Avian Surveys and Parasitism Control and Evaluation on Clark County Multiple Species Habitat Conservation Plan Properties – 2026 Final Project Report

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PREPARED FOR

Desert Conservation Program

Clark County Department of Environment and Sustainability

PREPARED BY

SWCA Environmental Consultants

AVIAN SURVEYS AND PARASITISM CONTROL AND EVALUATION ON CLARK COUNTY MULTIPLE SPECIES HABITAT CONSERVATION PLAN PROPERTIES – 2026 FINAL PROJECT REPORT

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EXECUTIVE SUMMARY

In 2026, SWCA Environmental Consultants (SWCA) conducted avian surveys across all properties managed by the Clark County Desert Conservation Program (County); these properties include the Riparian Reserve Units and the Boulder City Conservation Easement (BCCE). Surveys were conducted to build on the baseline dataset of avian species presence and distribution at the County's properties. These baseline data can be compared with future data to quantify the success of management and restoration efforts at the County's properties. Surveys consisted of three rounds of breeding bird point-count surveys at the Riparian Reserve Units and at the BCCE and species-specific surveys for southwestern willow flycatcher (*Empidonax traillii extimus*)[1] and yellow-billed cuckoo (*Coccyzus americanus*) (hereafter cuckoo) within appropriate habitat at the Riparian Reserve Units. SWCA also continued intensive flycatcher monitoring and brown-headed cowbird (*Molothrus ater*) (hereafter cowbird) control at Mesquite West (a historical flycatcher breeding site that includes Mesquite Parcel 1-A) and completed flycatcher monitoring at Bunkerville East Parcels 2-A through 2-G.

General avian point-count surveys and species-specific surveys and monitoring were completed between March 23 and August 5. During point-count surveys, surveyors detected four of the eight bird species covered by the Clark County Multiple Species Habitat Conservation Plan (MSHCP): Arizona Bell's vireo (*Vireo bellii arizonae*), blue grosbeak (*Passerina caerulea*), flycatcher, and phainopepla (*Phainopepla nitens*). One additional MSHCP covered avian species, cuckoo, was detected both incidentally and during species-specific surveys at the Riparian Reserve Units. The surveys also yielded two proposed covered species: loggerhead shrike (*Lanius ludovicianus*) and LeConte's thrasher (*Toxostoma lecontei*). In total, 65 avian species were recorded during general avian point-count surveys across all the County's properties, and MSHCP covered or proposed covered species were observed at each property.

Flycatcher monitoring was conducted between May 15 and August 15 to determine residency of willow flycatchers, find and monitor flycatcher nests, and band adult and nestling flycatchers. The monitoring program was important in assessing the effects of cowbird control on flycatcher nest success at Mesquite West. In total, 19 adult willow flycatchers were detected at Mesquite West and Bunkerville East Parcels 2-A through 2-G. No willow flycatchers were detected at Mormon Mesa. One within-year, between-study area[2] movement was observed: one adult that held a territory at Mesquite West was identified to individual via resighting and later observed at Warm Springs Natural Area during flycatcher monitoring completed by SWCA under a separate contract with the Southern Nevada Water Authority. This individual has moved back and forth between these two study areas between breeding seasons since the bird was banded in 2021. In 2026, this individual moved 54.0 kilometers (33.6 miles) during the breeding season. The 19 individuals detected comprised seven pairs, four unpaired resident males, and two individuals for which residency and breeding status could not be determined. Both individuals for which residency and breeding status could not be determined were known to be of the southwestern subspecies because they were previously banded. Eight confirmed nesting attempts were documented; four of these attempts were successful. One adult and 15 nestling flycatchers were newly banded; one adult banded in a previous year was recaptured. Of the 15 nestlings banded at Mesquite West, nine were confirmed to have fledged.

SWCA conducted cowbird control at Mesquite West from May 4 through July 27. SWCA biologists performed targeted mist netting of adult and fledgling cowbirds over 17 mornings, totaling 32.4 net-hours. Male cowbirds were released, and females were euthanized. In total, nine adult cowbirds (0.3 adult per net-hour) were captured, of which five were male. Four female cowbirds were euthanized.

[1] Throughout this document, when residency status for an individual is undetermined and the subspecies is unknown, the term *willow flycatcher* is used to refer to *E. traillii*. The term *flycatcher* refers to *E. t. extimus*.

[2] A flycatcher study area is comprised of one to several geographically grouped survey sites.

In 2026, cowbird parasitism on flycatcher nests was 0% at Mesquite West. In previous years in which SWCA conducted flycatcher monitoring under contract with the County (2020–2025), parasitism ranged from 22% to 50%. Parasitism rates during the cowbird netting period (2021–2026) were compared with parasitism rates in both a 5-year period (2016–2020) immediately preceding cowbird netting as well as the period in which flycatcher monitoring at Mesquite West was conducted by SWCA or the Nevada Department of Wildlife (2003–2020); parasitism was significantly lower during the cowbird netting period than either of the pre-netting periods.

Flycatcher nest success, productivity, and fecundity were 50%, 1.29 fledglings per nest, and 1.50 fledglings per female flycatcher, respectively, in 2026; these metrics fall within the ranges observed in 2020–2026 during flycatcher monitoring conducted under contract with the County. Flycatcher nest success, productivity, and fecundity across the cowbird netting period (2021–2026) were compared with the 5-year period preceding cowbird netting (2016–2020), as well as the period in which flycatcher monitoring was conducted by SWCA or the Nevada Department of Wildlife (2003–2020); all metrics were significantly higher during the cowbird netting period than either of the pre-netting periods.

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1 INTRODUCTION

The Clark County Desert Conservation Program (County) manages compliance with the Endangered Species Act (ESA) through the Clark County Multiple Species Habitat Conservation Plan (MSHCP) (Clark County Department of Comprehensive Planning [CCDCP] and U.S. Fish and Wildlife Service [USFWS] 2000). This is accomplished, in part, through the management of a reserve system, which includes Riparian Reserve Units and the Boulder City Conservation Easement (BCCE). The current MSHCP covers eight bird species, six of which are found primarily in desert riparian habitats: Arizona Bell's vireo (*Vireo bellii arizonae*), blue grosbeak (*Passerina caerulea*), southwestern willow flycatcher (*Empidonax traillii extimus*) (hereafter flycatcher),[1] summer tanager (*Piranga rubra*), vermilion flycatcher (*Pyrocephalus rubinus*), and yellow-billed cuckoo (*Coccyzus americanus*) (hereafter cuckoo). The other two MSHCP covered bird species can be found either in or away from desert riparian habitats: phainopepla (*Phainopepla nitens*) is typically found in desert washes with mesquite (*Prosopis* spp.) or catclaw acacia (*Senegalia greggii*), and American peregrine falcon (*Falco peregrinus anatum*) can be found in almost any type of habitat but prefers to nest on cliff faces (CCDCP and USFWS 2000). Two of the eight covered bird species are also federally protected under the ESA—flycatcher, listed as endangered (USFWS 1995), and cuckoo, listed as threatened (USFWS 2014). In addition to the eight currently covered species, seven species are proposed to be covered under the MSHCP permit amendment that is in progress: golden eagle (*Aquila chrysaetos*), western burrowing owl (*Athene cunicularia hypugaea*), gilded flicker (*Colaptes chrysoides*), loggerhead shrike (*Lanius ludovicianus*), Ridgway's rail (*Rallus obsoletus yumanensis*), Bendire's thrasher (*Toxostoma bendirei*), and LeConte's thrasher (*T. lecontei*) (Clark County 2026a). Most proposed covered species can be found in a variety of desert habitats, including upland habitats, which compose most of the BCCE; however, Ridgway's rail is a riparian obligate species.

The extent and quality of native desert habitat across the Southwest, particularly desert riparian habitat, have been steadily diminishing for decades, threatened by urban and agricultural development, invasion of nonnative species such as tamarisk (*Tamarix* spp.), fire, and the reduction of water tables through unsustainable water use (Clark County 2023b). Because quality avian habitats, particularly riparian habitats, are scarce within arid environments, management of these areas and conservation of the MSHCP covered avian species that inhabit them are essential to these species' survival.

1.1 Description of the Project

In 2023, the County solicited proposals to continue work that SWCA Environmental Consultants (SWCA) conducted from 2017 through 2023: avian surveys on its Riparian Reserve Units (Figure 1) and on the BCCE (Figure 2). The County contracted SWCA to conduct presence/absence surveys for both flycatcher and cuckoo across its Riparian Reserve Units (see Figure 1) as well as to conduct avian point counts at predetermined locations across the Riparian Reserve Units and the BCCE. The new contract (County Project No. 2023-SWCA-2325B) was awarded in December 2023 for work beginning in the spring of 2024. Data collected during these surveys build on baseline presence/absence and relative abundance data for all bird species on these properties, including any MSHCP covered and proposed covered avian species. These data can be used to inform and evaluate the success of restoration efforts and land management decisions for the County's properties.

[1] Throughout this document, when residency status for an individual is undetermined and the subspecies is unknown, the term *willow flycatcher* is used to refer to *E. traillii*. The term *flycatcher* refers to *E. t. extimus*.

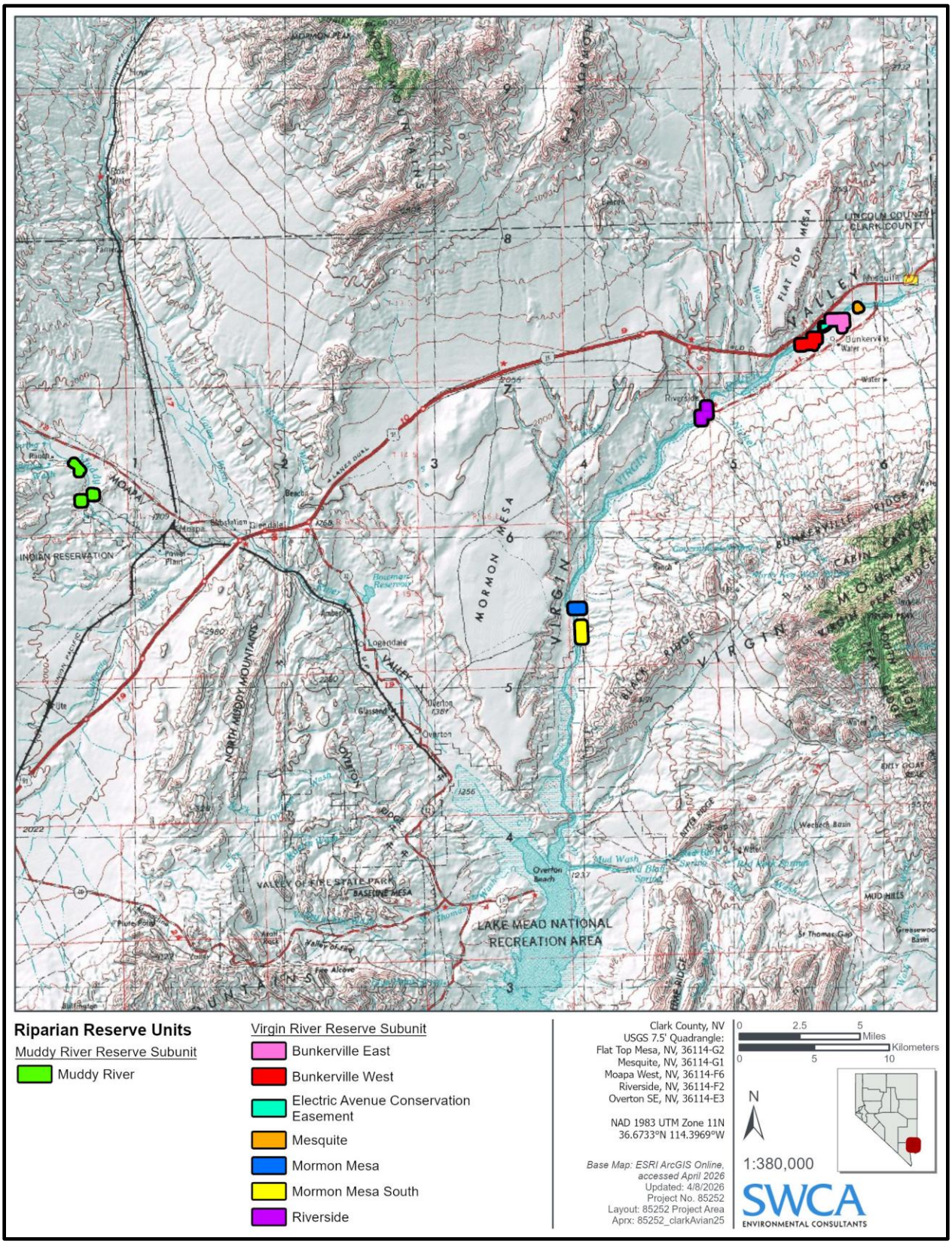


Figure 1. Riparian Reserve Unit locations.

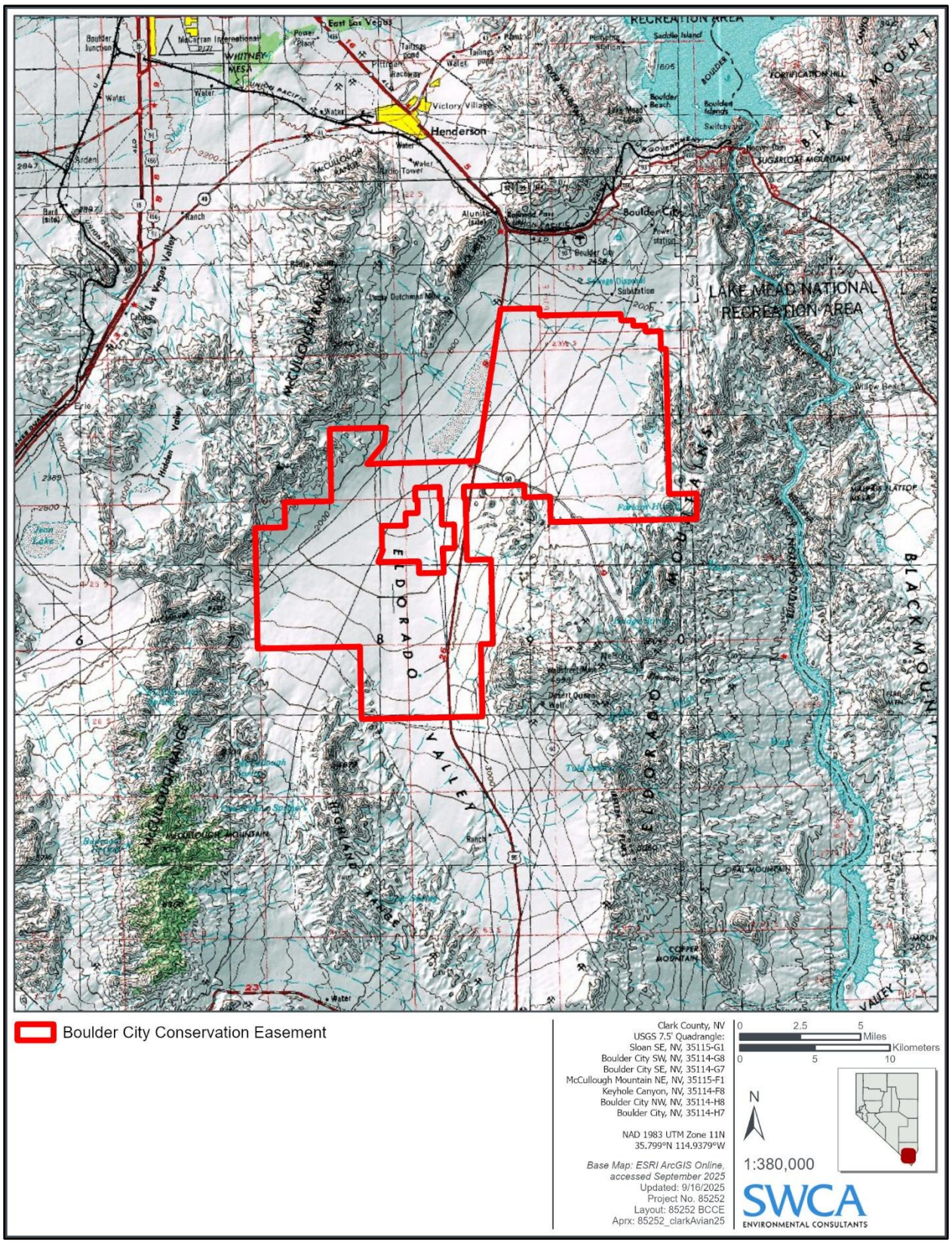


Figure 2. BCCE location.

The 2023 contract renewal included a one-time habitat suitability assessment for flycatcher and cuckoo of each property in the Riparian Reserve Units. Surveys prior to 2024 included all vegetation ≥3 meters (m) (10 feet) tall. Habitat assessments in 2024 took into consideration habitat suitability criteria developed from the summary of habitat conditions documented in flycatcher territories along the lower Colorado River and its tributaries (McLeod et al. 2008; McLeod and Pellegrini 2013), as well as descriptions of suitable habitat, which specify that suitable flycatcher habitat consists of patches of vegetation ≥10 m (33 feet) wide and ≥4.5 m (14.8 feet) tall with canopy closure ≥85% (McLeod and Pellegrini 2017). Some characteristics of suitable flycatcher habitat are similar to those of suitable cuckoo habitat, including dense vegetation ≥3 m (10 feet) tall and ≥80% canopy closure (Stanek et al. 2021). Only habitat with vegetation ≥4 m (13 feet) tall and ≥75% canopy closure was delineated for surveys for both flycatcher and cuckoo in 2024. In addition, sizable (≥0.4 hectare [ha] [1.0 acres]) areas of relatively dense mesquite were included in newly delineated cuckoo survey areas, as several detections were recorded in mesquite in 2019 through 2023 (SWCA 2019a, 2020, 2023a). In 2025 and 2026, surveys were continued in the areas that were delineated in 2024.

Work conducted by SWCA in 2026 also included continued flycatcher surveys and monitoring at Mesquite West (a historical flycatcher breeding site that includes Mesquite Parcel 1-A); combined-method brown-headed cowbird (*Molothrus ater*) (hereafter cowbird) control at Mesquite West; and flycatcher monitoring at Mormon Mesa Parcel 5-A. Flycatcher surveys and monitoring at Mesquite West under contract with the County were first conducted by SWCA in 2020, and the combined-method cowbird control program was instituted in 2021. SWCA also began flycatcher nest monitoring under contract with the County at Mormon Mesa Parcel 5-A in 2021.

1.2 Background and Need

On November 19, 2000, the USFWS issued the *Intra-Service Biological and Conference Opinion on Issuance of an Incidental Take Permit to Clark County, Nevada, for a Multiple Species Habitat Conservation Plan* (Biological and Conference Opinion) (USFWS 2000). Then, on March 28, 2001, USFWS issued an amended incidental take permit for the Clark County MSHCP (USFWS 2001).

1.2.1 Riparian Reserve Units

According to both the Biological and Conference Opinion and Condition K.1 of the associated incidental take permit, the County must acquire private property that contains desert riparian habitat along the Virgin River, Muddy River, and Meadow Valley Wash in Clark County. It was recognized that proper management of desert riparian habitats would be crucial in conserving the six bird species covered by the current MSHCP (including the two federally listed species) that are known to use this habitat. To date, the County has acquired 318 ha (785 acres) of land along the Muddy and Virgin Rivers in northeastern Clark County, Nevada. In addition, the Electric Avenue Conservation Easement, encompassing approximately 9 ha (22 acres) along the Virgin River, was established between a private landowner and the County at a site last known to be occupied by breeding flycatchers in 2019 (SWCA 2019b). The County-owned parcels and the Electric Avenue Conservation Easement parcel (Bunkerville East Parcel 2-N) are collectively known as the Riparian Reserve Units.

Prior to 2017, the County acquired 116 ha (286 acres) along the Muddy and Virgin Rivers. SWCA began conducting avian surveys at these properties in 2017 to establish a baseline dataset of avian species presence and distribution under two separate projects: 1) Federally Listed Bird Surveys on Riparian Properties (SWCA 2017a) and 2) Point-Count Surveys on Riparian Properties (SWCA 2017b). In late 2017, the County acquired an additional 130 ha (320 acres) along the Virgin River. Point-count surveys and species-specific surveys for federally listed species were conducted at these newly acquired

properties under one project in 2018 (SWCA 2018a). In 2019, avian surveys at all the County's properties were combined into one project (SWCA 2019a). Point-count surveys and species-specific surveys for federally listed species were conducted at all the County's riparian properties, including 24 ha (59 acres) of newly acquired land, through the 2021 field season (SWCA 2020, 2021). In late 2021, the County acquired an additional 48 ha (119 acres) along the Virgin River. Surveys were initiated at this property and continued at all other County properties in 2022 (SWCA 2022), and surveys at all properties continued in 2023 (SWCA 2023a). The County contracted SWCA for continuation of this work beginning in 2024 under a new contract (County Project No. 2023-SWCA-2325B) (SWCA 2024a, SWCA 2025a). The 9-ha (21-acre) Bunkerville East Parcel 2-N was added for the 2026 survey season; the 2026 survey efforts are described herein.

1.2.1.1 FEDERALLY LISTED BIRD SURVEYS

1.2.1.1.1 Species Background

Southwestern Willow Flycatcher

Flycatcher is one of four subspecies of willow flycatcher (*E. traillii*) (Unitt 1987). Flycatchers breed in dense, mesic riparian habitats at scattered, isolated sites in New Mexico, Arizona, southern California, southern Nevada, southern Utah, southwestern Colorado, and, at least historically, extreme northwestern Mexico and western Texas (Unitt 1987). Factors contributing to the decline of flycatcher on its breeding grounds include loss, degradation, and/or fragmentation of riparian habitat; invasion of riparian habitat by nonnative plants; and brood parasitism (parasitism) by cowbirds. One of the last long-distance neotropical migrants to arrive in North America in spring, flycatchers typically arrive in May or June and depart in August (Sogge et al. 2010).

Flycatchers nest in a variety of habitats, but common characteristics of flycatcher breeding habitat include dense tree or shrub cover ≥4.5 m (14.8 feet) tall, high canopy closure (≥85%), vegetation with dense twig structure, and flight paths in the midstory (McLeod et al. 2008; McLeod and Pellegrini 2013; Sogge et al. 2010). The presence of surface water or saturated soil is required to maintain suitable vegetation structure, but this structure may persist for a year or more without nearby wet soils. Flycatchers nest in habitat patches ranging in size from 0.8 ha (2.0 acres) to several hundred hectares but are rarely found in narrow strips of habitat less than 10 m (33 feet) wide (Sogge et al. 2010). During the nesting season, flycatchers occupy home ranges averaging less than 0.5 ha (1.2 acres) (Cardinal 2005). Willow flycatchers are generally monogamous, but polygyny has been documented (Ehrlich et al. 1988), particularly in the southwestern subspecies (SWCA 2019a, 2019b, 2020, 2021, 2022, 2023b, 2024b, 2025b). Migrant willow flycatchers are found in both spring and fall in a variety of habitats that are unsuitable for breeding. These migration stopover habitats, though not necessarily used for breeding, are likely important for both reproduction and survival. Designated critical habitat for flycatcher includes riparian habitats along the Virgin River from Berry Springs, Utah, downstream to the full pool level of Lake Mead (USFWS 2013a) and includes all six subunits (Mesquite, Bunkerville East, Bunkerville West, Riverside, Mormon Mesa, and Mormon Mesa South) of the Virgin River Riparian Reserve Unit (Virgin River Reserve Unit).

Yellow-Billed Cuckoo

Cuckoo was historically widespread and locally common along rivers throughout the western United States (USFWS 2013b). However, populations have declined across the West in recent years, largely as a result of loss, degradation, and fragmentation of riparian habitat. Consequently, the western distinct population segment was listed as threatened under the ESA in October 2014 (USFWS 2014). Critical

habitat for cuckoo was designated in 2021, but no critical habitat units were designated within the state of Nevada (USFWS 2021).

Cuckoos are late neotropical migrants, arriving on their breeding grounds around mid-June and departing by mid-September. Cuckoo home ranges are generally at least 40 ha (100 acres) and often exceed 80 ha (200 acres), though home ranges as small as 1 ha (3 acres) have been documented (USFWS 2020). These patches are typically at least 100 m (328 feet) wide (USFWS 2020). Cuckoos have not been found nesting in isolated patches less than 0.8 ha (2.0 acres) or in linear habitats less than 10 to 20 m (33 to 66 feet) wide, but they may use these habitats during migration and early in the breeding season (Halterman et al. 2016). Breeding habitat is typically thought to include multistoried riparian woodlands dominated by willow (*Salix* spp.) or cottonwood (*Populus* spp.) adjacent to watercourses with less than 3% slopes (USFWS 2020). In a study at the South Fork Kern River Valley, California, Wohner et al. (2020) found dense early successional riparian habitats 1 to 5 m (3–16 feet) tall to be especially important to cuckoos. A study of nest placement in Arizona and California found that nests were placed between 1 and 22 m (3 and 72 feet) above the ground, with an average height of 7 m (23 feet) (Hughes 2020). Wohner et al. (2020) found nest height ranged from 2 to 4 m (7–13 feet) across two studies and averaged 4.8 m (15.7 feet) at another study. Cuckoos tend to be serially monogamous, but serial polyandry has been regularly documented in western populations.

