-headed Grosbeak			X,P	X			
Black-throated Sparrow					X,P,N,F		X,P,N,F
Blue Grosbeak	X	X	X,P,N	X,P,N	X,P,N	X,P	X,P,N
Blue-gray Gnatcatcher	X,P	X	X	X	X,P	X	
Brown-headed Cowbird		X, P, F	X, P	X,P	X,P	X,P	
Brown Pelican			X				
Bullock's Oriole	X,P		X,P,N,F	X,P,N,F	X,P	X,P	X
Canada Goose			X, P, F				
Canyon Wren							X
Chipping Sparrow				X			
Chukar					X,F		X,P,F
Cinnamon Teal			X,P				
Common Raven	X,P,F		X,P,N,F	X,P,N,F	X, P		X
Common Yellowthroat		X,P,N,F	X, P, F	X	X,P	X,P	X,P,N
Cooper's Hawk	X		X,P,N	X, F	X, F	X	X
Crissal Thrasher	X,P	X,P				X	
Double-crested Cormorant			X				
Eared Grebe			X,P				
European Starling	X				X		
Ferruginous Hawk							X
Gadwall			X,P,F				
Gambel's Quail		X,P,F		X,P,F	X,P,F	X, P, F	X,P,F
Gray Flycatcher			X,P				
Great Blue Heron	X		X		X	X	X
Great Egret			X				
Great Horned Owl			X,P,N,F		X	X	
Greater Roadrunner					X	X	

Species	Corn Creek	Ash Meadows	Key Pittman	Crystal Springs	Oasis Valley	Moapa Valley	Meadow Valley
Green Heron			X	X			
Herring Gull				X			
Hooded Oriole							X,P,N,F
Horned Lark	X						
House Sparrow	X,P			X,P	X,P,N,F		
Housefinch	X,P		X,P	X,P	X,P,N,F	X,P	
Indigo Bunting	X,P					X	
Killdeer			X,P,N		X,P,N	X,P,N,F	
Ladder-backed Woodpecker			X	X		X,P	X,P
Lark Sparrow			X,F				
Lazuli Bunting	X			X		X,P	
Lesser Goldfinch			X	X,P			X
Lesser Nighthawk	X	X					
Lesser Scaup			X				
Loggerhead Shrike		X,P	X		X,P,N,F	X	
MacGillivray's Warbler				X			
Mallard			X,P,N,F	X,P,F			X
Marsh Wren			X,P,N		X		X
Mourning Dove	X,F	X,P,N,F	X,F	X	X,P	X,P,N,F	X,P
Northern Harrier		X,P,N,F	X		X	X	
Northern Mockingbird	X	X		X,P,N,F	X,P	X,P,N,F	X
Northern Rough-winged Swallow	X		X		X	X,P	
Northern Shoveler			X				
Peregrine Falcon						X	
Phainopepla	X,P	X	X	X	X	X,P,N,F	
Pied-billed Grebe			X,P,F	X			
Prairie Falcon							X
Redhead			X,P,N,F				
Red-tailed Hawk	X		X	X	X	X,F	
Red-winged Blackbird		X,P,N,F	X,P,N,F	X,P,N	X,P	X,P	
Ring-billed Gull			X				
Ring-necked Pheasant						X	
Rock Wren							X,P,N,F
Rose-breasted Grosbeak					X,P	X	
Ruddy Duck			X,P,N,F				
Sage Sparrow					X,P,N,F		
Sage Thrasher			X				
Say's Phoebe	X,P		X		X,P,F		X
Scrub Jay							X
Sharp-shinned Hawk					X		
Short-eared Owl			X			X	
Song Sparrow			X				X,P,F
Spotted Sandpiper			X	X			
Spotted Towhee							X
Summer Tanager	X			X,P,F		X,P,N,F	X,P,F

Species	Corn Creek	Ash Meadows	Key Pittman	Crystal Springs	Oasis Valley	Moapa Valley	Meadow Valley
Verdin	X,P,N	X,P		X	X,P,F	X, P, F	X
Vermilion Flycatcher						X, P, N, F	
Violet-green Swallow			X		X		X
Virginia Rail		X, P	X,P		X		X,P
Warbling Vireo		X, P		X	X,P	X	
Western Grebe			X				
Western Kingbird	X,P,N,F	X,P,N,F	X, P	X,P,N,F	X,P,N,F	X,P	X,P,F
Western Meadowlark		X			X	X	
Western Tanager	X			X	X,P		X
Western Wood-Pewee	X		X	X	X	X	
Whip-poor Will						X	
White-crowned Sparrow	X		X				
White-faced Ibis			X	X	X	X	
White-throated Swift	X				X		X
Wild Turkey							X
Willow Flycatcher (SW)	X,P	X,P,N	X, P, N, F		X	X,P,N	
Wilson's Warbler		X	X, P	X,P	X		
Yellow Warbler	X	X,P	X, P	X,P	X	X	X,P
Yellow-billed Cuckoo	X					X	
Yellow-billed Loon			X				
Yellow-breasted Chat		X,P,N	X,P	X	X	X,P,N	X
Yellow-headed Blackbird			X,P,N,F				

X—Occurance
P—Pair
N—Nesting
F—Fledged Young