1.2.1.1.2 Survey Background

In 2017, SWCA evaluated habitat for flycatcher and cuckoo on 41.9 ha (103.5 acres) across the Muddy River Riparian Reserve Unit (Muddy River Reserve Unit) and Bunkerville East and Mormon Mesa subunits of the Virgin River Reserve Unit.[2] Habitat suitability and the need for species-specific surveys were assessed during a site reconnaissance. According to Sogge et al. (2010), the minimum canopy height for breeding flycatcher is 3 m (10 feet); this habitat characteristic was considered during site assessment, and any portions of the habitat identified by the County for flycatcher and cuckoo surveys that were devoid of woody vegetation ≥3 m (10 feet) tall (as a result of scouring, restoration activities, etc.) were not surveyed. These areas were described (e.g., species, height, and percent cover of the dominant vegetation), photographed, and delineated in ArcGIS. Of the 41.9 ha (103.5 acres) originally estimated for survey by the County, SWCA delineated 31.7 ha (78.3 acres) in 2017 as potential habitat to be surveyed for both species across all subunits. Surveys in 2017 yielded several flycatcher detections at the Mormon Mesa subunit. No cuckoo detections were recorded.

In late 2017, wildfire burned a 0.3-ha (0.7-acre) portion of the Bunkerville East subunit; this area was removed from 2018 flycatcher and cuckoo surveys. In 2018, SWCA conducted flycatcher and cuckoo surveys on 18.2 ha (44.9 acres) of newly acquired land across the Bunkerville West and Riverside subunits. Surveys in 2018 yielded detections of several territorial flycatchers at the Mesquite subunit. No cuckoo detections were recorded.

By 2019, the County had outlined 53.5 ha (132.2 acres) within the Muddy River, Mesquite, Bunkerville East, Bunkerville West, Riverside, and Mormon Mesa subunits that were targeted for flycatcher and cuckoo surveys. Of the habitat originally estimated for survey by the County, SWCA delineated 47.9 ha (118.4 acres) in 2019 as potential habitat to be surveyed for both species across all subunits. Surveys in 2019 yielded territorial flycatchers at the Mesquite and Mormon Mesa subunits and nine cuckoo detections across the Muddy River, Mesquite, and Mormon Mesa subunits. One cuckoo nest was incidentally located at Mesquite Parcel 1-A during flycatcher monitoring activities; one cuckoo fledgling was later observed, marking the third known breeding site in the state of Nevada and the first nesting

[2] County naming conventions changed in 2020, and the Bunkerville subunit was split into Bunkerville East (Parcels 2-A through 2-G), Bunkerville West (Parcels 2-I and 2-J), and Mesquite (Parcel 1-A; formerly Bunkerville Parcel 2-H). Current names are used throughout this report.

attempt documented in the state since 2001 (SWCA 2019a). During cuckoo surveys at Mormon Mesa Parcel 5-A, a cuckoo was detected in a screwbean mesquite (*Prosopis pubescens*)–dominated bosque outside the delineated survey area. To better document cuckoo habitat use within this portion of the parcel, SWCA added this 5.1 ha (12.7 acres) of mesquite bosque to the Mormon Mesa Parcel 5-A cuckoo survey area in 2020.

In early 2020, the County acquired three new parcels (2-K, 2-L, and 2-M) within the Bunkerville West subunit. SWCA delineated 2.6 ha (6.4 acres) of riparian habitat within Parcels 2-L and 2-M (no habitat was identified in Parcel 2-K) to be surveyed for flycatcher and cuckoo. SWCA surveyed a total of 50.5 ha (124.7 acres) for flycatcher and 55.6 ha (137.4 acres) for cuckoo across all Riparian Reserve Units in 2020. Surveys yielded several flycatcher territories at the Mesquite and Mormon Mesa subunits and five cuckoo detections across all Riparian Reserve Units.

In late 2020, the County masticated 14.6 ha (36.1 acres) of dead and dying tamarisk at Mormon Mesa Parcel 5-A, and an additional 16.7 ha (41.3 acres) of tamarisk was masticated in early 2021; these areas were not surveyed for flycatcher or cuckoo in 2021. Flycatcher monitoring data collected at Mesquite West from 2003 through 2013 show that flycatcher nest and territory locations varied from year to year according to the distribution of suitable habitat within Mesquite West and sometimes were outside Mesquite Parcel 1-A (McLeod et al. 2008; McLeod and Pellegrini 2013, 2014). Monitoring at Mesquite Parcel 1-A in 2020 resulted in detections of singing male willow flycatchers well west of the Mesquite Parcel 1-A boundary (within a portion of the Mesquite West site referred to as Mesquite West West) (SWCA 2020). Therefore, SWCA and the County determined that flycatcher surveys across the entire Mesquite West site were important for detecting between-year habitat changes and flycatcher movements, as well as for assessing the effects of cowbird control on the breeding success of flycatcher across all occupied habitat at Mesquite West. To accomplish these goals, 11.4 ha (28.1 acres) of additional habitat within Mesquite West, generally west of Mesquite Parcel 1-A, was added to the flycatcher survey area in 2021. SWCA surveyed 43.9 ha (108.4 acres) for flycatcher and 38.5 ha (95.2 acres) for cuckoo across all Riparian Reserve Units in 2021. These surveys yielded territorial flycatchers at the Mesquite and Mormon Mesa subunits. No cuckoo detections were recorded.

In late 2021, the County acquired two additional parcels along the Virgin River (6-A and 6-B) that constitute the Mormon Mesa South subunit. SWCA delineated 14.3 ha (35.4 acres) along the eastern boundaries of the parcels to be surveyed for flycatcher and cuckoo. During the first round of flycatcher surveys at Bunkerville 2-I and 2-J in May 2022, the habitat in one previously surveyed portion of 2-I was deemed insufficient for flycatcher and cuckoo surveys due to defoliated tamarisk and lack of any continuous canopy. This 1.6-ha (4.0-acre) area was not surveyed in 2022 or thereafter. SWCA surveyed 57.9 ha (143.0 acres) for flycatcher and 51.2 ha (126.5 acres) for cuckoo across all Riparian Reserve Units in 2022. Surveys yielded territorial flycatchers at the Mesquite and Mormon Mesa subunits and one migrant willow flycatcher at the Bunkerville East subunit. No cuckoo detections were recorded.

During the winter of 2022 to 2023, the Bunkerville, Nevada, area experienced higher than average precipitation (Western Regional Climate Center 2023), which resulted in flooding along the Virgin River. Throughout the spring of 2023, melting of above-average winter snowpack in the Virgin River watershed in Arizona, Nevada, and Utah resulted in high flows in the Virgin River that scoured vegetation in portions of flycatcher and cuckoo survey areas; 1.4 ha (3.4 acres) at Bunkerville East Parcel 2-D, 0.01 ha (0.03 acre) at Bunkerville West Parcel 2-I, 0.4 ha (1.0 acres) at Bunkerville West Parcels 2-L and 2-M, and 0.3 ha (0.8 acre) at Riverside Parcel 3-A were eliminated from flycatcher and cuckoo survey areas in 2023. SWCA surveyed 55.8 ha (137.8 acres) for flycatcher and 49.1 ha (121.4 acres) for cuckoo in 2023. Surveys yielded territorial flycatchers at Mesquite and Mormon Mesa. Thirteen cuckoo detections were recorded across all Riparian Reserve Units.

In 2024, a habitat assessment was completed at each property in the Riparian Reserve Units as part of the requirements for County Project No. 2023-SWCA-2325B. Each Riparian Reserve subunit was assessed for habitat suitability for flycatcher and cuckoo, and survey boundaries for each species were adjusted based on results of the assessment. Only areas deemed to be suitable habitat (i.e., those with vegetation ≥4 m (13 feet) tall and ≥75% canopy closure) were included for both flycatcher and cuckoo. In addition, swaths of mesquite at least 0.4 ha (1.0 acres) in size with trees ≥4 m (≥13 feet) tall and with ≥65% canopy closure were included in cuckoo survey areas. Habitat assessments resulted in the reduction or complete elimination of flycatcher or cuckoo survey areas, or both, at each Riparian Reserve subunit. Both flycatcher and cuckoo survey areas were reduced by 0.3 ha (0.7 acre) at Mesquite, 6.0 ha (14.8 acres) at Bunkerville East, 5.4 ha (13.5 acres) at Bunkerville West Parcels 2-I and 2-J, and 1.5 ha (3.9 acres) at Bunkerville West Parcels 2-K through 2-M. All flycatcher survey areas (3.6 ha [8.9 acres]) at Riverside were eliminated; areas previously surveyed for cuckoo were eliminated and a mesquite bosque was added, resulting in a net reduction of 0.6 ha (1.7 acres). Flycatcher survey areas were reduced by 0.6 ha (1.6 acres) and cuckoo survey areas were reduced by 2.5 ha (6.2 acres) at Mormon Mesa. All areas (14.0 ha [35.4 acres]) previously surveyed for flycatcher and cuckoo at Mormon Mesa South were eliminated. Areas previously surveyed for flycatcher (3.5 ha [8.6 acres]) at Muddy River were eliminated; areas previously surveyed for cuckoo were reduced and one new mesquite bosque was added, resulting in a net reduction of 0.04 ha (0.1 acre). The resulting adjusted survey areas were surveyed in 2024. Surveys yielded territorial flycatchers at the Mesquite and Mormon Mesa subunits and two migrant willow flycatchers each at the Bunkerville East and Bunkerville West subunits. Three cuckoo detections were recorded across all Riparian Reserve Units.

In 2025, surveys were continued at all areas surveyed for flycatcher and cuckoo in 2024. Surveys yielded territorial flycatchers at the Mesquite, Mormon Mesa, and Bunkerville East subunits. One migrant willow flycatcher was incidentally detected at the Riverside subunit during point-count surveys. Four cuckoo detections were recorded across all Riparian Reserve Units.

The Electric Avenue Conservation Easement was finalized in January 2026, and surveys were conducted at the 9-ha (22-acre) Bunkerville East Parcel 2-N in 2026. Data for Bunkerville East Parcel 2-N are included in the Bunkerville East subunit throughout this document. Approximately 20 ha (50 acres) of tamarisk in the Bunkerville West and Bunkerville East subunits was masticated in November 2025; this mastication resulted in the elimination of 0.7 ha (1.7 acres) of flycatcher and cuckoo survey area. In 2026, flycatcher and cuckoo surveys were conducted at the County's Riparian Reserve Units under County Project No. 2023-SWCA-2325B.

FLYCATCHER MONITORING

Flycatcher breeding has been documented in Mesquite West for decades, and SWCA has been conducting surveys and monitoring for flycatcher in southern Nevada since 2003.[3] Over the course of this work, SWCA documented consistently high rates of parasitism of flycatcher nests.

In 2020, SWCA was contracted by the County to perform flycatcher territory and nest monitoring at Mesquite Parcel 1-A. As part of this effort, cowbird control (not specifically covered in the 2020 contract) was limited to the addling of one cowbird egg. All six flycatcher nesting attempts failed in 2020. SWCA and the County determined that continued monitoring of flycatcher territories and nests would be an

[3] In 1996 through 2002, flycatcher surveys and monitoring in southern Nevada were performed by the San Bernardino County Museum. SWCA assumed the responsibilities of flycatcher survey and monitoring activities in southern Nevada in 2003 under contract with the Bureau of Reclamation. Since 2003, SWCA has also conducted flycatcher activities in southern Nevada under contract with the Nevada Department of Wildlife (NDOW), the Animal and Health Inspection Service, and the County. The NDOW performed flycatcher surveys and/or monitoring in years in which SWCA was not contracted to conduct flycatcher activities.

essential component of determining whether cowbird control had an effect on flycatcher nesting success at not only Mesquite Parcel 1-A but also Mesquite West as a whole. The flycatcher monitoring program was expanded to include all of Mesquite West in 2021, and the entirety of Mesquite West has been monitored annually since 2021. Nest monitoring results at Mesquite West in 2021 through 2025 showed varied results, with productivity[4] ranging from 0.50 to 1.64 fledglings per nest (SWCA 2025a).

Additionally, SWCA monitored flycatchers at Mormon Mesa Parcel 5-A from 2021 through 2025, following successful breeding within that parcel in 2020. Territory and nest monitoring continued at Mesquite West and was scheduled at Mormon Mesa Parcel 5-A in 2026 under County Project No. 2019-SWCA-1935A.

1.2.1.2 BROWN-HEADED COWBIRD CONTROL

From 2013 through 2019, the Mesquite study area[5] (which encompasses several sites, including Mesquite West) consistently yielded one of the lowest average productivity rates (mean productivity = 0.45 fledgling per nest) of all the flycatcher study areas in southern Nevada (SWCA 2019b). Productivity at all southern Nevada study areas monitored in 2019 ranged from 0 to 2.5 fledglings per nest, with an overall average of 1.43 fledglings per nest (SWCA 2019b)—over three times greater than the 2013 through 2019 average at Mesquite West.

Parasitism by cowbirds is believed to have significantly contributed to nest failures and low productivity at Mesquite West (SWCA 2019b). As part of a previous project with the Bureau of Reclamation, SWCA used modified Australian crow traps to passively trap cowbirds across the Mesquite study area from 2003 through 2007 (McLeod and Pellegrini 2013). Despite substantial trapping efforts, the percentage of nests that were successful did not significantly improve during or following trapping (pre-trapping: 48%; trapping: 49%; post-trapping: 36%).

Starting in 2010, SWCA began addling cowbird eggs on flycatcher projects for the Bureau of Reclamation and the NDOW. After addling began, the proportion of cowbird eggs that hatched dropped from 74% (2003–2009) to 11% (2010–2012) (McLeod and Pellegrini 2013). Nest productivity did not increase significantly as a result of cowbird egg addling, possibly because high depredation rates obscured any benefits of egg addling. However, data collected in earlier years showed that nests with unhatched cowbird eggs produced more flycatcher fledglings, on average, than did nests with cowbird nestlings; therefore, McLeod and Pellegrini (2013) recommended that addling continue to be used as a cowbird control method in the lower Colorado River watershed.

Flycatcher nests in the Mesquite study area had high (51%) parasitism rates from 2015 through 2020 (SWCA 2019b, 2020). Rothstein et al. (2003) recommended implementing a cowbird control program when parasitism rates reach 20% to 30% for a threatened or endangered host or 50% for non-protected host species. Although trapping or addling alone did not prove beneficial to flycatcher nest success or productivity across Mesquite West, several avian studies have shown an increase in nest success when different means of cowbird control were combined, such as shooting adult cowbirds, addling cowbird eggs, and removing nestling cowbirds (Kostecke et al. 2005; Whitfield et al. 1999).

In 2021, SWCA implemented a combined-method cowbird control program at Mesquite West to evaluate the potential of target netting, in combination with cowbird egg addling and nestling euthanasia, in reducing the negative effects of parasitism on flycatcher nest success. Parasitism rates at Mesquite West under the combined-method cowbird treatment program in 2021, 2022, 2023, 2024, and 2025 were 50%,

[4] Productivity is the number of young fledged per nest that contained flycatcher eggs and for which outcome was known.

[5] A flycatcher study area consists of one to several geographically grouped survey sites. Each survey site consists of one to several survey areas.

22%, 8%, 9%, and 13%, respectively. This combined-method cowbird control program was continued in 2026 under County Project No. 2019-SWCA-1935A.

1.2.1.3 POINT-COUNT SURVEYS

In 2017, SWCA began conducting breeding bird point-count surveys for the County at 27 locations across the Riparian Reserve Units (SWCA 2017b). In 2018, SWCA conducted point-count surveys at 24 locations across newly acquired properties in the Virgin River Reserve Unit (SWCA 2018a). Starting in 2019, SWCA completed breeding bird point-count surveys at a subset of the 51 previously surveyed locations in odd-numbered years and surveyed the remaining points in even-numbered years as part of the comprehensive bird survey effort across all the County's properties (SWCA 2019a). Four point-count locations were added with the acquisition of Bunkerville West Parcels 2-K, 2-L, and 2-M in 2020 (SWCA 2020), and four more point-count locations were added at Mormon Mesa South Parcels 6-A and 6-B at the beginning of surveys in 2022 (SWCA 2022). In 2026, two point-count locations were added at Bunkerville East Parcel 2-N. Point-count surveys were conducted at the 31 even-year locations across all Riparian Reserve Units in 2026 under County Project No. 2023-SWCA-2325B.

1.2.2 Boulder City Conservation Easement

In addition to the acquisition of riparian properties, implementation of the MSHCP required the establishment of a conservation easement in the Eldorado Valley. This easement, known as the BCCE, was established on approximately 34,400 ha (approximately 85,000 acres) in July 1995 through an agreement between Clark County and Boulder City. The easement was amended once in 2010 and again in 2020. As a result of these amendments, the BCCE currently encompasses 35,216 ha (87,268 acres).

According to both the Biological and Conference Opinion (USFWS 2000) and Condition P of the associated incidental take permit (USFWS 2001), the County is required to take measures necessary to ensure maintenance of habitat connectivity for Mojave desert tortoise (*Gopherus agassizii*) and other covered species within the BCCE. While the BCCE is primarily managed for protecting desert tortoise, it was recognized that proper management of desert tortoise habitat could also be beneficial for protecting habitat for other species covered by the MSHCP, including avian species (Clark County 2023a).

1.2.2.1 POINT-COUNT SURVEYS

In 2018, SWCA began conducting breeding bird point-count surveys for the County at 40 locations across the BCCE (SWCA 2018b). Starting in 2019, SWCA completed breeding bird point-count surveys at 20 of these locations in odd-numbered years and surveyed the remaining 20 in even-numbered years as part of the comprehensive bird survey effort across all the County's properties (SWCA 2019a, 2020, 2021, 2022, 2023a, 2024a, 2025a). Point-count surveys continued in 2026 under County Project No. 2023-SWCA-2325B.

1.3 Management Actions, Goals, and Objectives

The County's Riparian Reserve Unit Management Plan (Clark County 2023b) identifies goals and objectives that help guide management directives on the Riparian Reserve Units. The first goal listed in this plan is to "manage reserves to provide habitat for the six MSHCP covered avian species" (Clark County 2023b:35) that use desert riparian habitat. The objective identified to reach this goal is to "restore, create, and enhance habitat for riparian bird species" (Clark County 2023b:35). In addition, the BCCE Management Plan (Clark County 2023a) identifies goals and objectives that help guide management directives within the BCCE. The second goal listed in the BCCE Management Plan is to

"protect and manage the BCCE for other MSHCP covered species" (Clark County 2023a:40). Managing MSHCP covered species and their habitats requires an in-depth understanding of baseline conditions within a given management unit. Collecting species abundance and distribution data is a critical first step in monitoring and conserving habitat for the MSHCP covered bird species. Furthermore, once management actions have been taken, monitoring responses to those actions is integral in determining success or failure of that action. The combined short-term objectives for the projects discussed in this report include both documenting baseline conditions and monitoring responses to management actions; these objectives are to 1) continue building a record of federally listed and non-listed bird species present at the County's Riparian Reserve Units and the BCCE; 2) conduct surveys for flycatcher and cuckoo where suitable habitat exists; 3) conduct flycatcher nest searching at Mesquite West and Mormon Mesa; 4) monitor all flycatcher nests found at Mesquite West and Mormon Mesa and record all successes and failures; 5) record instances of parasitism by cowbirds; and 6) conduct cowbird control at Mesquite West throughout the flycatcher breeding season.

The long-term goals are to 1) track changes in the presence and relative abundance of all bird species that use these properties to measure the success of management and restoration efforts conducted therein and 2) maintain and/or improve habitat for flycatcher and help identify lands where habitat enhancement may be implemented to expand habitat for flycatcher.

2 METHODS

Surveys and monitoring for flycatcher and cuckoo were conducted by biologists authorized under USFWS 10(a)1(A) Permit No. PER0009523-3 and NDOW Scientific Collecting Permit No. 495754. Bird banding was performed under U.S. Geological Survey Federal Bird Banding Permit No. 23258. Cowbird control activities were conducted by personnel authorized under USFWS 10(a)1(A) Permit No. PER0009523-3, USFWS Migratory Bird Scientific Collecting Permit No. PER0038972, and NDOW Scientific Collecting Permit No. 495754.

2.1 Federally Listed Bird Surveys

Multiple flycatcher broadcast surveys conducted throughout the breeding season were used to assess the presence of the southwestern subspecies of willow flycatcher. Flycatcher surveys followed the standard five-survey protocol described in Sogge et al. (2010), which calls for one survey between May 15 and 31, two surveys between June 1 and 24, and two surveys between June 25 and July 17. Each round of surveys at a particular site was separated by a minimum of 5 days. To elicit responses from nearby flycatchers, surveyors stopped approximately every 30 m (98 feet) and broadcast 18 seconds of the flycatcher's primary song (*fitz-bew*) and call (*breet*). Surveyors watched for willow flycatchers and listened for vocal responses for 1 minute before proceeding to the next survey station. If an unidentified *Empidonax* flycatcher was observed but did not respond with song to the initial broadcast, other flycatcher vocalizations were broadcast, including *creets/breets*, *wee-oos*, *whitts*, *churr/kitters*, and a set of interaction calls given by a mated pair of flycatchers (in accordance with Lynn et al. 2003). These calls are frequently effective in eliciting a *fitz-bew* song or *wee-oo* vocalization, thereby enabling surveyors to positively identify willow flycatchers.

Cuckoos vocalize infrequently, have a short breeding cycle, and typically occupy home ranges varying from 40 to 80 ha (100–200 acres) in size (USFWS 2020). These factors make it difficult to use survey results to determine the number of cuckoo territories at a site. However, repeated broadcast surveys allow an assessment of the presence of cuckoos, and survey results can be used to estimate the number of possible and probable breeding territories (Halterman et al. 2016).

Cuckoo surveys followed the standard four-survey protocol described by Halterman et al. (2016). The survey protocol requires one survey between June 15 and 30, two surveys between July 1 and 31, and one survey between August 1 and 15, with a 3-day leeway for start and end dates for each survey period. Surveys were separated by 12 to 15 days. Surveyors stopped every 100 m (328 feet) and listened for 1 minute for spontaneously calling cuckoos, then broadcast a succession of five cuckoo contact calls (*kuk/kowlp*), each separated by a 1-minute period of silence. Surveyors listened and watched for cuckoo responses between each set of broadcast calls; the total time spent at each survey point was approximately 6 minutes.

If a willow flycatcher or cuckoo was detected, the observer recorded the location of the bird, the type of detection (i.e., territory center, territorial male, female, pair, family group, or unknown for flycatcher and visual, aural, or both for cuckoo), and any other pertinent notes. The surveyor then proceeded at least 40 m (131 feet) away from any detected willow flycatcher and 300 m (984 feet) away from any cuckoo before resuming the survey to avoid double-counting individuals. Survey protocols recommend that surveys commence at or after first light and conclude by 10:30 a.m. for flycatcher (Sogge et al. 2010) and by 11:00 a.m. or when the temperature reaches 40 degrees Celsius (ºC) (104 degrees Fahrenheit [ºF]) for cuckoo (Halterman et al. 2016). No surveys were conducted if winds exceeded 4 on the Beaufort scale (21–29 kilometers [km] [13–18 miles] per hour).

Start points, end points, and routes for flycatcher and cuckoo surveys varied between surveys. Standard flycatcher and cuckoo survey summary forms were completed following each survey. In addition to completing flycatcher and cuckoo surveys, SWCA recorded qualitative site descriptions for each parcel. Surveyors recorded the dominant vegetation species, visual estimates of vegetation height (to the nearest meter), canopy closure (to the nearest 5%), and qualitative assessments of surface hydrology. Surveys were completed in all areas that were dominated by trees or shrubs ≥4 m (13 feet) tall (Figures 3–7).

2.2 Southwestern Willow Flycatcher Monitoring

Flycatcher territory and nest monitoring involves more frequent visits to flycatcher territories than do broadcast surveys alone and facilitates locating nests, determining nest fates, and calculating productivity. Territory monitoring was scheduled to commence at Mesquite West and Mormon Mesa Parcel 5-A once a territorial flycatcher was detected. Nest searching and nest monitoring (when appropriate) commenced once a pair of flycatchers was detected. The methods for territory and nest monitoring described herein followed a combination of those described by Martin and Geupel (1993), Martin et al. (1997), Ralph et al. (1993), and Rourke et al. (1999), which recommend monitoring every 2 to 4 days, depending on territory stage and activity.

SWCA conducted flycatcher territory and nest monitoring at each territory approximately every 4 days to determine territory status, locate nests, and monitor known nests. Nests were monitored using a mirror on a telescoping pole to determine nest contents, including any cowbird eggs or nestlings. When appropriate, biologists addled cowbird eggs, replaced cowbird eggs with fake eggs, or removed cowbird nestlings from nests (see Sections 2.5.2 and 2.5.3). No nest was mirror poled after flycatcher nestlings reached 8 days of age to avoid forced fledging.

Nesting attempts were determined to be successful if fledged young were observed in the vicinity of the nest or were identified by their color bands. The number of young produced from each nest was determined by the number of fledglings visually confirmed (not just aurally detected or presumed fledged upon finding an empty nest), resulting in a conservative number of young produced per nest. Fledgling begging calls of many songbird species sound similar, which could be problematic to a biologist when confirming flycatcher fledglings by sound alone; erroneous identification of fledglings could result in inaccurate nest productivity and fecundity calculations.[6] Therefore, only fledglings that were visually located were confirmed to have fledged. Failed nests were inspected to determine the condition of the nest and to record the presence of eggs, eggshells, or dead nestlings in or around the nest. These data were used to determine the stage and cause of nest failure.

Color banding and subsequent resighting can greatly improve the certainty with which individual flycatchers can be associated with a specific territory or nest. Color banding nestling flycatchers helps with confirming the number of fledglings produced from each nest and allows for a more accurate determination of nest success and productivity. Color banding involves fitting each flycatcher with an aluminum federal band (either standard silver or anodized in one of several colors) on one leg and a colored, aluminum, pinstriped band on the opposite leg, resulting in a unique color combination of bands.

Resighting involves subsequently observing these color bands via binoculars and digital cameras to confirm a bird's identity. Resighting color-banded birds at different times of the season or in subsequent years can help with understanding movements of flycatchers within and between sites.

Biologists captured, uniquely color banded, and subsequently monitored adult and nestling flycatchers whenever possible. Adult willow flycatchers were captured with mist nets, which provide the most

[6] Fecundity is the number of young fledged per female for which all nest outcomes over the breeding season were known.

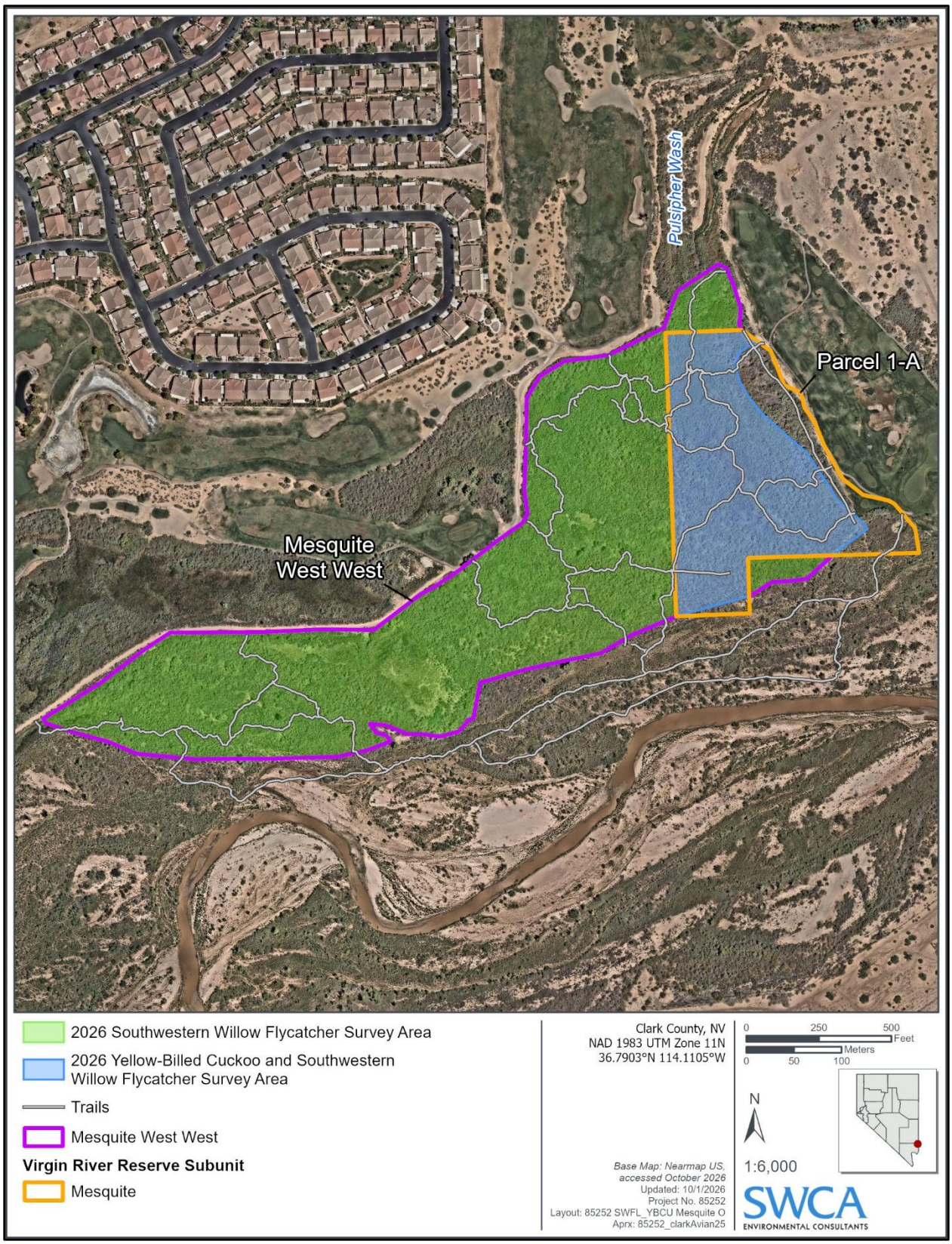


Figure 3. Yellow-billed cuckoo and southwestern willow flycatcher survey areas at Mesquite West West and the Mesquite subunit.

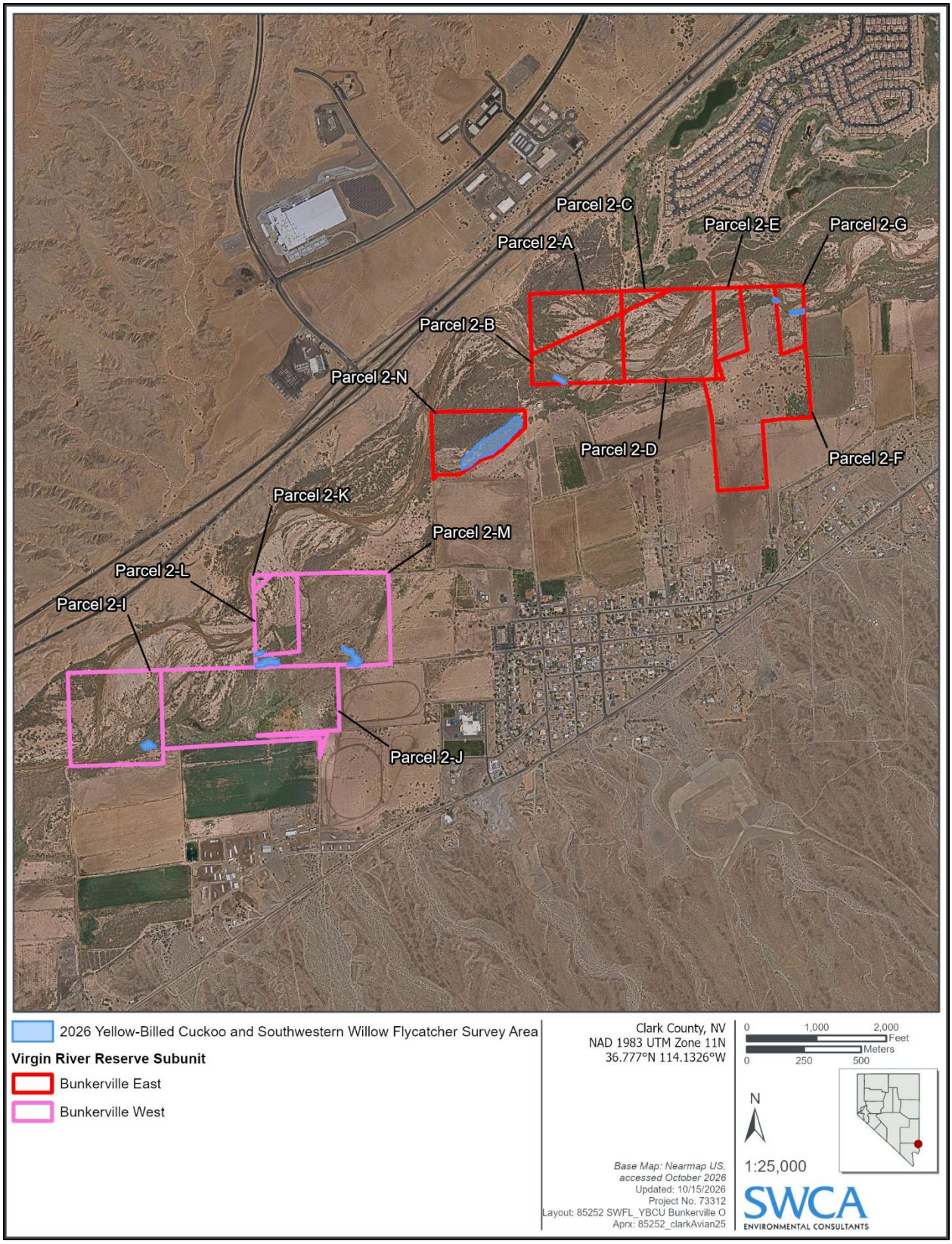


Figure 4. Yellow-billed cuckoo and southwestern willow flycatcher survey areas at the Bunkerville subunits.

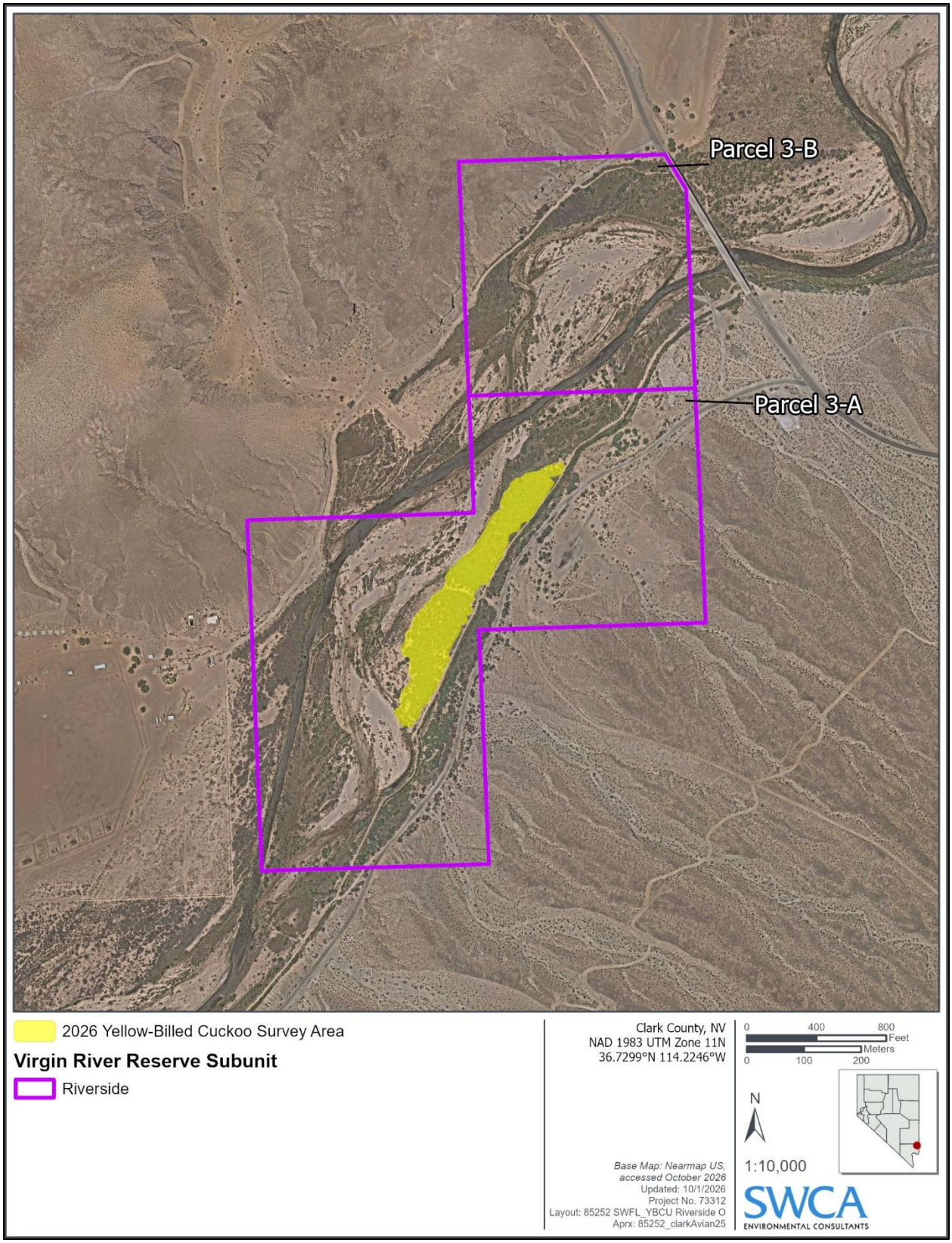


Figure 5. Yellow-billed cuckoo survey area at the Riverside subunit.

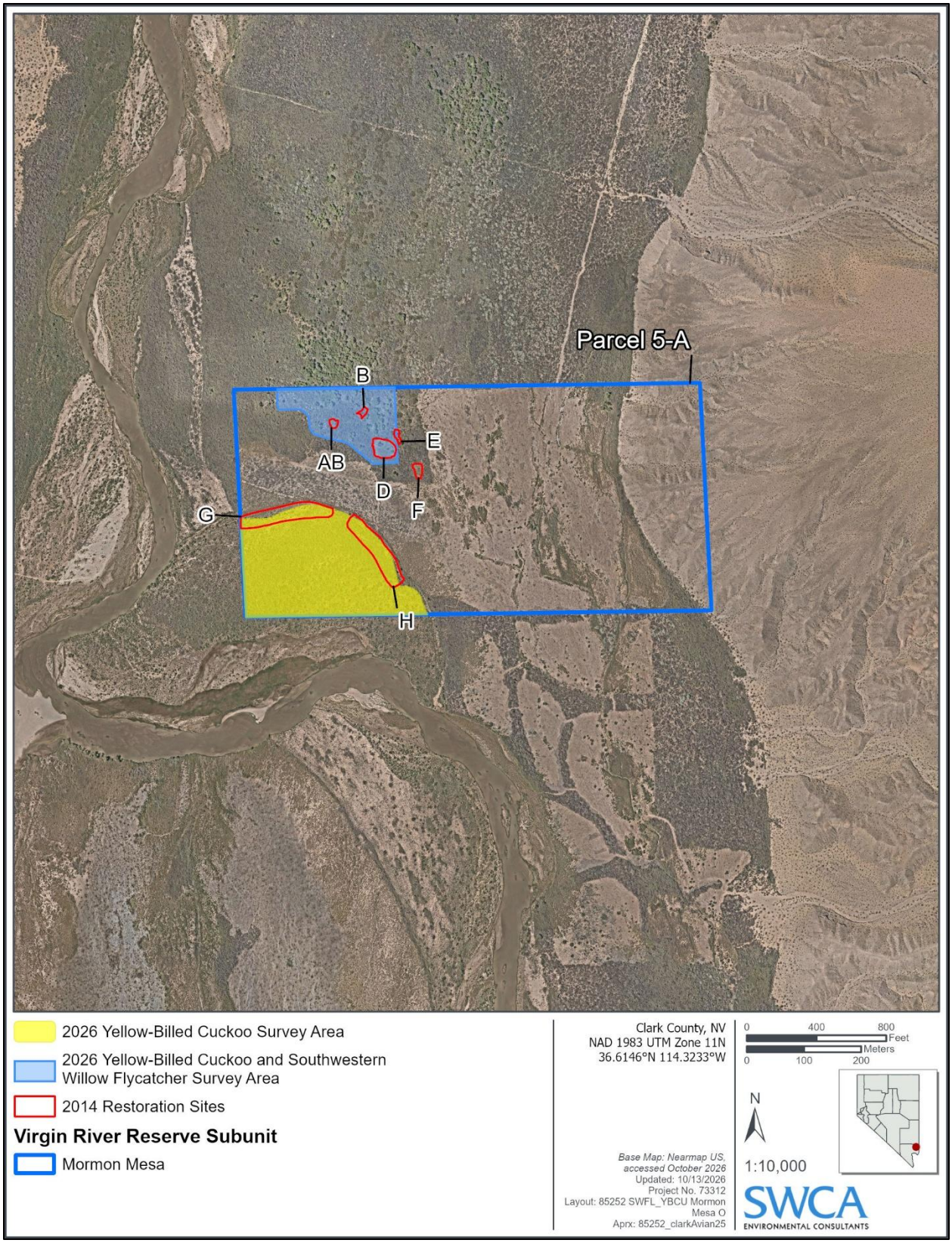


Figure 6. Yellow-billed cuckoo and southwestern willow flycatcher survey areas at the Mormon Mesa subunit.

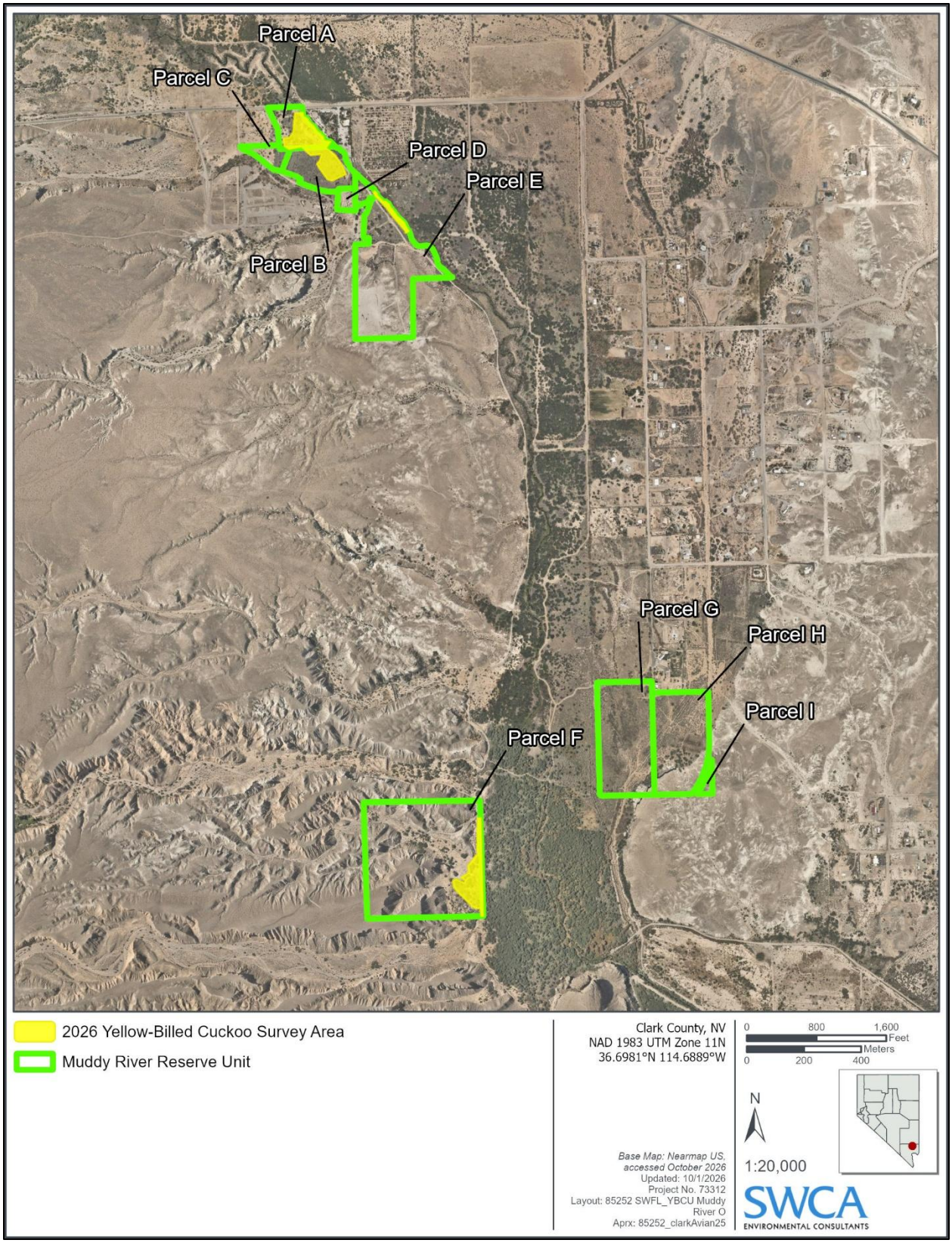


Figure 7. Yellow-billed cuckoo survey areas at the Muddy River Reserve Unit.

effective technique for live capture of adult songbirds (Ralph et al. 1993). A targeted capture technique was used (in accordance with Sogge et al. 2001) whereby a variety of conspecific vocalizations were broadcast via Apple iPods connected by Bluetooth to remote speakers to lure territorial flycatchers into the nets. Nestlings were banded at 7 to 10 days of age, when they were large enough to retain leg bands, yet young enough that they would not prematurely fledge from the nest (Paxton et al. 1997; Whitfield 1990).

2.3 Data Management for Federally Listed Bird Surveys and Monitoring

For flycatcher and cuckoo surveys and flycatcher monitoring, biologists collected data on Apple iPad tablets or iPhones equipped with Field Maps for ArcGIS (Version 26.2.2) and paired with an external Juniper Geode GPS receiver. The GPS receiver was capable of submeter accuracy and provided real-time data corrections; data post-processing was not required. Several feature services were published to ArcGIS Online for use in Field Maps. These included site boundaries, trails, a 30 × 30–m (98 × 98–foot) grid, and feature services for field data. High-resolution aerial imagery of all survey sites was used to facilitate navigation and estimate the location of any willow flycatcher or cuckoo detected at a location offset from the biologist's location.

Data collected included point locations of surveys (start, stop, and broadcast points) and willow flycatcher and cuckoo detections (e.g., territorial male, territory center, pair, nest, nest flag, or family group) and line features to show the relationship between any two willow flycatcher or cuckoo detection locations (e.g., same bird, different bird, countersinging males, or possible pair). All data collected in the field were recorded into an offline copy of the feature services.

Summary information for each resight and for each territory or nest visit (time in and out of the territory, breeding stage [e.g., single male, pair, nest stage, or no activity], nest contents [if applicable], and behavioral comments) was entered in a form in Survey123 for ArcGIS. Each form was a child feature linked to its respective territory center or nest flag parent point.

All data recorded in Field Maps were synced to and managed in a feature service that resided on an Esri server. All data on the Esri server were backed up to an SWCA server periodically and will be stored indefinitely. Quality control features that facilitate identifying common errors were built into Field Maps. All data were reviewed and proofed before data were finalized and delivered to the County.

All spatial data collected in the field, as well as any spatial data provided by the County and edited by SWCA, were exported to a geodatabase and are included as part of the 2026 Final Data Deliverable. A full list of the spatial layers and a description of the data that each layer contains are included in the metadata for the geodatabase. The geodatabase also includes general project information, such as the County project number, the name of SWCA's project manager, the dates for the project, a brief project description, the title of the associated final report, the model of GPS receiver used for the project, and relative positional accuracy.

2.4 Data Analyses

Apparent nest success, parasitism rate, productivity, and fecundity were calculated for flycatchers at Mesquite West (see Section 3.2.1.1). Apparent nest success was calculated as the number of successful nests/total number of nests containing at least one flycatcher egg. The parasitism rate was calculated as the number of nests containing at least one flycatcher egg and one cowbird egg/total number of nests containing at least one flycatcher egg. Productivity was calculated as the number of young

fledged/number of nesting attempts that contained at least one flycatcher egg and had a known outcome. Fecundity was calculated as the number of young fledged/number of females for which the outcome of all nesting attempts throughout the season was known. Mesquite West data from 2026 were pooled with data from 2021 through 2025 (i.e., the cowbird netting period) and compared with data from both the 5-year period (2016–2020) immediately before cowbird netting began and the entire data set from years when SWCA or NDOW biologists conducted flycatcher monitoring at Mesquite West (2003–2020).[7] Parasitism and nest success were compared using one-tailed Fisher's exact tests. Productivity and fecundity in pre-netting and netting periods were compared using one-tailed t-tests. A statistical significance level of $P \leq 0.05$ was chosen to reject the null hypotheses for all calculations (Section 4.10).

2.5 Brown-Headed Cowbird Control

2.5.1 Target Netting

Cowbird target netting commenced at Mesquite West just prior to the beginning of the flycatcher breeding season (i.e., early May) in anticipation of the site being occupied by flycatchers. Target netting employed broadcasts of conspecific vocalizations to lure cowbirds into a mist net. Each target-netting attempt consisted of erecting a single mist net 2.6 m (8.5 feet) tall with 38-millimeter (1.5-inch) mesh size and placing a female cowbird decoy near the midpoint of the net. A small, portable speaker was placed near the decoy, and a second speaker was placed on the opposite side of the net. These speakers were coupled with Bluetooth to Apple iPods loaded with multiple tracks of cowbird vocalizations.

Once the net was erected and the decoy and speakers were in place, the observer hid approximately 10 m (33 feet) from the net in a place with a full view of the net. The observer began broadcasting a female cowbird chatter vocalization, with periodic pauses to mimic a natural vocalization rate, until a female cowbird came near the net. Once a female cowbird was in sight, different tracks were played to agitate the female and draw her into the net. Any male cowbird or non-target species that was caught in the net was removed immediately and released. The observer clipped the tail of each male cowbird in a "swallow pattern" prior to release to signify that the bird had been previously captured, should the bird be caught again later in the season. All female and juvenile cowbirds were euthanized via decapitation, a method approved under the current American Veterinary Medical Association guidelines for euthanizing small birds (American Veterinary Medical Association 2020).

2.5.1.1 NET LOCATIONS

Mist nets were placed in semi-open areas at least 70 m (230 feet) from all known flycatcher nests or territory centers, which resulted in net locations being approximately 50 m (164 feet) or more from the edge of those occupied territories. Because SWCA also conducted territory and nest monitoring for flycatcher at Mesquite West in 2026, biologists attempting to net cowbirds had access to current information on all flycatcher detection, territory, and nest locations. All cowbird mist-net locations were approached from a direction that did not cause the observer to pass through or near a flycatcher territory.

Female cowbirds can occupy territories of 4.5 ha (11.1 acres) or greater (Lowther 2020), which is a much larger area than a typical flycatcher territory (less than 0.5 ha [1.2 acres]) (Cardinal 2005); thus, placing netting attempts between 50 and 100 m (164 and 328 feet) from the edge of flycatcher territories targeted female cowbirds whose ranges likely overlapped those flycatcher territories. Placing all cowbird nets outside flycatcher territories minimized the chance of inadvertently capturing a flycatcher or attracting a cowbird into a flycatcher territory. However, because it was still possible that a flycatcher could be

[7] Data in the cited reports may be presented differently, as the reports dated before 2020 include not only Mesquite West but also all other sites in the Mesquite study area.

captured during cowbird target netting, all biologists who attempted to target net cowbirds were also authorized through SWCA's existing USFWS 10(a)1(A) Permit No. PER0009523-3 and U.S. Geological Survey Federal Bird Banding Permit No. 23258 to handle flycatchers.

2.5.1.2 TIMING OF NETTING ATTEMPTS

Any netting attempt that failed to attract female cowbirds to the vicinity was terminated after 1 hour. The first netting attempt of the day began as early as first light, allowing for multiple netting attempts in a day. Female cowbirds are typically on their laying territories in the early morning (Goguen and Mathews 2001); thus, morning netting attempts targeted those cowbirds likely to parasitize hosts in the vicinity. Netting attempts were planned to be terminated by 10:00 a.m., and no netting attempts were conducted during inclement weather or with direct sunlight on the net. The net was removed at the conclusion of each netting attempt. Netting attempts began in early May and were conducted twice per week through May 31, then once per week through July 27. Starting target netting for cowbirds in early May allowed for five netting visits prior to the initiation of the earliest flycatcher nests.

2.5.2 Egg Addling and Replacement

When a flycatcher nest was parasitized on or before the fifth day of incubation and the nest was accessible by an observer without causing damage to the nest, the cowbird egg(s) was either addled via vigorous shaking or replaced with a fake egg painted to resemble the speckled pattern of a cowbird egg. Cowbird eggs were not removed from the nest without replacement so as not to mimic a partial depredation event, which could cause nest desertion. Shaking cowbird eggs greatly reduces the chance of the egg hatching, and there is no evidence that this activity results in nest desertion (McLeod and Pellegrini 2013; McLeod et al. 2019). If a ladder was necessary to access the cowbird egg without causing damage to the nest, the egg was addled or replaced with a fake egg on the next visit to the site.

2.5.3 Nestling Euthanasia

Cowbird nestlings may be present in a flycatcher nest either when the nest is found or after an addling attempt has failed and the cowbird egg hatches. If a cowbird nestling was discovered in a nest, the nestling was removed. If the nest was accessible without a ladder, the nestling was removed at the time of discovery. If a ladder was necessary to remove the nestling without causing damage to the nest, the nestling was removed on the next visit to the site.

2.6 Point-Count Surveys

Surveys conducted in 2026 followed methods used during the 2017 through 2025 point-count surveys (SWCA 2017b, 2018a, 2018b, 2019a, 2020, 2021, 2022, 2023a, 2024a, 2025a), which applied established point-count protocols and drew from methods described in *Nevada Bird Count: A Habitat-Based Monitoring Program for Breeding Birds of Nevada* (Great Basin Bird Observatory [GBBO] 2003) and in the *Handbook of Field Methods for Monitoring Landbirds* (Ralph et al. 1993).

In 2017, SWCA conducted surveys at all 27 point-count locations across the Bunkerville East (Parcels 2-A through 2-E), Mormon Mesa, and Muddy River subunits. In 2018, surveys were completed at all 24 points across the Bunkerville East (Parcels 2-F and 2-G), Mesquite, Bunkerville West, and Riverside subunits. In 2019, SWCA randomly selected 25 of the 51 previously established point-count locations across all Riparian Reserve Units to be surveyed in odd-numbered years (i.e., 2019, 2021, 2023, 2025); the remaining 26 points were selected to be surveyed in even-numbered years (i.e., 2020, 2022, 2024, 2026) (Figures 8–13). In 2020, the County added four survey points in Bunkerville West Parcels

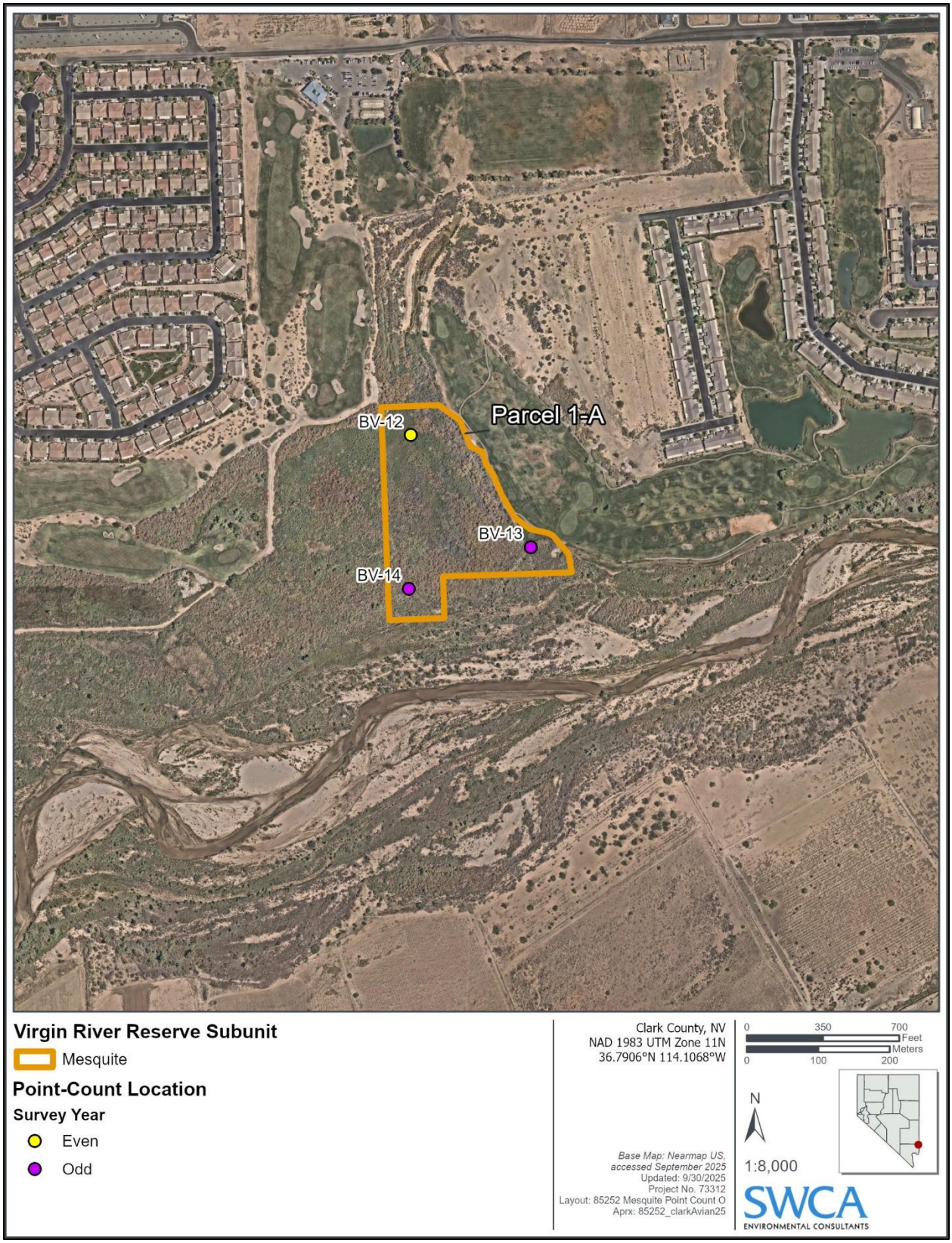


Figure 8. Point-count locations within the Mesquite subunit.

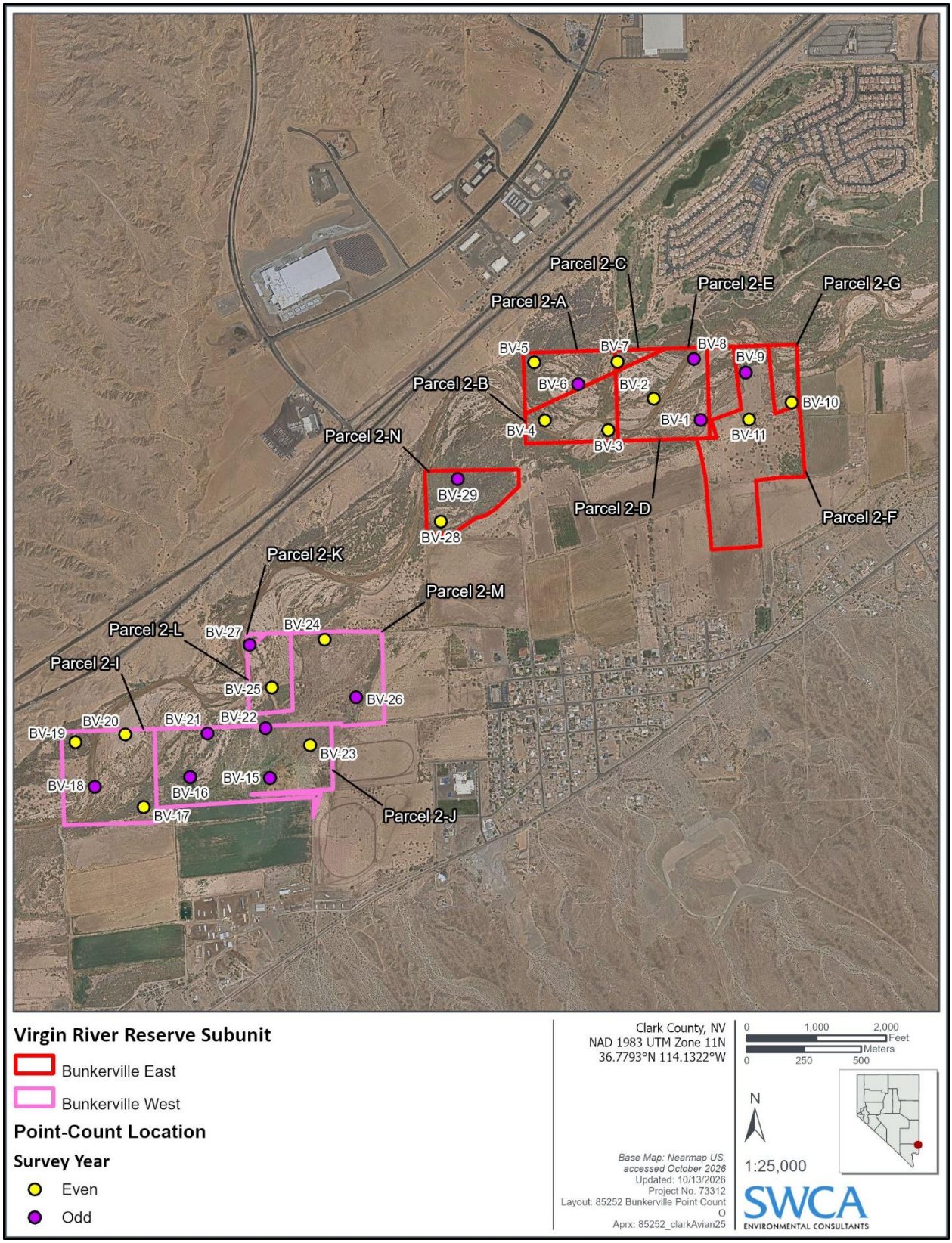


Figure 9. Point-count locations within the Bunkerville East and Bunkerville West subunits.

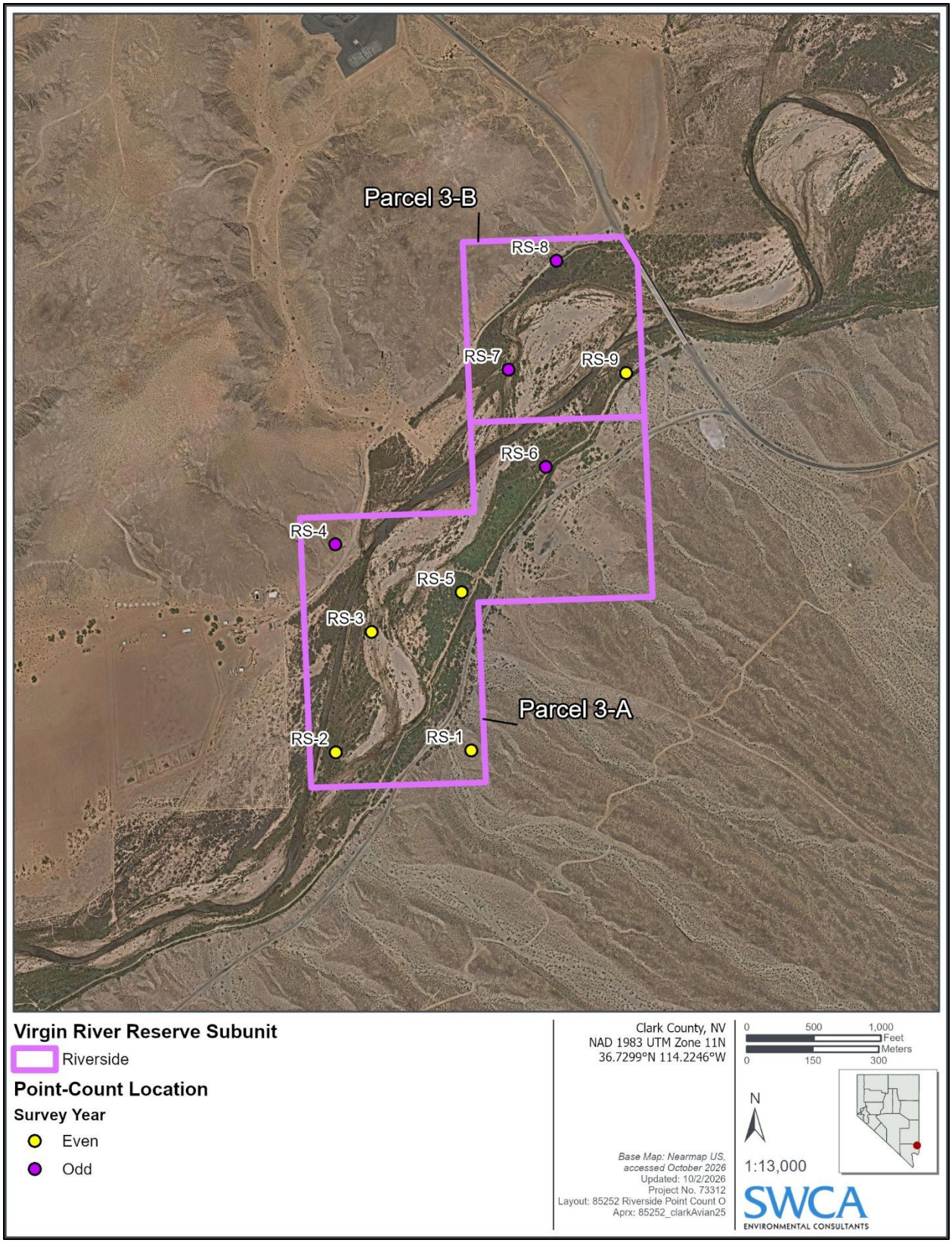


Figure 10. Point-count locations within the Riverside subunit.

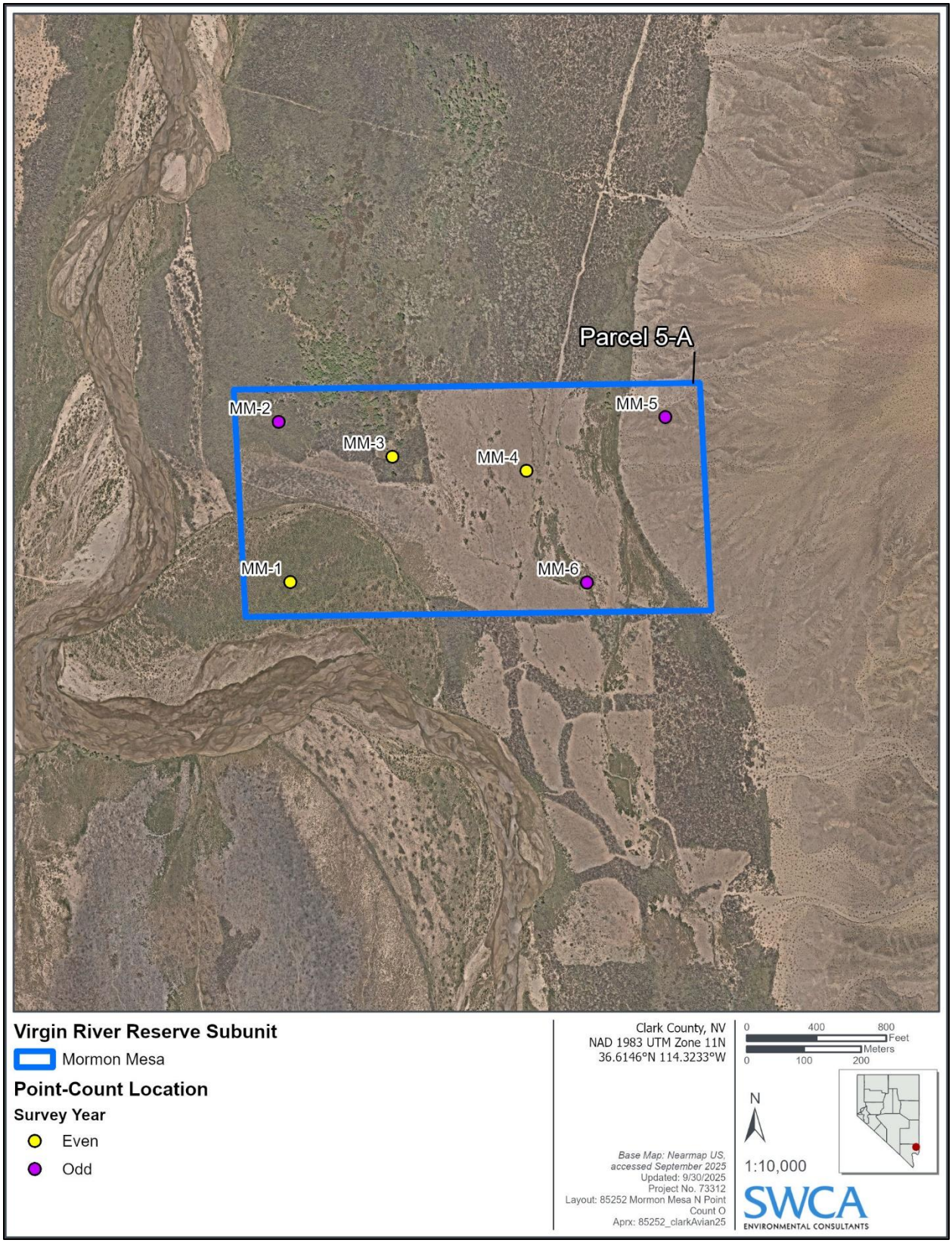


Figure 11. Point-count locations within the Mormon Mesa subunit.

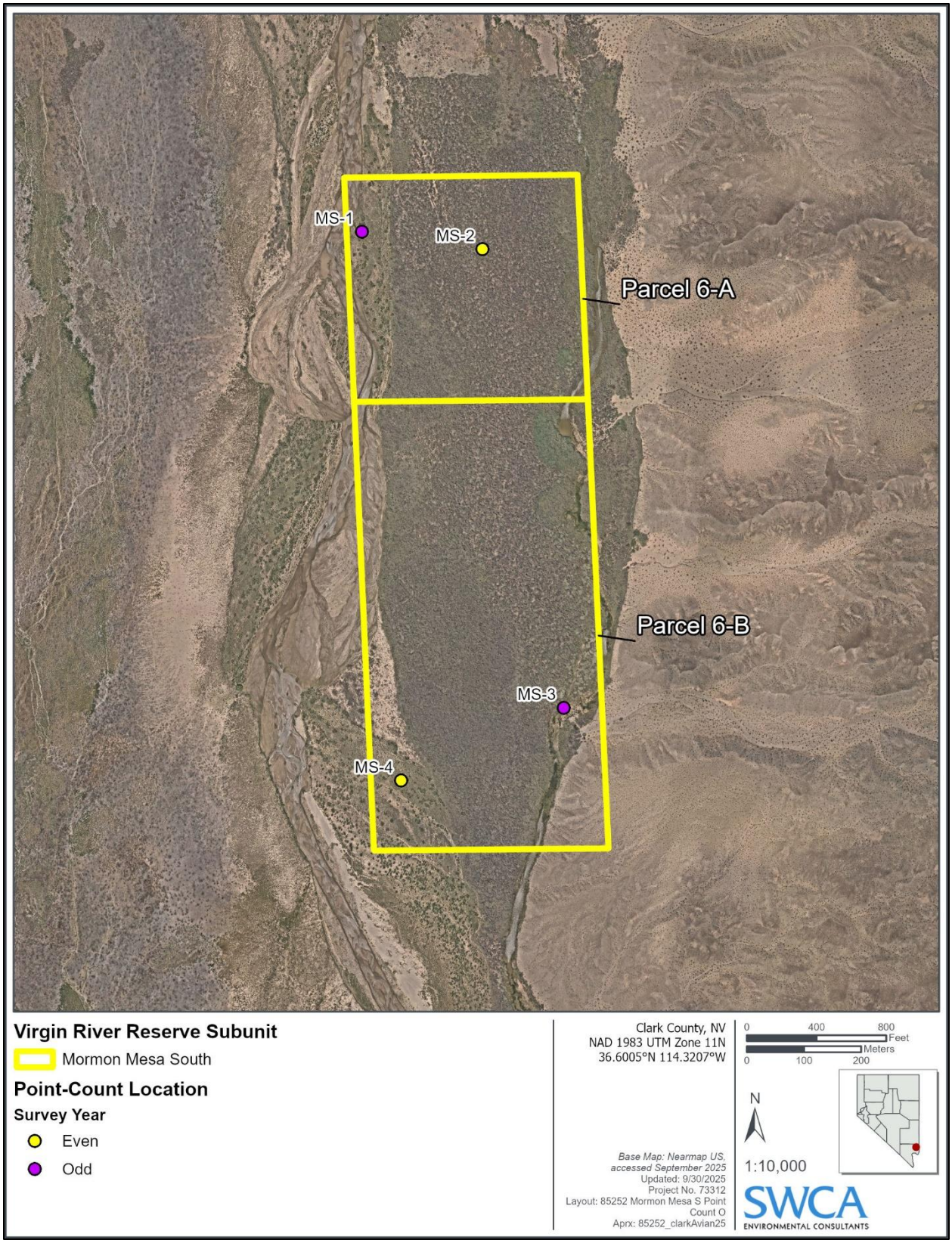


Figure 12. Point-count locations within the Mormon Mesa South subunit.

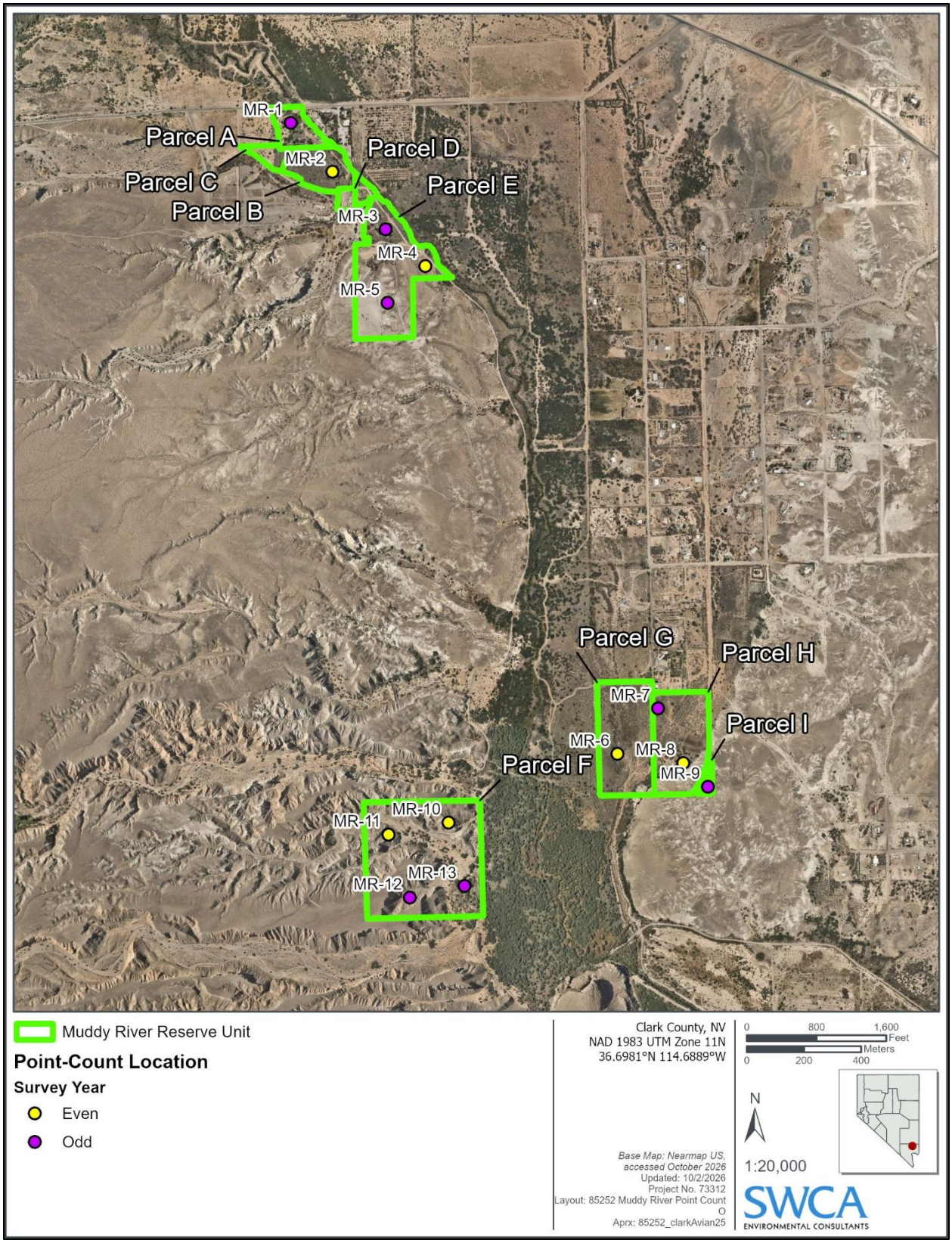


Figure 13. Point-count locations within the Muddy River Reserve Unit.

2-L and 2-M, two to be surveyed in odd years and two to be surveyed in even years. In 2022, another four points were added in Mormon Mesa South Parcels 6-A and 6-B, two to be surveyed in odd years and two to be surveyed in even years. In 2026, two points were added in Bunkerville East Parcel 2-N, one to be surveyed in odd years and one to be surveyed in even years. In 2026, SWCA conducted avian point-count surveys at the 31 even-year point-count locations. SWCA conducted reconnaissance visits to each site in late April or early May to assess site access and mark travel routes with flagging. SWCA did not encounter any impediments to access at any of the point-count locations. All 31 of the original even-year point-count locations were easily accessed and were used in 2026; no alternate points were needed.

In 2018, surveys were conducted at all 40 point-count locations across the BCCE. In 2019, SWCA randomly selected 20 of the 40 previously surveyed point-count locations at the BCCE to be surveyed in odd-numbered years (i.e., 2019, 2021, 2023, 2025); the remaining 20 locations were selected to be surveyed in even-numbered years (i.e., 2020, 2022, 2024, 2026) (Figure 14). It was anticipated that conditions at the BCCE had not changed dramatically since even-year points were last surveyed in 2024, and no field reconnaissance was completed prior to field surveys in 2026. Surveyors were able to access all 20 of the original point-count locations without impediment, and all the original locations assigned to even-numbered years were used in 2026.

Each surveyor followed standard unlimited-radius point-count procedures, with surveys starting at sunrise and concluding by 10:00 a.m. (GBBO 2003; Ralph et al. 1993). Consecutive surveys at each point were separated by a minimum of 7 days. The order in which point counts were completed was altered between each round of surveys.

For each survey, the surveyor approached each point quietly to avoid unnecessary disturbance to any birds present. Prior to or immediately following each point count, the surveyor recorded weather data, consisting of percent cloud cover, wind speed and direction, temperature, and precipitation, on a standardized form. No surveys were conducted when wind speeds exceeded 40 km (25 miles) per hour or during periods of heavy rain (GBBO 2003).

Point counts consisted of a 10-minute observation period broken into four intervals (0–3, 3–5, 5–8, and 8–10 minutes). Surveyors noted the time interval in which the first detection of a given bird or group of birds was made. For each detection, surveyors also recorded species code, sex, age, number of birds, estimated distance from the observer, compass bearing to the bird(s), and behavior of the bird(s) as it pertained to breeding status. Any bird(s) that flushed as the surveyor approached the point-count location but was not detected during the survey was recorded as observed during the 0- to 3-minute interval and in the location from where it flushed. All detections were recorded on hardcopy datasheets. Any bird that gave an unknown vocalization was pursued following the survey to determine its identity (Ralph et al. 1993).

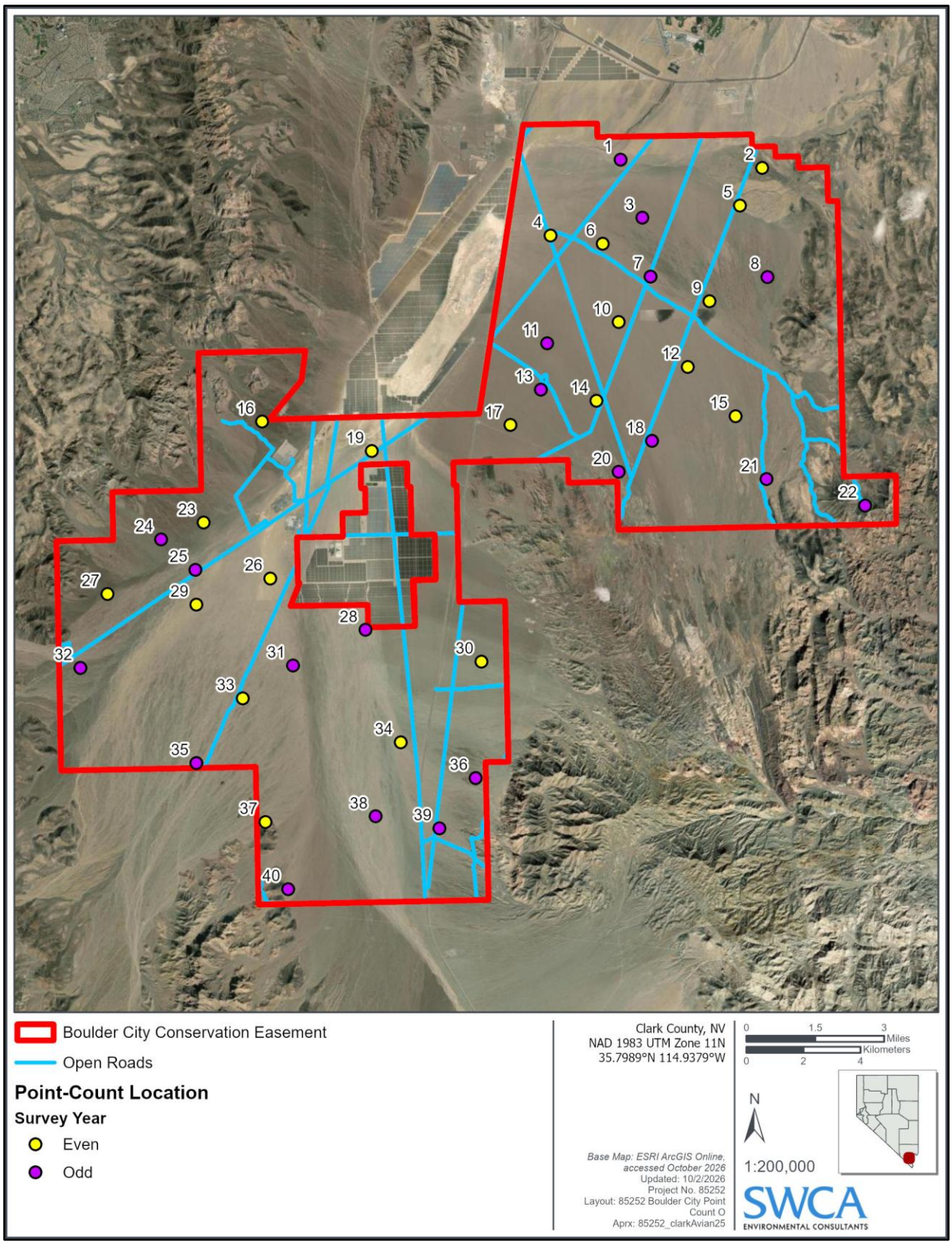


Figure 14. Point-count locations within the BCCE.

3 RESULTS AND EVIDENCE OF THE RESULTS

3.1 Objectives Completed

The objectives for this project were to 1) conduct point-count surveys for all avian species at predetermined locations in all Riparian Reserve Units and the BCCE, 2) conduct protocol-level presence/absence surveys for flycatcher and cuckoo where suitable habitat exists, 3) conduct flycatcher nest searching at the Mesquite West and Mormon Mesa sites, 4) monitor all flycatcher nests found at the Mesquite West and Mormon Mesa sites and record all successes and failures, 5) record instances of parasitism by cowbirds, and 6) conduct cowbird control at Mesquite West throughout the flycatcher breeding season. All objectives were completed, and results of field efforts are presented here.

Survey Effort

3.1.1 Federally Listed Bird Surveys

The five rounds of flycatcher surveys were completed by SWCA biologists Kimber Godfrey, MaKenna Magdos, Jeremiah Sullivan, Cheyenne Szydlo, and Lauren Strong between May 22 and July 10 (Table 1). Each round of flycatcher surveys required 4 observer-mornings. SWCA surveyed 19.6 ha (48.5 acres) for flycatcher at the Mesquite, Bunkerville East, Bunkerville West, and Mormon Mesa subunits (see Figures 3, 4, and 6), and surveys required 60.2 survey-hours (see Table 1). Flycatcher surveys concluded by 10:58 a.m. Site photographs are presented in Appendix A.

The four rounds of cuckoo surveys were completed by SWCA biologists K. Godfrey, M. Magdos, and Sarah Nichols between June 22 and August 5 (Table 2). Each cuckoo survey round required 3 or 4 observer-mornings. SWCA surveyed 19.4 ha (47.9 acres) for cuckoo across all Riparian Reserve Units (see Figures 3–7), and surveys required 31.5 survey-hours (see Table 2). Cuckoo surveys concluded by 11:04 a.m. or when the temperature reached 40ºC (104°F), whichever occurred first. Site photographs are presented in Appendix A.

3.1.2 Point-Count Surveys

The three rounds of point-count surveys at the Riparian Reserve Units were completed by K. Godfrey, Trevor Hinckley, and M. Magdos between May 12 and June 28 (Table 3). Each round of point counts required 4 or 5 observer-mornings. Weather conditions were favorable during all three survey rounds, with light drizzle recorded at four survey points; otherwise, no precipitation was recorded. Wind speeds ranged from 0 to 15.5 km (0–9.6 miles) per hour.

K. Godfrey, M. Magdos, and S. Nichols completed three rounds of point-count surveys within the BCCE between March 23 and May 15 (Table 4). Each round of point counts at the BCCE required 3 or 4 observer-mornings. Weather conditions were favorable during all three survey rounds, with no precipitation recorded and wind speeds ranging from 0 to 18.4 km (0–11.4 miles) per hour.

Table 1. Survey Dates and Effort for Flycatcher Surveys, 2026

Subunit	Parcel(s)	Area Surveyed (acres)	Total Survey-Hours	Survey Dates				
				First	Second	Third	Fourth	Fifth
Mesquite	West West	28.2	21.8	May 22	June 11	June 21, 22	July 2	July 8
	1A	9.2	15.4	May 26	June 10	June 21, 22	July 2	July 8
Bunkerville East	2-A through 2-G	0.5	5.2	May 22	June 9	June 17	June 27	July 3
	2-N	4.3	3.9	May 22	June 9	June 18	June 27	July 4
Bunkerville West	2-1 and 2-J	0.4	1.4	May 22	June 10	June 18	June 27	July 4
	2-K through 2-M	1.4	5.3	May 22	June 9	June 18	June 27	July 4
Mormon Mesa	5-A	4.5	6.8	May 29	June 8	June 22	June 30	July 10

Table 2. Survey Dates and Effort for Cuckoo Surveys, 2026

Subunit	Parcel(s)	Area Surveyed (acres)	Total Survey-Hours	Survey Dates			
				First	Second	Third	Fourth
Mesquite	1A	9.2	3.8	June 23	July 8	July 21	August 3
Bunkerville East	2-A through 2-G	0.5	3.4	June 23	July 8	July 20	August 3
	2-N	4.3	2.6	June 23	July 8	July 20	August 3
Bunkerville West	2-1 and 2-J	0.4	2.0	June 23	July 8	July 21	August 3
	2-K through 2-M	1.4	2.3	June 23	July 8	July 21	August 3
Riverside	3-A and 3-B	7.2	4.0	June 24	July 9	July 22	August 5
Mormon Mesa	5-A	16.3	8.2	June 22	July 5	July 17	July 29
Muddy River	A through I	8.6	5.5	June 24	July 9	July 22	August 5

Table 3. Survey Dates for Point-Count Surveys at the Riparian Reserve Units, 2026

Subunit	Parcel(s)	Survey Dates		
		First	Second	Third
Mesquite	1A	May 13	June 6	June 28
Bunkerville East	2-A through 2-G	May 13	June 5	June 27
	2-N	May 13	June 6	June 28
Bunkerville West	2-1 and 2-J	May 12	June 6	June 24, 27
	2-K through 2-M	May 12	June 6	June 24, 27
Riverside	3-A and 3-B	May 12	June 5, 7	June 24
Mormon Mesa	5-A	May 12	June 5	June 26
Mormon Mesa South	6-A and 6-B	May 12	June 5	June 26
Muddy River	A through I	May 13	June 4	June 25

Table 4. Survey Dates for Point-Count Surveys at the BCCE, 2026

Survey Round	Dates
First	March 23, 24, 25
Second	April 16, 20, 21, 22
Third	May 9, 10, 11, 15

3.2 Findings

3.2.1 Federally Listed Bird Surveys and Monitoring

3.2.1.1 SOUTHWESTERN WILLOW FLYCATCHER

Adult willow flycatchers detected for at least 7 days at a particular study area were considered to be residents occupying territories at that study area and were determined to be of the southwestern subspecies. Additionally, adults detected between June 24 and July 17 were also considered to be of the southwestern subspecies, regardless of detection duration. Individuals detected for less than 7 days were termed floaters. Floaters may have been individuals of the southwestern subspecies detected for a short period of time on any date(s), or they may have been migrants detected during northbound (before June 24) or southbound (after July 17) migration.

In total, 19 adult flycatchers were detected during survey and monitoring activities at the Virgin River Reserve Unit (Table 5). Seventeen flycatchers were detected at a regularly monitored site (Mesquite West) (Figure B-1 in Appendix B), and two were detected at a site intended for surveys only (Bunkerville East Parcels 2-A through 2-G) (Figure B-2) and were subsequently monitored.

All 17 of the adult flycatchers detected at a regularly monitored site were detected at Mesquite West; no flycatchers were detected at Mormon Mesa Parcel 5-A. All 17 of the adults detected at Mesquite West were residents of the southwestern subspecies that were present for at least 7 days.

Of the 19 adult flycatchers detected across all sites, 16 (84%) were known to be banded, two (11%) were unbanded, and the band status of one (5%) could not be determined. One of the 16 banded adults was newly banded in 2026, and 15 were banded in previous years. Of the 15 previously banded birds, 12 were individually identified by band combination while three could not be identified to individual. Eleven identified individuals had been previously detected as adults; of these 11, eight returned to Mesquite West where they were last detected, one dispersed 27.4 km (17.0 miles) from Mormon Mesa to Mesquite West, and one dispersed 1.6 km (1.0 mile) from Mesquite West to just south of Bunkerville 2-A through 2-G in 2026. One adult was detected for the first time since it was banded as a juvenile; this individual fledged from a nest at Mesquite West in 2024.

3.2.1.1.1 Mesquite West

Biologists spent 166.0 observer-hours on territory and nest monitoring at Mesquite West; activities included determining residency status, observing resident flycatchers, monitoring nests, and banding adults and nestlings. The 17 adults documented at Mesquite West comprised seven pairs and four territorial, unpaired males (see Table 5).

One adult was newly color banded, and one adult banded in a previous year was recaptured (see Table 5). Eight additional adults were identified to individual via resighting. Three adults were determined to be banded, but their color combinations could not be confirmed. Two adults remained unbanded, and band

status could not be determined for the remaining adult. Fifteen nestling flycatchers were newly banded (see Table 5); nine of the banded nestlings were confirmed to have fledged. Three banded nestlings were known to have died: one nest containing three banded nestlings was depredated. Three banded nestlings from one nest whose fate remained unknown could not be confirmed as fledged.

Nests were confirmed for six of the seven pairs documented in 2026. Eight confirmed nesting attempts were documented (see Figure B-1). All eight nesting attempts were known to contain at least one flycatcher egg and were used in calculating nest success and productivity. Four (50%) of these eight nests were successful and fledged young, three (38%) failed, and the fate of one nest (13%) remained unknown (Table 6). Four females each had one nesting attempt, and two females each had two nesting attempts. No nest was located for one pair. In total, nine fledglings were produced from seven nests with known outcome. Productivity at Mesquite West was 1.29 fledglings per nest, and fecundity was 1.50 fledglings per female (Table 7).

Three nest failures were documented at Mesquite West; depredation was the cause of failure at all three nests. Nests that were found empty or destroyed 2 days or more before their anticipated fledge date were considered to have been depredated. Nests that were found empty less than 2 days before their anticipated fledge date were considered to have been depredated if there was other evidence that the nest had not fledged (i.e., a female building a new nest with no defense of the previous nest location); otherwise, nest fate was unknown.

Seven of the eight nests documented had a known parasitism status (see Table 6). One nest with unknown parasitism status was found during the building stage. One flycatcher egg was observed during the first check for contents, and it was presumed that the nest was still in the laying stage at that time. The nest failed between this visit and the next visit, which occurred 9 days later; the nest empty and nest material was pulled up from the bottom of the nest. The nest contents were not observed during incubation; therefore, parasitism status could not be determined. None of the seven nests with flycatcher eggs and known parasitism status were parasitized by cowbirds.

3.2.1.1.2 Mormon Mesa

No flycatchers were detected at Mormon Mesa Parcel 5-A in 2026. Due to the lack of detections at Mormon Mesa, a contract amendment was processed, and funds were reallocated to conduct monitoring at Bunkerville.

3.2.1.1.3 Bunkerville

Biologists spent 10.0 observer-hours on territory monitoring just south of Bunkerville Parcel 2-B; activities included determining residency status and observing flycatchers. Two adults were documented at Bunkerville; each was detected for less than 7 days (see Table 5). Both flycatchers were banded in previous years, were identified to individual via resighting, and were known males. One individual held a territory in 2025 in the same area where the bird was observed on July 3, 2026. The second adult held a territory at Mesquite West in 2025 and was observed on July 12, 2026, at Bunkerville.

Table 5. Details of Flycatchers and Willow Flycatchers Detected at All Riparian Reserve Properties, 2026

Subunit*	Parcel	Date Banded†	Federal Band No.†	Color Combination‡	Age§	Sex¶	Territory or Location#	Observation Status**, ††
MESQ	West‡‡	August 14, 2021	2590-53196	WRW(M):XX	6Y	F	01	RS
		June 27, 2019	2660-23228	MY(M):VI	8Y	M	01	RS
		July 7, 2026	3080-27444	PP:RDR(M)	L	U	01	N
		July 7, 2026	3080-27688	BW(M):PP	L	U	01	N
		July 7, 2026	3080-27794	BD(M):TT	L	U	01	N
		July 19, 2022	2940-35234	Xs:YB(M)	A6Y	F	02	RS
		July 18, 2024	1710-58977	GN:RD(M)	A4Y	M	02	RS
		June 27, 2026	3010-42174	EY:MKM(M)	L	U	02	N
		June 27, 2026	3080-27660	PP:YR(M)	L	U	02	N
		June 27, 2026	3080-27804	GR(M):TT	L	U	02	N
		N/A	N/A	UB:UB	L	U	02	Not confirmed to have fledged
		July 30, 2026	3080-27724	WG(M):TT	AHY	F	03	N
		June 22, 2025	3010-42141	GM(M):EY	3Y	M	03	RS
		July 28, 2026	3080-27790	GW(M):TT	L	U	03	N
		July 28, 2026	3080-27690	MB(M):PP	L	U	03	N
		INA	INA	Banded	AHY	F	04	RS
		INA	INA	Banded	AHY	M	04	RS
		July 18,2026	3080-27445	PP:WD(M)	L	U	04	N; not confirmed to have fledged
		July 18,2026	3080-27765	KGK(M):TT	L	U	04	N; not confirmed to have fledged
		July 18,2026	3080-27443	PP:WRW(M)	L	U	04	N; not confirmed to have fledged
		August 4, 2024	1710-58919	GN:BMB(M)	3Y	F	05	R July 22
		May 27, 2020	2660-23165	MG(M):VI	A8Y	M	05, 11	RS; polygynous with 11
		July 2, 2026	3010-42172	EY:KM(M)	L	U	05	N
		INA	INA	Undetermined	AHY	F	06	
		INA	INA	Banded	AHY	M	06	RS
		July 3, 2026		UB:BR(M)	L	U	06	N; died
		July 3, 2026	3080-27687	PP:RG(M)	L	U	06	N; died
		July 3, 2026	3080-27746	BG(M):TT	L	U	06	N; died

Subunit*	Parcel	Date Banded†	Federal Band No.†	Color Combination‡	Age§	Sex¶	Territory or Location#	Observation Status**, ††
		July 1, 2021	2660-23379	EY:RKR(M)	7Y	M	T07	RS; detected May 16–July 26
		June 25, 2022	2940-35206	Xs:BW(M)	5Y	M	T08	RS; detected May 23–July 7
		N/A	N/A	UB:UB	AHY	M	T09	RS; detected June 8–25
		N/A	N/A	UB:UB	AHY	M	T10	RS; detected June 10–28
		June 5, 2022	2940-35207	Xs:BMB(M)	A6Y	F	11	RS
BUNK E	2-B	July 2, 2024	3010-42142	EY:MB(M)	3Y	M	F01	RS; detected July 3
		July 18, 2024	2590-59240	Vs:DR(M)	3Y	M	F02	RS; detected July 12

* BUNK E = Bunkerville East, MESQ = Mesquite

† INA = information not available, N/A = not applicable

‡ Color-band codes: B = light blue, banded = bird was banded but combination could not be determined, D = dark blue, EY = electric yellow federal band, G = green, GN = green federal band, K = black, M = mulberry, (M) = metal pinstriped band, PP= pumpkin federal band, R = red, TT = turquoise federal band, UB = unbanded, undetermined = presence of bands could not be determined, VI = violet federal band applied prior to 2023, Vs = violet federal band applied after 2023, W = white, Xs = standard silver federal band, Y = yellow. Color combinations are read as the bird's left leg and right leg, top to bottom; two or three letters designate every band; color-band designations for left and right legs are separated with a colon.

§ Age in 2026: L = nestling, AHY = 2 years or older, 3Y = 3 years, A4Y = 4 years or older, 5Y = 5 years, 6Y = 6 years, A6Y = 6 years or older, 7Y = 7 years, 8Y = 8 years, A8Y = 8 years or older

¶ Sex codes: F = female, M = male, U = unknown

Territory or location code: Numbers indicate unique individual, pair, or nest locations; a number without an alpha prefix indicates a flycatcher pair; F = individual detected for less than 7 days; T = territorial individual detected for at least 7 days.

** Observation status codes: N = new capture, R = recapture followed by date captured, RS = resight

†† Dates shown aid in distinguishing floaters (F) from territorial residents (T). All pairs were residents; no dates of detection are shown for pairs.

‡‡ Includes Mesquite Parcel 1-A

Table 6. Summary of Flycatcher Nest Monitoring Results at the Mesquite and Mormon Mesa Subunits, 2019–2026

Subunit*	Year	Pairs	Nests with 1+ WE†	Successful Nests‡	Failed Nests‡	Nests with Unknown Fate	Nests with 1+ WE† and Known Parasitism Status	Parasitized Nests§	Young Fledged
MESQ	2019	6	9	4 (44)	4 (44)	1 (11)	8	4 (50)	5
	2020¶	4	5	0	5 (100)	0	5	2 (40)	0
	2021	3	6	2 (33)	4 (67)	0	6	3 (50)	3
	2022	7	9	7 (78)	1 (11)	1 (11)	9	2 (22)	13
	2023	8	13	6 (46)	7 (54)	0	12	1 (8)	11
	2024	7	12	7 (58)	4 (33)	1 (8)	11	1 (9)	18
	2025	8	10	5 (50)	5 (50)	0	8	1 (13)	8
	2026	7	8	4 (50)	3 (38)	1 (13)	7	0	9

Subunit*	Year	Pairs	Nests with 1+ WE†	Successful Nests‡	Failed Nests‡	Nests with Unknown Fate	Nests with 1+ WE† and Known Parasitism Status	Parasitized Nests§	Young Fledged
	Total	50	72	35 (49)	33 (46)	4 (6)	66	14 (21)	67
MOME	2019	0	0	0	0	0	0	0	0
	2020	2	1	1 (100)	0	0	1	0	1
	2021	0	0	0	0	0	0	0	0
	2022	0	0	0	0	0	0	0	0
	2023	1	1	0	1 (100)	0	1	1 (100)	0
	2024	1	1	0	1 (100)	0	1	0	0
	2025	2	0	0	0	0	0	0	0
	2026	0	0	0	0	0	0	0	0
	Total	6	3	1 (33)	2 (67)	0	3	1 (33)	1
All	2019	6	9	4 (44)	4 (44)	1 (11)	8	4 (50)	5
	2020	6	6	1 (17)	5 (83)	0	6	2 (33)	1
	2021	3	6	2 (33)	4 (67)	0	6	3 (50)	3
	2022	7	9	7 (78)	1 (11)	1 (11)	9	2 (22)	13
	2023	9	14	6 (46)	7 (54)	0	13	2 (15)	11
	2024	8	13	7 (54)	6 (38)	1 (8)	12	1 (8)	18
	2025	10	10	5 (50)	5 (50)	0	8	1 (13)	8
	2026	7	8	4 (50)	3 (38)	1 (13)	7	0	9
Overall total		**56**	**75**	**36 (48)**	**35 (47)**	**4 (5)**	**69**	**15 (22)**	**68**

* MESQ = Mesquite, MOME = Mormon Mesa

† WE = willow flycatcher egg

‡ Only nests with at least one flycatcher egg were used in tallies and percentage calculations. Percentages are given in parentheses.

§ Parasitized nests include all nests that contained at least one flycatcher egg and one cowbird egg regardless of nest fate. Percentages in parentheses include only nests with at least one flycatcher egg and for which parasitism status could be determined.

¶ Data presented are for Mesquite Parcel 1-A only; no monitoring was conducted at Mesquite West West.

Table 7. Flycatcher Nest Productivity and Fecundity at Mesquite West, 2019–2026

Year	No. Young Fledged	No. Nests with Known Outcome	Productivity Mean (SE)*	No. Females with Known Outcome	Fecundity Mean (SE) †
2019	5‡	8	0.63 (0.26)	5#	0.8 (0.58)
2020	0	5	0	4	0
2021	3	6	0.50 (0.34)	3	1.00 (0.58)
2022	13§	8	1.63 (0.26)	6#	1.83 (0.54)
2023	11	13	0.85 (0.32)	8	1.38 (0.46)
2024	18‡	11	1.64 (0.49)	6#	2.83 (1.01)
2025	8	10	0.80 (0.29)	8	1.00 (0.33)
2026	9	7	1.29 (0.52)	6**	1.50 (0.56)
Total	**67¶**	**68**	**0.99 (0.14)**	**46††**	**1.37 (0.22)**

* Productivity calculations (number of young fledged per nest) include nests that contained flycatcher eggs and had a known outcome. SE = standard error.

† Fecundity calculations (number of young fledged per female over the breeding season) include all females for which all nest outcomes were known. SE = standard error.

‡ One fledgling associated with a female that had a subsequent nesting attempt of unknown fate was not included in the fecundity calculation.

§ Two fledglings associated with a female that had a subsequent nesting attempt of unknown fate were not included in the fecundity calculation.

¶ Four fledglings associated with three females that had a subsequent nesting attempt of unknown fate were not included in the fecundity calculation.

One female that had one successful nest and one nest of unknown outcome was not included.

** One female that had one nest of unknown outcome was not included.

†† Three females that each had one successful nest and one nest of unknown outcome and one female that had one nest of unknown outcome were not included.

3.2.1.2 YELLOW-BILLED CUCKOO

Three cuckoo detections were recorded during surveys across the Riparian Reserve Units, and two were incidentally recorded within 45 minutes after a survey ended. Two detections, one each during the second and third survey rounds, were recorded during cuckoo surveys at Mesquite Parcel 1-A (Figure B-3). The incidental detection at Mesquite Parcel 1-A was recorded 27 minutes after and 57 m (187 feet) northwest of the initial detection; these two detections are believed to have been of the same bird. Detections across two survey periods indicate a possible breeding territory (Halterman et al. 2016).

A single survey detection was recorded at Mormon Mesa Parcel 5-A during the fourth survey round. The incidental detection at Mormon Mesa Parcel 5-A was recorded 39 minutes after and 168 m (551 feet) north of the initial detection. The initial detection was recorded in a mesquite bosque where dead and dying mesquite have resulted in decreased canopy closure and deteriorating habitat quality in recent years. The cuckoo may have been drawn to the mesquite bosque by broadcast vocalizations. The subsequent incidental detection was near mature Goodding's willows (*Salix gooddingii*) with tamarisk understory and higher canopy closure (Figure B-4). The two detections at Mormon Mesa Parcel 5-A are believed to have been of the same bird. Detections during a single survey period are insufficient evidence to determine the presence of a breeding territory.

3.2.2 Brown-Headed Cowbird Control

Cowbird netting was conducted at Mesquite West over a period of 13 weeks, beginning May 4 and ending July 27 (Table 8). Netting occurred on 17 mornings, with a total of 34 separate net set-ups totaling 32.4 net-hours. No individual netting attempt lasted more than 1.1 hours. One to three nets were set up each morning, beginning at first light and ending by 10:05 a.m. In total, nine cowbirds were captured:

five males and four females (0.3 adult per net-hour). No males were recaptured. Biologists used a small-mammal guillotine to decapitate the four female cowbirds immediately following extraction from the net.

Of the four female cowbirds captured at Mesquite West, two (50%) were captured between May 4 and May 31 (see Table 8). These results fall within the range of the proportion of female cowbirds captured in May at Mesquite West in previous years (range 29%–70%, average 49%) as well as at other flycatcher breeding sites in southern Nevada where cowbird netting was conducted in 2023 and 2024 (range 50%–100%, average 71%) (SWCA 2023b, 2024b). In 2026, the number of females captured per net-hour at Mesquite West in May, June, and July were 0.14, 0.11, and 0.11, respectively.

The first flycatcher nests of the season are typically initiated in late May; starting cowbird netting in early May allows for a substantial proportion of the total female cowbird captures to occur before most flycatcher nesting activity begins. Removing female cowbirds from flycatcher breeding habitat may decrease the chance of flycatcher nests being parasitized.

3.2.3 Point-Count Surveys

In total, 65 avian species were recorded across all the County's properties during point-count surveys, and MSHCP covered species were observed at each property. Two additional species were detected at the Riparian Reserve Units but were not detected during point counts; one was detected during species-specific surveys, and one was incidentally detected.

3.2.3.1 RIPARIAN RESERVE UNITS

3.2.3.1.1 MSHCP Covered and Proposed Covered Species

Of the eight avian species covered by the MSHCP, four were recorded during point-count surveys: Arizona Bell's vireo, blue grosbeak, phainopepla, and flycatcher. Cuckoo was not detected during general avian point counts but was detected both incidentally and during species-specific surveys (Table 9). One additional MSHCP covered species, American peregrine falcon, was detected approximately 485 m (1,591 feet) west of the Mesquite Parcel 1-A boundary during flycatcher monitoring activities and is not included in Table 9.

One of the seven species proposed to be covered under an amendment to the MSHCP, loggerhead shrike, was incidentally detected at the Mormon Mesa and Muddy River subunits (see Table 9). For each species, the number of recorded individuals is listed for each set of connected parcels. To standardize the data and account for species that may be detected at greater distances (e.g., crissal thrasher) than others, numbers reported in Table 9 include only birds detected within 100 m (328 feet) of a point-count location (GBBO 2003; Ralph et al. 1995).

SWCA documented multiple flycatcher nesting attempts at Mesquite West. Arizona Bell's vireo, blue grosbeak, and cuckoo were suspected of breeding at various other Riparian Reserve Subunits (refer to breeding codes in Table 9; note that a lack of a breeding code does not indicate that the species was not breeding in a particular subunit or set of parcels, but only that no evidence of such was recorded). Breeding could not be confirmed for any of the other MSHCP covered species.

3.2.3.1.2 Non-MSHCP Species

During the three rounds of point-count surveys, biologists recorded 57 avian species not covered or proposed for coverage by the MSHCP across all the Riparian Reserve Units (Table 10). Of these 57 species, 52 were recorded within 100 m (328 feet) of a point-count location. To account for species that

may be detected at greater distances than others, numbers reported in Table 10 include only birds detected within 100 m (328 feet) of a point-count location (GBBO 2003; Ralph et al. 1995). One additional non-MSHCP avian species (American barn owl [*Tyto furcata*]) was incidentally detected while the observer was walking between point-count locations.

Of the 57 non-MSHCP species detected during point-count surveys, five were recorded at each of the seven subunits: Abert's towhee (*Melozone aberti*), Gambel's quail (*Callipepla gambelii*), Lucy's warbler (*Leiothlypis luciae*), mourning dove (*Zenaida macroura*), and yellow-breasted chat (*Icteria virens*). Although some species (e.g., belted kingfisher [*Megaceryle alcyon*]) were likely migrating through the area on their way to breeding grounds farther north or at higher elevations, most of the species recorded during point-count surveys are known to breed in the Mojave Desert. While breeding could not be confirmed for most of the species recorded at the Riparian Reserve Units, it is assumed that many may have bred or attempted to breed in the Riparian Reserve Units.

Breeding was confirmed for barn owl (nest with nestlings observed), Lucy's warbler (fledgling observed), and mourning dove (adult observed on a nest). Twenty-seven additional species were recorded singing or performing territorial displays, indicating that breeding for those species was possible within the Riparian Reserve Units (though some species may also exhibit either of these behaviors during migration).

Species richness varied between the seven subunits: the Bunkerville East subunit showed the highest avian species richness, with 39 species recorded during point-count surveys, while the Mesquite subunit yielded the lowest species richness, with 11 species recorded. The three species with the highest number of detections within 100 m (328 feet) of a point-count location across all the Riparian Reserve Units were Abert's towhee, mourning dove, and Gambel's quail.

Table 8. Number of Cowbirds Netted by Date at Mesquite West, 2026

Sex	May 04	May 09	May 12	May 16	May 17	May 22	May 25	May 28	June 03	June 12	June 19	June 27	June 30	July 06	July 12	July 21	July 27	Total
Male	0	1	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	5
Female	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	4
Total	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**9**

Table 9. Number of Detections and Breeding Codes for MSHCP Covered and Proposed Covered Avian Species Recorded at the Riparian Reserve Subunits, 2026

Common Name (*Scientific Name*)	Mesquite	Bunkerville East	Bunkerville West	Riverside	Mormon Mesa	Mormon Mesa South	Muddy River
Arizona Bell's vireo (*Vireo bellii arizonae*)	–	3 (PO)	1 (PO)	9 (PO)	4 (PO)	2 (PO)	4 (PO)
Blue grosbeak (*Passerina caerulea*)	–	2 (PO)	X	3 (PO)	2 (PO)	–	1 (PO)
Phainopepla (*Phainopepla nitens*)	–	1	4	1	X	–	X
Southwestern willow flycatcher (*Empidonax traillii extimus*)	2*	I	–	–	–	–	–
Yellow-billed cuckoo (*Coccyzus americanus*)	S (PO)†	–	–	–	S‡	–	–
Loggerhead shrike (*Lanius ludovicianus*)	–	–	–	–	I	–	I

Notes: X = species recorded at that subunit during point counts but not within 100 m (328 feet) of a point-count location; PO = breeding possible—individual(s) singing in appropriate habitat at that subunit during the breeding season; I = species recorded incidentally during surveys or monitoring for federally listed birds but not during point-count surveys; S = species recorded during protocol-level presence/absence surveys. The lack of a breeding code does not indicate that the species was not breeding but only that no evidence of such was recorded. A dash indicates no detections of the species.

* Breeding was confirmed during surveys or monitoring for federally listed birds but not during point-count surveys.

† Two yellow-billed cuckoo detections were recorded during different survey periods within the Mesquite Parcel 1-A boundary during species-specific surveys, indicating a possible breeding territory (Halterman et al. 2016).

‡ One yellow-billed cuckoo was detected during species-specific surveys within the Mormon Mesa Parcel 5-A boundary.

Table 10. Number of Detections and Breeding Codes for Non-MSHCP Avian Species Recorded at the Riparian Reserve Subunits, 2026

Common Name	Scientific Name	Clark County Riparian Reserve Subunits (number of point-count locations)						
		Mesquite (1)	Bunkerville East (8)	Bunkerville West (6)	Riverside (5)	Mormon Mesa (3)	Mormon Mesa South (2)	Muddy River (6)
Abert's towhee	*Melozone aberti*	5	23	16	21	9	3	15
American barn owl	*Tyto furcata*	–	–	–	–	–	–	I*
Anna's hummingbird	*Calypte anna*	–	4 (PO)	–	–	–	–	–
Ash-throated flycatcher	*Myiarchus cinerascens*	–	2	1	3	1 (PO)	1	5
Barn swallow	*Hirundo rustica*	–	X	–	–	–	–	–
Belted kingfisher	*Megaceryle alcyon*	–	–	–	X			
Bewick's wren	*Thryomanes bewickii*	–	–	–	–	1 (PO)	–	X
Black-chinned hummingbird	*Archilochus alexandri*	–	1	–	–	–	–	–
Black-tailed gnatcatcher	*Polioptila melanura*	–	5	4	10	–	2	3
Black-throated sparrow	*Amphispiza bilineata*	–	–	–	1	–	–	–
Black phoebe	*Sayornis nigricans*	–	–	–	X	–	–	2 (PO)
Blue-gray gnatcatcher	*Polioptila caerulea*	–	–	–	–	2 (PO)	–	–
Brown-crested flycatcher	*Myiarchus tyrannulus*	–	–	–	3 (PO)	1	–	3 (PO)
Brown-headed cowbird	*Molothrus ater*	–	2	1	13 (PO)	–	X	3
Bullock's oriole	*Icterus bullockii*	–	–	X	5 (PO)	–	–	–
Canada goose	*Branta canadensis*	X	5	–	–	–	–	–
Canyon wren	*Catherpes mexicanus*	–	–	–	–	–	–	1 (PO)
Cliff swallow	*Petrochelidon pyrrhonota*	–	9	12	18	2	–	–
Common raven	*Corvus corax*	–	2	X	X	–	–	X
Common yellowthroat	*Geothlypis trichas*	1 (PO)	2 (PO)	1 (PO)	–	2 (PO)	–	–
Cooper's hawk	*Astur cooperii*	–	1	–	–	–	–	–
Crissal thrasher	(*Toxostoma crissale*)	–	4 (PO)	2	X	1	2 (PO)	6 (PO)
Double-crested cormorant	*Nannopterum auritum*	–	–	–	X	–	–	–
Eurasian collared-dove	*Streptopelia decaocto*	–	–	–	2 (PO)	–	–	7 (PO)

Common Name	Scientific Name	Clark County Riparian Reserve Subunits (number of point-count locations)						
		Mesquite (1)	Bunkerville East (8)	Bunkerville West (6)	Riverside (5)	Mormon Mesa (3)	Mormon Mesa South (2)	Muddy River (6)
European starling	*Sturnus vulgaris*	–	1	–	–	–	–	–
Gambel's quail	*Callipepla gambelii*	2	19	8 (PO)	4	5	2	26 (PO)
Great blue heron	*Ardea herodias*	–	X	2	X	X	–	–
Great horned owl	*Bubo virginianus*	–	1	–	–	–	–	–
Greater roadrunner	*Geococcyx californianus*	–	–	–	2 (PO)	X	–	–
Great-tailed grackle	*Quiscalus mexicanus*	–	4	1	X	–	–	–
House finch	*Haemorhous mexicanus*	–	10 (PO)	3	6 (PO)	–	3	22 (PO)
House sparrow	*Passer domesticus*	–	–	–	–	–	–	26 (PO)
Indigo bunting	*Passerina cyanea*	–	2 (PO)	1 (PO)	–	–	–	–
Killdeer	*Charadrius vociferus*	–	4 (PO)	5	1	–	–	–
Ladder-backed woodpecker	*Dryobates scalaris*	–	4	1	2	1	–	X
Lazuli bunting	*Passerina amoena*	–	2 (PO)	–	–	–	–	–
Lesser goldfinch	*Spinus psaltria*	–	–	1	–	–	–	–
Lesser nighthawk	*Chordeiles acutipennis*	–	–	–	2	–	1	–
Lucy's warbler	*Leiothlypis luciae*	1 (PO)	13 (CO)	4 (PO)	2 (PO)	6 (PO)	4 (PO)	5 (PO)
Mallard	*Anas platyrhynchos*	–	–	–	–	–	–	1
Mourning dove	*Zenaida macroura*	2 (CO)	24 (PO)	6 (PO)	15 (PO)	6 (PO)	7 (PO)	8
Northern mockingbird	*Mimus polyglottos*	–	2	–	–	1	–	X
Northern rough-winged swallow	*Stelgidopteryx serripennis*	–	5	5	4	2	4	–
Northern yellow warbler	*Setophaga aestiva*	7 (PO)	2 (PO)	3 (PO)	6 (PO)	4 (PO)	–	1 (PO)
Red-tailed hawk	*Buteo jamaicensis*	–	–	–	–	X	–	–
Red-winged blackbird	*Agelaius phoeniceus*	2 (PO)	1	7 (PO)	1	X	6 (PO)	–
Rock pigeon	*Columba livia*	–	–	–	–	–	–	6
Rock wren	*Salpinctes obsoletus*	–	–	–	–	–	–	1 (PO)
Say's phoebe	*Sayornis saya*	–	–	2	X	–	–	X

Common Name	Scientific Name	Clark County Riparian Reserve Subunits (number of point-count locations)						
		Mesquite (1)	Bunkerville East (8)	Bunkerville West (6)	Riverside (5)	Mormon Mesa (3)	Mormon Mesa South (2)	Muddy River (6)
Song sparrow	*Melospiza melodia*	2 (PO)	2 (PO)	–	2 (PO)	4 (PO)	–	2 (PO)
Spotted sandpiper	*Actitis macularius*	–	1 (PO)	–	–	–	–	–
Turkey vulture	*Cathartes aura*	–	1	X	X	–	–	2
Verdin	*Auriparus flaviceps*	–	19 (PO)	9	16 (PO)	7	2	9
Western kingbird	*Tyrannus verticalis*	–	–	X	–	–	–	–
White-crowned sparrow	*Zonotrichia leucophrys*	–	–	–	–	–	2	–
White-faced ibis	*Plegadis chihi*	–	65	X	–	–	–	–
White-winged dove	*Zenaida asiatica*	–	1*	–	X	1 (PO)	–	2 (PO)
Yellow-breasted chat	*Icteria virens*	7 (PO)	2	5 (PO)	6 (PO)	10 (PO)	3 (PO)	1 (PO)

Notes: X = species recorded at that subunit during point counts but never within 100 m (328 feet) of a point-count location; CO = Breeding confirmed—fledgling(s) observed; PO = breeding possible—individual(s) singing in appropriate habitat at that subunit during the breeding season; I = species recorded incidentally during surveys or monitoring for federally listed birds but not during point-count surveys. The lack of a breeding code does not indicate that the species was not breeding but only that no evidence of such was recorded. A dash indicates no detections of the species.

* Breeding was confirmed during surveys or monitoring for federally listed birds but not during point-count surveys.

3.2.3.2 BOULDER CITY CONSERVATION EASEMENT

3.2.3.2.1 MSHCP Covered and Proposed Covered Species

None of the eight MSHCP covered bird species were recorded during point-count surveys in the BCCE. Two bird species proposed for coverage under the MSHCP were recorded: loggerhead shrike and LeConte's thrasher. Each species was detected from a single point-count location (Table 11). A group of four LeConte's thrashers was incidentally observed on May 10; though the observation of four individuals together strongly suggests a family group, the presence of fledglings could not be confirmed. While breeding could not be confirmed for either species in 2026, the LeConte's thrashers are suspected to have bred on-site. LeConte's thrasher nests have been documented in the BCCE during previous survey years (SWCA 2020).

Table 11. Number of Detections and Breeding Codes for MSHCP Proposed Covered Species Recorded at the BCCE During Point-Count Surveys, 2026

Common Name	Scientific Name	Total Detections	Detections Within 100 m	Breeding Codes
Loggerhead shrike	*Lanius ludovicianus*	1	0	–
LeConte's thrasher	*Toxostoma lecontei*	1	1	(PO)

Notes: PO = breeding possible—possible family group observed. A dash indicates no evidence of breeding was observed.

3.2.3.2.2 Non-MSHCP Species

SWCA biologists recorded nine avian species not covered or proposed for coverage under the MSHCP across the BCCE point-count locations over all three rounds of point-count surveys (Table 12). These data are presented as total detections and detections within 100 m (328 feet) of the observer to account for species with different detection probabilities and reduce bias toward species that are more conspicuous at greater distances (e.g., common raven) (GBBO 2003; Ralph et al. 1995). Of the nine species recorded during point-count surveys, eight were recorded within 100 m (328 feet) of a point-count location. The two species with the highest number of detections within 100 m (328 feet) of a point-count location were horned lark (*Eremophila alpestris*) and black-throated sparrow (*Amphispiza bilineata*) (see Table 12).

All species detected at the BCCE are known to breed in the Mojave Desert and may have bred or attempted to breed within the BCCE boundary.

Table 12. Number of Detections and Breeding Codes for Non-MSHCP Species Recorded at the BCCE During Point-Count Surveys, 2026

Common Name	Scientific Name	Total Detections	Detections Within 100 m	Breeding Codes
Black-throated sparrow	*Amphispiza bilineata*	61	44	CO
Brewer's sparrow	*Spizella breweri*	4	4	PO
Common raven	*Corvus corax*	13	3	CO
Horned lark	*Eremophila alpestris*	74	50	PO
House finch	*Haemorhous mexicanus*	2	2	–
Lesser nighthawk	*Chordeiles pusillus*	5	4	PO
Mourning dove	*Zenaida macroura*	1	0	PO

Common Name	Scientific Name	Total Detections	Detections Within 100 m	Breeding Codes
Red-tailed hawk	*Buteo jamaicensis*	1	1	–
Rock wren	*Salpinctes obsoletus*	3	2	PO

Notes: CO = Breeding confirmed—fledgling observed or adult observed at nest. PO = breeding possible—individual(s) singing in appropriate habitat during the breeding season. A dash indicates no evidence of breeding was observed.

Six species were recorded singing at the BCCE, which indicates that breeding for those species was possible (though some species sing during migration) (see Table 12). Species lacking a breeding code in Table 12 may have bred within the BCCE; however, no evidence of breeding was recorded.

4 EVALUATION/DISCUSSION OF RESULTS

This project builds on a baseline avian dataset for the County's MSHCP properties. Point-count surveys across all County properties resulted in a total of 65 avian species detected: 61 species were detected at the Riparian Reserve Units and 11 were recorded at the BCCE; seven of these species were detected at both the Riparian Reserve Units and the BCCE. The 61 species detected across the Riparian Reserve Units included four MSHCP covered and proposed covered species; one additional MSHCP covered species was detected both incidentally and during protocol-level surveys for federally listed species, and one proposed covered species was incidentally detected. Peregrine falcon was detected west of Mesquite Parcel 1-A during flycatcher activities and is not included in the total species detected at the Riparian Reserve Units. The 11 species detected at the BCCE included two proposed covered MSHCP species. Goals identified in both the Riparian Reserve Unit Management Plan (Clark County 2023b) and the BCCE Management Plan (Clark County 2023a) include managing these properties to protect MSHCP covered species. Baseline vegetation community and structure data for the MSHCP properties are necessary to inform habitat management interventions for managing avian species at these properties. This section includes a closer analysis of avian species presence and distribution for each set of connected parcels within the Riparian Reserve Units and at the BCCE, as well as a qualitative assessment of existing vegetation conditions therein.

4.1 Mesquite

4.1.1 Mesquite Parcel 1-A

Portions of the eastern Mesquite Parcel 1-A boundary adjacent to Coyote Willows Golf Course consisted of standing, dead narrowleaf willows (*Salix exigua*) that extended from the northeastern border of the site to the southeast third of the site; these areas were removed from flycatcher and cuckoo surveys in 2024. An additional area of standing, dead narrowleaf willows was observed in the southeast quarter of the site where lack of water was first noted in 2023; a strip of dead or dying vegetation extended approximately 200 m (656 feet) northwest of this area to just outside the Mesquite Parcel 1-A boundary. Outside these areas of dead vegetation, much of Mesquite Parcel 1-A consisted of 4- to 7-m-tall (13- to 23-foot-tall) narrowleaf willows (Figure A-1 in Appendix A); the remainder of the vegetation consisted primarily of 4- to 6-m-tall (13- to 20-foot-tall) tamarisk and patches of narrowleaf willows approximately 3 to 4 m (10–13 feet) tall with emergent 5- to 8-m-tall (16- to 26-foot-tall) Goodding's willows. Canopy closure was generally greater than 65%; lower canopy closure (50%) was observed in tamarisk-dominated areas. Canopy closure was as low as 40% along the eastern boundary of the site where dead, fallen willows and tamarisk created gaps in the canopy. Where tamarisk and narrowleaf willows had begun to fill in some of these areas, canopy height reached up to 3 m (10 feet). A large patch of common reed (*Phragmites australis*) was present along the northern boundary of the site; most of these reeds were dead during the

2026 season. Vegetation along the southern edge of the site was dominated by tamarisk with an understory of mule-fat (*Baccharis salicifolia*). The northwestern portion of this parcel, where vegetation was 5-m-tall (16-foot-tall) narrowleaf willow and tamarisk with up to 80% canopy closure, contained the best habitat for flycatcher within the County's Riparian Reserve Units.

SWCA biologists observed water from Pulsipher Wash flowing into Mesquite Parcel 1-A from one of two channels (eastern or western) while conducting flycatcher surveys and monitoring under contract with the Bureau of Reclamation in 2003–2017 (McLeod and Koronkiewicz 2010, McLeod and Pellegrini 2011). In 2020, SWCA began flycatcher monitoring at Mesquite Parcel 1-A under contract with the County; at this time, water in Pulsipher Wash flowed through the eastern channel. In 2023, water was diverted to the western channel approximately 230 m (755 feet) north of the Mesquite Parcel 1-A boundary, and water did not reach as far south into the Mesquite 1-A parcel as in previous years when water flowed through the eastern channel (Figure 15) (SWCA 2023). In 2024, water flowed into Mesquite Parcel 1-A through both channels, and water was observed farther south in the site than in 2023 (SWCA 2024). In 2025 and 2026, water was diverted to flow west from the eastern channel approximately 100 m (328 feet) north of the Mesquite Parcel 1-A boundary, and conditions were similar to those observed in 2023 (Figure 16).



Figure 15. Aerial image depicting Pulsipher Wash flow along western channel, July 1, 2023 (Clark County GISMO 2026).



Figure 16. Aerial image depicting Pulsipher Wash flow along eastern channel and diverted west, July 1, 2026 (Clark County GISMO 2026).

In recent years, habitat quality within Mesquite Parcel 1-A has been inferred from the number of resident adult flycatchers within or adjacent to the parcel boundary (SWCA 2020, 2021, 2022, 2023a, 2024a, 2025a). In 2019 and 2020, SWCA monitored only territories within or adjacent to the Mesquite Parcel 1-A boundary. In 2021, under a County contract, SWCA began monitoring all of Mesquite West, a historical breeding site that has been monitored annually by the San Bernardino County Museum, SWCA (under various contracts) and NDOW biologists since 1996 (McKernan and Braden 1997; McLeod and Pellegrini 2013, 2014; NDOW, unpublished data). A shift in territory locations was observed from 2022 through 2026: as the number of individuals within or adjacent to Mesquite Parcel 1-A decreased from nine to one, the number of individuals up to 150 m (492 feet) west of the Mesquite Parcel 1-A boundary increased from two to 13 (SWCA 2022, 2023a, 2024a, 2025). Though territory locations shifted from 2022 through 2026, the overall number of flycatchers observed (16 to 21 each year) was within the range of flycatchers observed from 2003 through 2012 (six to 30 each year) (McLeod and Pellegrini 2013; SWCA 2022, 2023a, 2024a, 2025). A relatively stable number of flycatchers and continued flycatcher breeding at Mesquite West indicate that the site contains suitable flycatcher habitat, though the locations of suitable habitat within Mesquite West have changed in recent years. The shift in territory locations from Mesquite Parcel 1-A to locations farther west coincides with the timing of the diversion of Pulsipher Wash from the eastern channel to the western channel, which resulted in decreased water flow through Mesquite Parcel 1-A. The change in flycatcher territory locations indicates that habitat conditions have recently been more favorable on the Mesquite West side of the Mesquite Parcel 1-A border than within Mesquite Parcel 1-A.

While the shift in flycatcher territory locations from Mesquite Parcel 1-A to areas farther west in Mesquite West may indicate that habitat quality within Mesquite Parcel 1-A has decreased from 2022 through 2026, it may also be an indication that habitat quality in other portions of Mesquite West has increased in those years. Before 2009, a large portion of northeastern Mesquite West contained several wet cattail (*Typha* sp.) marshes (McLeod and Pellegrini 2013). Hydrologic conditions in 2009 became more variable than in previous years as the site was dry for a large portion of the season while the flow of Pulsipher Wash was diverted from the western channel to the eastern channel. Subsequently, less frequent irrigation return flows inundated a smaller portion of the site. Hydrologic conditions remained variable in subsequent years, and as the cattail marshes began to dry, narrowleaf willows filled in these areas (McLeod et al. 2019). In 2026, 13 of the 17 resident flycatchers detected occupied territories in the areas where narrowleaf willows filled in former cattail marshes (Figure 17; see Figure B-1).



Figure 17. Aerial image depicting locations of several dry cattail marshes at Mesquite West in 2010 (Google Earth 2010).

In addition to flycatcher, cuckoo was detected at Mesquite Parcel 1-A during species-specific surveys and incidentally during flycatcher monitoring activities. No other MSHCP covered species were detected at Mesquite Parcel 1-A in 2026.

Northern yellow warbler, a Mojave riparian indicator species (GBBO 2010) though not an MSHCP covered species, was one of two species with the highest number of detections recorded during point-count surveys within Mesquite Parcel 1-A in 2026, signifying that Mesquite Parcel 1-A provided high-quality riparian woodland habitat; the other species with the same number of detections was yellow-breasted chat.

4.1.2 Mesquite West West

Most of the vegetation at Mesquite West West consisted of dense 4- to 7-m-tall (13- to 23-foot-tall) narrowleaf willows with interspersed tamarisk (Figure A-2). Some tamarisk-dominated areas were present along the northern boundary of the site (Figure A-3). A few 10-m-tall (33-foot-tall) Goodding's willows and Fremont cottonwoods (*Populus fremontii*) were scattered throughout the site. Several dry cattail and bulrush (*Schoenoplectus californicus*) marshes were also scattered throughout the site. Several small areas of dead narrowleaf willows and/or tamarisk were present in the eastern and central portions of the site. Vegetation along the southern edge of the site was dominated by tamarisk with an understory of mule-fat and occasional patches of common reed. A few emergent Russian olive (*Elaeagnus angustifolia*), screwbean mesquite, and velvet ash (*Fraxinus velutina*) were scattered throughout this portion of the site. Canopy closure varied from 40% in the areas of dead narrowleaf willows to greater than 85% in areas of healthy willows. Hydrology at the site was influenced by fluctuating, irregular irrigation return flows from Pulsipher Wash and runoff from the adjacent golf course. Soils along an east-west-trending channel in the southwestern portion of the site were often damp with scattered puddles. Occasionally, the channel was inundated with up to 10 cm (4 inches) of water. A large beaver pond at the west end of the site contained up to 1 m (3 feet) of water at various points throughout the season; sporadically, the beaver pond was only muddy and did not contain standing water. Water levels outside the beaver pond varied throughout the season, and portions of the site retained damp soils into August. Less surface water was observed in the southwestern portion of the site than in previous years. Larval tamarisk leaf beetles were detected at the site in mid-June. Some tamarisk were brown by early July (Figure A-4), and refoliation was observed in late July. Signs of cattle were observed on-site in late May through late June, and cattle were observed on-site in early June.

4.2 Bunkerville East

4.2.1 Bunkerville East Parcels 2-A Through 2-G

Bunkerville East Parcels 2-A through 2-E are mostly within the active floodplain of the Virgin River, which experiences high-flow events. These parcels consisted largely of sandy bare ground dotted with small-diameter arrowweed (*Pluchea sericea*), tamarisk, and mule-fat (Figure A-5). In Bunkerville East Parcels 2-D through 2-G, several areas of tamarisk totaling approximately 10.5 ha (26.0 acres) were masticated in November 2025, including a large swath in Bunkerville East Parcels 2-D and 2-E; the mastication resulted in elimination of 0.7 ha (1.7 acres) of habitat previously surveyed for flycatcher and cuckoo (Figure A-6). Bunkerville East Parcels 2-F and 2-G were dominated by anthropogenically disturbed lands and included large areas that have been completely cleared of native vegetation. The areas of Bunkerville East Parcels 2-F and 2-G that have not been disturbed by anthropogenic activities were generally dominated by 1- to 3-m-tall (3- to 10-foot-tall) mule-fat, tamarisk, screwbean mesquite, and intermittent arrowweed (Figure A-7). Any regrowth in this area was generally patchy 2- to 4-m-tall (7- to 13-foot-tall) tamarisk, arrowweed, and big saltbush (*Atriplex lentiformis*) with little to no continuous canopy. An approximately 110 × 110–m (361 × 361–foot) area in the southeastern portion of Bunkerville East Parcel 2-F consisted of honey mesquite (*Prosopis glandulosa*) and screwbean mesquite.

Bunkerville East Parcels 2-A through 2-G lacked the multistoried canopy that is generally used by cuckoo, and although the minimum canopy height for breeding flycatcher is considered to be 3 m (10 feet) (Sogge et al. 2010), occupied flycatcher sites along the Virgin River in 2003 through 2011 had median canopy heights of 5 to 6 m (16–20 feet) (McLeod and Pellegrini 2013). There was generally very little continuous canopy at this height within Bunkerville East Parcels 2-A through 2-G. Median canopy closure of occupied flycatcher sites along the Virgin River from 2003 to 2011 was >90% (McLeod and

Pellegrini 2013). Portions of the site exhibited canopy closure that reached 80% to 85%, but most of the site was much more open.

One small patch surveyed for flycatcher and cuckoo consisted of 2- to 6-m-tall (7- to 20-foot-tall) narrowleaf willows and tamarisk with scattered 6-m-tall (20-foot-tall) screwbean mesquite. Canopy closure was up to 80%. Two other patches were surveyed for flycatcher and cuckoo: both patches consisted of 4- to 5-m-tall (13- to 16-foot-tall) narrowleaf willows with emergent 10-m-tall (33-foot-tall) Goodding's willows and screwbean mesquite with 75% canopy closure (Figure A-8). All three surveyed patches were adjacent to the Virgin River and exhibited damp to saturated soils throughout the season; the easternmost survey area was inundated with approximately 15 cm (6 inches) of water in mid-June. Narrowleaf willow saplings on the north side of the survey areas, adjacent to the Virgin River, had been browsed by cattle (Figure A-9).

Bunkerville East Parcels 2-A through 2-G contained very little vegetation that resembled typical flycatcher or cuckoo breeding habitat. In 2021, however, a cuckoo was recorded immediately south of Bunkerville East Parcel 2-B in a patch of young narrowleaf willows; this area was not considered suitable cuckoo breeding habitat due to very small patch size. In 2024, a willow flycatcher was detected in the same area of young narrowleaf willows where a cuckoo was detected in 2021. In 2025, one unpaired territorial male flycatcher and one floater were detected in this same patch of narrowleaf willows. In 2026, two male flycatchers were detected on separate occasions in the same patch of narrowleaf willows; neither was detected during subsequent monitoring visits.

Three MSHCP covered species were recorded during point-count surveys at Bunkerville East Parcels 2-A through 2-G: Arizona Bell's vireo, blue grosbeak, and phainopepla. Arizona Bell's vireo was detected from three point-count locations, phainopepla was detected from two point-count locations, and blue grosbeak was detected from one point-count location. While blue grosbeak is considered a desert riparian obligate, the species is known to tolerate more open, scrubby habitat than can some of the other MSHCP riparian species (CCDCP and USFWS 2000).

4.2.2 Bunkerville East Parcel 2-N

Bunkerville East Parcel 2-N is approximately 120 m (394 feet) southwest of Bunkerville East Parcels 2-A through 2-G and was bordered by riparian vegetation on the north and west and agricultural land on the east and south. This site was last surveyed by SWCA in 2019. At that time, vegetation within the site consisted of 4- to 6-m-tall (13- to 20-foot tall) narrowleaf willows with tamarisk mixed in with the narrowleaf willows in the western central portion of the site, several small cattail patches, and emergent cottonwoods and Goodding's willows; canopy closure was 60% to 90% (McLeod et al. 2019a). The agricultural fields were in production in 2019, and the site received agricultural return flows, with up to 90% of the site inundated. In 2026, it was evident that the site had not received water in several years: a previously inundated pond in the southwestern portion of the site was dry, piles of narrowleaf willow deadfall were observed throughout the site, and most soils throughout the site were dry. Tamarisk was growing in the former pond (Figure A-10), and cottonwoods formed a sparse stringer with low (20%) canopy closure along the northern border of the survey area. Most cottonwoods north of the survey area were dead. Surface water was observed in late May in a patch of 4- to 5-m-tall (13- to 16-foot-tall) narrowleaf willows in the easternmost 100 m (328 feet) of the site just north of an irrigation return channel. Narrowleaf willows and an emergent Goodding's willow in this area were observed yellowing with sparse canopy closure in early August (Figure A-11). Tamarisk leaf beetles were first observed on-site in late June. No signs of livestock were observed on-site.

No willow flycatchers, cuckoos, or MSHCP covered or proposed covered avian species were detected at Bunkerville East Parcel 2-N.

4.3 Bunkerville West

4.3.1 Bunkerville West Parcels 2-I and 2-J

SWCA biologists have observed regular flooding adjacent to the Virgin River at Bunkerville West Parcels 2-I and 2-J, and some of the most abundant plants within these two parcels were small-diameter arrowweed and tamarisk less than 3 m (10 feet) tall (Figure A-12). Much of the area was relatively unvegetated. This is likely due, at least in part, to regular flood events, including flood events in the spring of 2019 and winter of 2022 to 2023.

Bunkerville West Parcels 2-I and 2-J had very few large native riparian trees, such as those used by flycatcher and cuckoo. Most of the mature riparian vegetation within these parcels consisted of 2- to 6-m-tall (7- to 20-foot-tall) tamarisk and screwbean mesquite without continuous canopy closure or nearby surface water. In early 2026, National Park Service biologists with the Lake Mead Inter-Regional Invasive Plant Management Team completed a tamarisk cut/stump treatment in the northeast corner of Bunkerville West Parcel 2-J (Norman 2026). Live tamarisk remained in Bunkerville West Parcel 2-I and the southwest corner of Bunkerville West Parcel 2-J. Despite many dead branches resulting from repeated defoliation by tamarisk leaf beetles, live portions of tamarisk were green and appeared to be in fair health in mid-May. While tamarisk can provide habitat for desert riparian bird species, much of the tamarisk at Bunkerville West Parcels 2-I and 2-J does not, due to dead branches and annual defoliation during avian nesting season (February 15 through August 31 in southern Nevada [Bureau of Land Management 2019]). Tamarisk leaf beetle adults and larvae were first detected in late May, and refoliating tamarisk was observed in early July. Cattle were observed on-site in mid-June, and recent cattle tracks were noted during surveys in early July; otherwise, no signs of recent cattle use were recorded.

Bunkerville West Parcels 2-I and 2-J had flowing channels, a pond, and a wet meadow/wetland with emergent vegetation, all of which could support native riparian habitat in the future. The pond, which is in the southwestern portion of Parcel 2-J, was inundated throughout the season. The wet meadow is in the east half of Parcel 2-J and was vegetated largely by sedges (Cyperaceae family) and wetland grasses, with scattered Goodding's willows. The wet meadow is unique within the County's reserve system and could be an area to target for riparian restoration. In 2026, one additional area adjacent to and west of the cattail marsh along the southern border was also inundated. This newly inundated area was approximately 80 × 180 m (262 × 591 feet) and held water throughout the season. Agricultural fields surrounding Bunkerville West Parcels 2-I and 2-J were not planted in 2025. An approximately 18-ha (45-acre) field was planted in 2026, and the newly inundated area in Parcel 2-J is believed to have been created by irrigation runoff from this field. Recent American beaver (*Castor canadensis*) activity and a small beaver pond inundated with approximately 0.5 m (1.5 feet) of water were observed on the west end of the cattail marsh in mid-May. Water levels in the Virgin River decreased throughout the season.

One small area surveyed for flycatcher and cuckoo consisted of 4- to 6-m-tall (13- to 20-foot-tall) tamarisk with 60% to 70% canopy closure (Figure A-13). A stream bed that had conveyed water through the survey area in previous years was dry.

No willow flycatchers or cuckoos were detected at Bunkerville West Parcel 2-I or 2-J.

One MSHCP covered bird species, phainopepla, was recorded at two of the four point-count locations at Bunkerville West Parcels 2-I and 2-J in 2026.

4.3.2 Bunkerville West Parcels 2-K Through 2-M

Bunkerville West Parcels 2-K, 2-L, and 2-M are immediately north of Bunkerville West Parcel 2-J (see Figure 4). Parcels 2-L and 2-M were characterized by isolated or narrow, or both, patches of riparian vegetation containing tamarisk, narrowleaf willows, and Goodding's willows. Patches of riparian vegetation were adjacent to areas that, in previous years, consisted of wet meadows, marshes, and open water features; these areas were dry in 2026.

Three disjunct areas were surveyed for flycatcher and cuckoo. One survey area consisted of 5- to 7-m-tall (16- to 23-foot-tall) Goodding's willows with a 4- to 6-m-tall (13- to 20-foot-tall) narrowleaf willow and tamarisk understory. In 2023, results from a thermal refugia study conducted across all Riparian Reserve Units under County Project No. 2023-SWCA-2325B showed that this survey area exhibited daily maximum temperature and mean relative humidity more closely resembling flycatcher breeding habitat than did any other area surveyed across the Riparian Reserve Units (SWCA 2023a). Through 2024, the overstory in this area was 8 to 12 m (26–39 feet) tall and provided 75% to 90 % canopy closure (Figure A-14). Through 2024, water was delivered to the agricultural fields adjacent to the survey area via an open irrigation channel, which intermittently overflowed and inundated the survey area. Between the 2024 and 2025 breeding seasons, the irrigation system was upgraded and an underground pipe was installed. No water flowed through the irrigation channel in 2025 or 2026. After 2 consecutive years of no water in this area, the Goodding's and narrowleaf willows in the south end of the survey area appeared dead, and canopy closure was reduced to 40% (Figure A-15). A small grove of 7-m-tall (23-foot-tall) Goodding's willow with 3-m-tall (10-foot-tall) tamarisk understory was present in the north end of this survey area.

The other two survey areas were adjacent to a pond in the southwest corner of Bunkerville West Parcel 2-M. From 2024 through 2026, the pond was observed to be drier each year; in 2026, no water or saturated soils were observed in the pond at any time during the season. Cattails in the west end of the dry pond were dead, while some of the cattails on the east end were alive. Cattails in the east end showed signs of being browsed by cattle (Figure A-16). A survey area on the north side of the pond consisted of 5- to 6-m-tall (16- to 20-foot-tall) narrowleaf willows with 45% to 55% canopy closure. Foliage appeared sparse and small, and some narrowleaf willows were dead. Some sapling narrowleaf willows were present along the southern edge of the survey area; many of these saplings showed signs of being browsed by cattle (Figure A-17). The remaining survey area, on the south side of the pond, consisted of 4- to 6-m-tall (13- to 20-foot-tall) tamarisk and screwbean mesquite with 2-m-tall (7-foot-tall) arrowweed scattered throughout the patch. Canopy closure in this survey area was 55% to 65%. Tamarisk leaf beetle larvae were first detected in late May, and tamarisk were turning brown in July. Cattle were observed on-site in mid-June, and fresh cattle sign was observed through early July.

Most mature vegetation at Parcels 2-K through 2-M outside surveyed areas consisted of 2- to 5-m-tall (7- to 16-foot-tall) tamarisk and screwbean mesquite with no continuous canopy closure or nearby surface water. An 8.5-ha (21.1-acre) patch of tamarisk in the northern portion of Bunkerville West Parcel 2-M was masticated in November 2025 (Clark County 2026b); in 2026, vegetation in this area consisted of small-diameter arrowweed and tamarisk. Other vegetation in Parcels 2-K through 2-M consisted primarily of riparian scrub dominated by arrowweed, and soils in these areas were generally dry (Figure A-18). Bunkerville West Parcels 2-K through 2-M do not currently provide breeding habitat for flycatcher or cuckoo.

In the spring of 2025, native vegetation, including screwbean mesquite, honey mesquite, cottonwood, ash (*Fraxinus* sp.), Goodding's willow, and narrowleaf willow, were planted at the Bunkerville West subunit (Goodwin 2025). Surveyors observed many of these plantings in Parcel 2-M. Most plantings appeared dead, presumably due to the lack of water observed in 2025 and 2026.

No willow flycatchers or cuckoos were detected during surveys at these parcels.

Two MSHCP covered species, Arizona Bell's vireo and blue grosbeak, were each recorded at one of the two point-count locations surveyed in 2026 at Bunkerville West Parcels 2-K through 2-M.

4.4 Riverside

Much like Bunkerville West Parcels 2-I and 2-J, Riverside Parcels 3-A and 3-B were composed mostly of the open, scrubby vegetation typically found in riparian areas that experience frequent flooding (Figure A-19). The Riverside subunit was subjected to substantial seasonal runoff associated with above-average winter precipitation in the Virgin River watershed in 2019 and 2023. Each flood event removed portions of large, contiguous patches of tamarisk.

One area was surveyed for cuckoo. This area consisted of 3- to 8-m-tall (10- to 26-foot-tall) honey and screwbean mesquite (Figure A-20). No cuckoos were detected in 2026. Habitat within the site boundary and surrounding the survey area consisted of large areas of dense 2-m-tall (7-foot-tall) arrowweed, large areas of relatively contiguous 3- to 4-m-tall (10 to 13-foot-tall) tamarisk with canopy closure less than 50%, and a less-than-5-m-wide (less-than-16-foot-wide) strip of 3- to 4-m-tall (10- to 13-foot-tall) narrowleaf willows along an irrigation ditch. Mule-fat up to 2 m (7 feet) tall were scattered throughout the site. A few centimeters of water flowed through the northern third of the site from the irrigation ditch on the east and pooled along the western boundary (Figures A-21 and A-22). Inundated and saturated soils were present along the western border of the north half of the site. The south half of the site was dry.

The Riverside subunit did not contain vegetation that resembles typical cuckoo breeding habitat. The patch of narrowleaf willows along the irrigation ditch was not wide enough to provide suitable breeding habitat, and the patches of tamarisk were dry and open and did not provide the canopy closure required for cuckoo nesting habitat. However, cuckoos were detected in the mesquite bosque in each of the previous 3 years (2023–2025), indicating that the area may provide foraging habitat for cuckoo. In 2026, no cuckoos were detected.

Three MSHCP covered avian species were recorded at the Riverside subunit: Arizona Bell's vireo, blue grosbeak, and phainopepla. Arizona Bell's vireo was detected at all five point-count locations, blue grosbeak was detected at three point-count locations, and phainopepla was detected at one point-count location. Arizona Bell's vireo is a desert riparian obligate. This species can also occupy dense mesquite habitat, and Arizona Bell's vireos were regularly heard singing and seen foraging in screwbean and honey mesquite at the Riverside subunit. The MSHCP identifies blue grosbeak and phainopepla as capable of occupying habitat other than desert riparian, and blue grosbeak can occupy open riparian habitat (CCDCP and USFWS 2000). Phainopepla prefers shrub- or mesquite-dominated habitats and depends heavily on the berries of mistletoe (*Phoradendron* spp.) that grows on mesquite. Riverside Parcels 3-A and 3-B have a relatively abundant population of screwbean and honey mesquite compared to the other Riparian Reserve subunits.

4.5 Mormon Mesa

For several decades, Parcel 5-A in the Mormon Mesa subunit was largely dominated by monotypic tamarisk. However, much of this vegetation was dying or dead as the result of defoliation by tamarisk leaf beetles. In 2018 and 2020, the County masticated a total of 16.3 ha (40.3 acres) of dead tamarisk; these areas of masticated tamarisk were excluded from flycatcher and cuckoo surveys (Figure A-23; see Figure 6). Narrow patches of mostly dead and dying tamarisk remained outside the masticated area along the eastern and southern boundary of the Mormon Mesa subunit, but these areas did not provide the

vegetative or hydrologic conditions used by nesting flycatcher or cuckoo. Vegetation observed growing in the masticated area included screwbean mesquite, mule-fat, arrowweed, big saltbush, and pickleweed (*Salicornia* sp.).

One flycatcher and cuckoo survey area consisted of clumps of 4-m-tall (13-foot-tall) narrowleaf willows and tamarisk with scattered, emergent 6- to 14-m-tall (20- to 46-foot-tall) Goodding's willows (Figure A-24). Approximately 30% of the standing tamarisk was dead, and some clumps had fallen, creating large piles of deadfall. Some areas surrounding the dead tamarisk had begun to fill in with 2-m-tall (7-foot-tall) arrowweed. Canopy closure ranged from 20% in areas consisting of only tamarisk to 80% in areas with willow overstory. Water levels in the Virgin River decreased throughout the season. Within the surveyed area, soils in small areas were inundated with a few centimeters of water in late May and most other soils were damp. Soil moisture levels on-site decreased throughout the season, and the site was dry to damp in June. Tamarisk leaf beetle larvae and adults were first detected in late May. Of the live tamarisk, approximately 75% was green and 25% was brown in early July. Cattle were observed in the survey area throughout the season.

An approximately 5-ha (13-acre) patch of screwbean mesquite and arrowweed shrubland was present in the southwest corner of this subunit (see Figure 6); this area was surveyed for cuckoo. This survey area contained 3- to 6-m-tall (10- to 20-foot-tall) screwbean and honey mesquite with canopy closure ranging from 30% to 65%. Some of the mesquite trees in this area, particularly in the western and northeastern portions, were dead or in poor condition. Live mesquite trees in the western portion of the survey area were less than 3 m (10 feet) tall. Tamarisk and Goodding's willows up to 3 m (10 feet) tall and mule-fat up to 2 m (7 feet) tall were scattered throughout the survey area. A stringer of 10-m-tall (33-foot-tall) Goodding's willows was present along the northwestern border of the survey area. Soils in this survey area were dry and sandy.

Seven restoration plots are scattered throughout the west half of the Mormon Mesa subunit; in 2014, the County cleared tamarisk and planted native vegetation within these plots (Figures A-24 and A-25). SWCA biologists first observed cattle within multiple restoration plots at the Mormon Mesa subunit in 2021. Cattle activity increased in 2022 through 2025 as access to the restoration plots became easier, and cattle and associated browsing and trampling of the vegetation were routinely recorded in and around the restoration plots in 2025 and 2026 (Figures A-26 and A-27).

No flycatchers were detected at Mormon Mesa in 2026. Despite the lack of nesting attempts within the Mormon Mesa Parcel 5-A boundary in 2021 through 2026, the northwest corner of the parcel contained large Goodding's willows and small patches of narrowleaf willows and appeared suitable for flycatcher, providing similar canopy height and canopy closure to conditions recorded when nesting last occurred in the area in 2020. Within restoration area B (see Figure 6), some narrowleaf willows have died and Goodding's willows have grown taller; consequently, dense branching structure at heights conducive to flycatcher nesting has been reduced. Hydrologic conditions were generally drier throughout the site in 2025 and 2026 than in previous years, as well as drier than when flycatcher nesting was last recorded on-site. Two cuckoo detections were recorded; one detection was recorded during a survey, and one was incidentally recorded.

While tamarisk can provide habitat for desert riparian species, the dead or dying tamarisk at the Mormon Mesa subunit has less benefit to wildlife than does native vegetation or live tamarisk. The dying monotypic tamarisk stands at Mormon Mesa provide less concealment from predators and are relatively hot and dry compared to living vegetation. Reduced canopy closure results in decreased thermal protection for eggs and nestlings (McLeod 2019). McLeod and Pellegrini (2013) showed that occupied breeding habitat for flycatcher exhibited >90% median canopy closure along the Virgin River between

2003 and 2011. However, despite much of the subunit appearing to be in poor health, there are still patches of mature native vegetation that should be protected.

In addition to cuckoo, three other MSHCP covered species were recorded at the Mormon Mesa subunit: Arizona Bell's vireo, blue grosbeak, and phainopepla. Each species was detected from one of three point-count locations surveyed in 2026. One MSHCP proposed covered species, loggerhead shrike, was incidentally detected.

4.6 Mormon Mesa South

A backwater slough, which appears to have been created by floods or American beaver activity, or both, is present along the eastern edge of the Mormon Mesa South subunit (Figure A-28, see Figure 12). Portions of the site away from the point-count locations in Parcels 6-A and 6-B were not visited in 2026. When these portions of the site were last observed in 2024, narrow patches of 3- to 4-m-tall (10- to 13-foot-tall) narrowleaf willows, common reed, and cattails were present along the edge of the slough and provided canopy closure of less than 50%. As observed from the point-count locations and river edge, much of the vegetation in the site was similar to that of the Mormon Mesa subunit: dead or dying 3- to 4-m-tall (10- to 13-foot-tall) tamarisk with 8- to 12-m-tall (26- to 39-foot-tall) Goodding's willows scattered in low numbers throughout the parcels (Figure A-29). Mesquite trees were present along the western edge of the parcels.

Like the tamarisk at the Mormon Mesa subunit, the dead or dying tamarisk at the Mormon Mesa South subunit has less benefit to wildlife than does native vegetation or live tamarisk. When last observed in 2024, the narrowleaf willows along the edge of the slough lacked the height, density, and areal extent of typical flycatcher or cuckoo breeding habitat. No flycatcher or cuckoo surveys were conducted in 2026.

One MSHCP covered species, Arizona Bell's vireo, was recorded at the Mormon Mesa South subunit. This species was recorded from one of two point-count locations surveyed.

4.7 Muddy River

Vegetation at the Muddy River Reserve Unit was highly diverse. Parcels A through E were dominated by horticultural plantings (e.g., pine [*Pinus* sp.], California fan palm [*Washingtonia filifera*], and oak [*Quercus* sp.]), creosote bush (*Larrea tridentata*) scrubland, and big saltbush (Figures A-30 and A-31); two areas were surveyed for cuckoo in these parcels. California fan palms adjacent to the Muddy River were removed between the 2025 and 2026 cuckoo survey seasons. California fan palms in Parcel B were treated with a drill and fill method between the 2025 and 2026 survey seasons (Norman 2026); these trees were standing dead in 2026 (Figure A-32). Canopy closure ranged from 0% in forest openings to 90% where the trees formed clumps. Parcel F was dominated almost completely by creosote bush scrub, with small (≤40-m × 40-m [≤131-foot × 131-foot]) patches of honey mesquite, particularly in the central and southeastern portions of the parcel (Figures A-33 and A-34). One area was surveyed for cuckoo in Parcel F; this area consisted of 3- to 5-m-tall (10- to 16-foot-tall) honey mesquite with ≥65% canopy closure. Parcels G through I were composed largely of very dense thickets of big saltbush and Mojave seablite (*Suaeda moquinii*) mixed with scattered honey mesquite and tamarisk (Figure A-35). Although the Muddy River runs near the Muddy River Reserve Unit, it does not run through any of the southern parcels and only forms the eastern boundary of Parcels A through E. This portion of the Muddy River is deeply incised, and desert riparian vegetation, consisting of widely scattered tamarisk, narrowleaf willows, and velvet ash, was generally limited to within approximately 2 m (7 feet) of the riverbank (Figure A-36).

No cuckoos were detected during surveys at Muddy River in 2026.

Three MSHCP covered bird species were recorded at the Muddy River Reserve Unit in 2026: Arizona Bell's vireo, blue grosbeak, and phainopepla. Arizona Bell's vireo was detected from two point-count locations, while blue grosbeak and phainopepla were each detected from one point-count location. One MSHCP proposed covered bird species, loggerhead shrike, was incidentally detected. Most of the desert riparian obligate birds were not detected (e.g., flycatcher) or were detected in low numbers (e.g., song sparrow and northern yellow warbler) in the Muddy River Reserve Unit, which is not surprising given the lack of riparian habitat at this property.

4.8 Boulder City Conservation Easement

Mojave Desert scrub, which is co-dominated by creosote bush and burrobush (*Ambrosia dumosa*), is the dominant vegetation community across the Mojave Desert, and this community covers over 97% of the BCCE (Clark County 2023a). Most point-count survey locations at the BCCE are within this habitat type (Figures A-37 and A-38). The remainder of the BCCE is composed of salt desert scrub (1.5%), mesquite/acacia (*Senegalia* spp.) habitat (less than 1%), and previously disturbed habitat (Clark County 2023a). A few point-count locations were in areas of moderately dense cholla (*Cylindropuntia* spp.) or desert wash habitat (Figure A-39).

The BCCE Management Plan identified that no MSHCP covered avian species are known to occur within the BCCE (Clark County 2023a). During the initial site reconnaissance and point-count surveys of the BCCE in 2018, biologists did not observe any habitat, including desert riparian habitat, that could be considered suitable breeding habitat for the MSHCP covered avian species. Single phainopepla were recorded at two of the point-count locations in 2019 and 2022. No MSHCP covered species were detected during point counts at the BCCE in 2026. Two proposed covered species, LeConte's thrasher and loggerhead shrike, are known to occur within the BCCE (Clark County 2023a); these two species have been recorded at the BCCE every year since 2018, and they were detected from one point-count location each in 2026 (see Table 11).

4.9 Timing of Brown-Headed Cowbird Netting

In addition to the cowbird netting conducted at Mesquite West, SWCA conducted cowbird netting in previous seasons at other study areas where flycatcher breeding was known to occur. Cowbird netting was conducted at two study areas (Key Pittman Wildlife Management Area [Key Pittman WMA] and Warm Springs Natural Area [Warm Springs]) in 2023 and five study areas (Key Pittman WMA, River Ranch, Meadow Valley Wash, Overton Wildlife Management Area [Overton WMA], and Warm Springs) in 2024. Netting was conducted once per week at each study area in mid-May through July.

At Mesquite, netting occurred only once per week in 2021. In 2022 and 2023, the frequency of netting attempts was increased to twice per week in May, and netting started earlier than in 2021, allowing for five more netting attempts through May 31. In 2024 through 2026, the netting start date was earlier than in all previous years, allowing for one additional netting attempt through May 31. From 2021 through 2024, earlier start dates each year coincided with an increased proportion of the total number of females captured at Mesquite being captured in May (Table 13). Netting at all other study areas began in mid-May in 2023 and 2024. Data from each of these study areas showed that a substantial proportion (50% to 100%) of females were captured through May 31.

The number of females captured per net-hour during each month across all netting years in which SWCA conducted cowbird netting in Southern Nevada is shown in Table 14. Across all years and study areas, the average number of female cowbirds captured per net-hour decreased from May through July. Conducting intensive cowbird netting in May, when the number of female cowbirds captured per net-hour is highest,

Table 1. Female Cowbird Captures Occurring Through May 31 at Southern Nevada Study Areas, 2021–2026

Study Area*	Year	Netting Start Date	Number of Netting Visits Through May 31	Number of Females Captured Through May 31	Total Number of Females Captured	% of Females Captured Through May 31
MESQ†	2021	May 15	2	4	14	29
MESQ†	2022	May 11	7	5	11	45
MESQ†	2023	May 9	7	2	4	50
MESQ†	2024	May 7	8	7	10	70
MESQ†	2025	May 5	8	9	18	50
MESQ†	2026	May 4	8	2	4	50
KEPI	2023	May 15	4	4	7	57
KEPI	2024	May 15	6	6	8	75
RIRA	2024	May 15	6	4	6	67
MVWA	2024	May 14	6	1	1	100
MUDD	2024	May 14	6	5	10	50
WMSP	2023	May 16	4	6	10	60
WMSP	2024	May 16	6	6	7	86

* KEPI = Key Pittman WMA, MESQ = Mesquite, MUDD = Overton WMA, MVWA = Meadow Valley Wash, RIRA = River Ranch, and WMSP = Warm Springs

† Data were collected under contract with the County (SWCA 2021, 2022, 2023a, 2024a, 2025).

Table 14. Number of Female Cowbirds Captured per Net-hour by Month at All Southern Nevada Study Sites, 2021–2026

Study Area*	Year	May	June	July†
MESQ	2021	1.82	0.69	0.48
MESQ	2022	0.40	0.49	0.30
KEPI	2023	0.50	0.33	0.19
MESQ	2023	0.17	0.15	0.13
WMSP	2023	0.86	0.43	0
KEPI	2024	0.72	0.33	0
MESQ	2024	0.47	0.33	0.14
MUDD	2024	0.39	0.65	–
MVWA	2024	0.07	0	–
RIRA	2024	0.39	0.17	0.18
WMSP	2024	0.52	0	0.15
MESQ	2025	0.48	0.60	0.34
MESQ	2026	0.14	0.11	0.11
Mean (SE)‡		**0.53 (0.12)**	**0.33 (0.07)**	**0.18 (0.04)**

* KEPI = Key Pittman, MESQ = Mesquite, MUDD = Overton Wildlife Management Area, MVWA = Meadow Valley Wash, RIRA = River Ranch, WMSP = Warm Springs

† A dash indicates that no cowbird netting was conducted during the month of July.

‡ SE = standard error

allows the greatest chance of removing female cowbirds from flycatcher habitat before cowbirds have an opportunity to parasitize flycatcher nests.

4.10 Brown-Headed Cowbird Control and Southwestern Willow Flycatcher Nest Success

Following continued high parasitism rates and 100% failure of flycatcher nests at Mesquite West in 2020, SWCA implemented a target-netting program for cowbirds at Mesquite West in 2021; this program continued through 2026. The goal of this program was to reduce the incidence of parasitism on flycatcher nests and improve flycatcher nest success. SWCA was successful in target netting cowbirds in 2026, and four female cowbirds were removed (Table 15). No nests were parasitized; therefore, no egg addling, egg replacement, or nestling removal were necessary (see Table 15).

Table 15. Cowbird Control by Method Used, Cowbird Parasitism, and Flycatcher Productivity at Mesquite West, 2019–2026

Year	Parasitism Rate (%)	Cowbird Control Method*				Nest Success (%)
		Target Netting (no. females removed)	Egg Addling (no. CE† addled)	Egg Replacement (no. CE† replaced with fake egg)	Nestling Removal (no. CN‡ removed)	
2019	50	–	–	–	–	44
2020	40	–	1	–	0	0
2021	50	14	3	–	0	33
2022	22	11	1	1	1	78
2023	8	4	0	1	0	46
2024	9	10	0	0	0	58
2025	13	18	0	1	0	50
2026	0	4	0	0	0	50

***** A dash indicates that SWCA was not permitted to conduct that method in that year; thus, the method was not practiced.

† CE = cowbird egg.

‡ CN = cowbird nestling.

Prior to the implementation of cowbird target netting in 2021, the parasitism rate of flycatcher nests at Mesquite West was 50% in 2019 and 40% in 2020 (see Table 15). Data from Mesquite West in 2016 through 2020 show a range in parasitism rate from 40% to 67%, with an average of 55% (Table 16) (SWCA 2019b, 2020). In 2021, despite the implementation of the combined-method cowbird control program, 50% of flycatcher nests at Mesquite West were parasitized. This parasitism rate seemed to indicate that cowbird control efforts were initially unsuccessful in reducing parasitism rates. The combined-method cowbird control program continued, and in 2022, 22% of flycatcher nests were parasitized. In 2023, the parasitism rate at Mesquite West reached an all-time low of 8%. In 2024 and 2025, the parasitism rate remained low (9% and 13%, respectively). The parasitism rate during years (2021–2026) when combined-method cowbird control was implemented ranged from 0 to 50% and averaged 17%.

At Mesquite West in 2016 through 2020, prior to implementation of the cowbird netting program, nest success, productivity, and fecundity averaged 16%, 0.43 fledglings produced per nest, and 0.64 fledglings produced per female, respectively (see Table 16). In 2021 through 2026, during the cowbird netting

program, nest success, productivity, and fecundity averaged 53%, 1.13 fledglings produced per nest, and 1.59 fledglings produced per female, respectively. Though these metrics have been variable between years, all three metrics were higher during the combined-method cowbird control program than prior to the implementation of the combined-method cowbird control program.

Though fecundity at Mesquite West improved during the cowbird netting period, the average of 1.59 young produced per female fell short of being considered a self-sustaining population. An average annual fecundity of approximately 2.0 is required for a population to be self-sustaining (SWCA 2019b).

Table 16. Cowbird Parasitism Rates, Nest Success, Number of Fledglings, and Fecundity at Mesquite West, 2016–2026

	Year	No. Nests	% Parasitism	% Nest Success	Productivity	Fecundity
Pre-netting	2016*	4	50.00	25.00	1.33	2.00
	2017*	8	66.67	12.50	0.17	0.2
	2018†	5	66.67	0	0.00	0
	2019	9	50.00	44.44	0.63	1.00
	2020	6	40.00	0	0.00	0
Netting	2021	8	50.00	33.33	0.50	1.00
	2022	11	22.22	77.78	1.63	1.83
	2023	13	8.33	46.15	0.85	1.38
	2024	12	9.09	58.33	1.64	2.83
	2025	10	12.50	50.00	0.80	1.00
	2026	8	0	50.00	1.29	1.50
Pre-netting period mean (SE)‡			54.67 (5.23)	16.39 (8.41)	0.43 (0.25)	0.64 (0.39)
Netting period mean (SE) ‡			17.02 (7.22)	52.60 (6.04)	1.13 (0.16)	1.59 (0.25)

Note: Number of nests includes all nesting attempts. Percent parasitism is calculated using only nests for which contents could be determined. Percent nest success is calculated using only nests in which at least one flycatcher egg was laid. Productivity indicates the average number of confirmed fledglings per nest that contained flycatcher eggs and had a known outcome. Fecundity indicates the average number of young fledged over the breeding season per female for which all nest outcomes were known. Data for the pre-netting period (2016–2020) are from the NDOW (unpublished data) and SWCA.

* Irregular monitoring was completed by the NDOW.

† Irregular monitoring was completed by the NDOW, and surveys were completed by the County.

‡ SE = standard error

Parasitism rates, flycatcher nest success, productivity, and fecundity were compared between the pre-netting and netting periods; for each test, $P < 0.05$ was used to reject the null hypothesis. Flycatcher nest success (one-tailed Fisher's exact test, $P = 0.006$), productivity (two-sample t-test assuming unequal variances, degrees of freedom [*df*] = 8, $t = 2.17$, $P = 0.031$), and fecundity (two-sample t-test assuming unequal variances, $df = 8$, $t = 1.99$, $P = 0.041$) were significantly higher across the 6 years in which combined-method cowbird control was conducted (2021–2026) than in the previous 5-year period when no cowbird netting occurred (2016–2020) at Mesquite West; cowbird parasitism (one-tailed Fisher's exact test, $P = 0.001$) was significantly lower across the same 5-year cowbird netting period (2021–2026) than during the previous 5 years (2016–2020). An odds ratio of 4.1 was calculated using the Fisher's exact test using nest success data; this odds ratio indicates that a nest was 4.1 times more likely to be successful during the netting period than during the 5-year pre-netting period. An odds ratio of 6.6 was calculated using the Fisher's exact test using parasitism data; this odds ratio indicates that parasitism was 6.6 times more likely to occur during the 5-year pre-netting period than during the netting period.

Data from the cowbird netting period (2021–2026) were also compared to data across all pre-netting years (2003–2020) in which flycatcher monitoring at Mesquite West was conducted by SWCA or the NDOW. Nest success (one-tailed Fisher's exact test, $P = 0.03$), productivity (two-sample t-test assuming unequal variances, $df = 10$, $t = 2.10$, $P = 0.03$), and fecundity (two-sample t-test assuming unequal variances, $df = 9$, $t = 2.40$, $P = 0.02$) were significantly higher during the netting period than the 2003 through 2020 pre-netting period. Parasitism (one-tailed Fisher's exact test, $P = 0.001$) was significantly lower during the netting period than during the 2003 through 2020 pre-netting period.

The statistical significance of these metrics provides evidence that the combined-method cowbird control program plays a role in reducing parasitism rates in Mesquite West, as well as increasing nest success, productivity, and fecundity.

5 CONCLUSION

Five MSHCP covered and two MSHCP proposed covered bird species were recorded at the County's reserve system properties in 2026. Intensive flycatcher monitoring and cowbird control were continued. Some notable conclusions about this year's efforts and the habitats at the County's properties are listed below.

- Flycatcher monitoring resulted in documentation of seven pairs at Mesquite West, of which six were confirmed to be nesting. The six nesting pairs had eight nesting attempts, four of which were successful and produced nine fledglings.
- SWCA successfully target netted nine adult cowbirds (four female, five male) at Mesquite West; the female cowbirds were subsequently euthanized.
- Combined-method cowbird control began in 2021; the parasitism rate of flycatcher nests at Mesquite West was 50% in that year. Combined-method cowbird control continued in 2022 through 2026, and the parasitism rates were 22%, 8%, 9%, 13%, and 0%, respectively. The 0% parasitism rate in 2026 was the lowest parasitism rate ever recorded by SWCA at the site. Flycatcher nest success (one-tailed Fisher's exact test, $P = 0.006$), productivity (two-sample t-test assuming unequal variances, degrees of freedom [df] = 8, $t = 2.17$, $P = 0.031$), and fecundity (two-sample t-test assuming unequal variances, $df = 8$, $t = 1.99$, $P = 0.041$) were significantly higher across the 6 years in which combined-method cowbird control was conducted (2021–2026) than in the previous 5-year period when no cowbird netting occurred (2016–2020) at Mesquite West; cowbird parasitism (one-tailed Fisher's exact test, $P = 0.001$) was significantly lower across the same 5-year cowbird netting period (2021–2026) than during the previous 5 years (2016–2020). The statistical significance of these metrics provides evidence that the combined-method cowbird control program has reduced parasitism rates in Mesquite West, as well as increased flycatcher nest success, productivity, and fecundity.
- Three flycatcher nests failed at Mesquite West; depredation was the cause of failure for all three of these nests. Many animals are known to depredate bird nests, including several avian species (such as cowbirds), snakes, raccoons, and small rodents. The species of nest predators that depredated flycatcher nests at Mesquite West are unknown.
- No flycatchers were detected at Mormon Mesa; no monitoring was conducted at that site.
- Two flycatchers were detected just south of Bunkerville Parcel 2-B. This is the second consecutive year in which flycatchers were detected in the same area.
- Five cuckoo detections were recorded at the Riparian Reserve Units: three detections were recorded during cuckoo surveys, and two cuckoo detections were incidentally recorded.

Detections across two survey periods at Mesquite Parcel 1-A indicate a possible breeding territory. Detections in one survey period at Mormon Mesa Parcel 5-A do not provide enough evidence to draw conclusions about breeding status at that site.

- Cattle exclusion from portions of Bunkerville West Parcel 2-J appeared to be successful in 2026. Cattle were observed on-site, but not in areas where efforts have been made to exclude cattle.
- Cattle were observed at Bunkerville West Parcel 2-M during a flycatcher survey in June, including one individual in the survey area in the southeastern corner of the parcel. Cattle sign was observed on-site during subsequent surveys. Continued cattle exclusion efforts at this patch of vegetation would prevent further destruction of narrowleaf willow habitat and allow for habitat maintenance, enhancement, and restoration.
- A lack of water in the southeast corner of Bunkerville West Parcel 2-M, where microclimate data collected in 2023 showed that conditions were similar to those recorded at flycatcher nests, has resulted in death of Goodding's willows in this area; the survey area is no longer suitable for flycatchers.
- Biologists recorded two MSHCP proposed covered species at the BCCE in 2026: LeConte's thrasher and loggerhead shrike. In 2026, a group of four LeConte's thrashers were observed together on May 10. Although fledglings could not be confirmed, the observation of four LeConte's thrashers together strongly suggests a family group. Although LeConte's thrasher breeding could not be confirmed within the BCCE during recent point-count surveys, this species is known to breed at the BCCE as several active nests were incidentally recorded in 2019 and 2020.
- Biologists recorded five MSHCP covered species at the Riparian Reserve Units in 2026: Arizona Bell's vireo, blue grosbeak, phainopepla, flycatcher, and cuckoo. One MSHCP proposed covered species, loggerhead shrike, was incidentally detected.

Aggressive efforts are likely required to restore, create, and enhance additional habitat for most of the MSHCP avian species at the County's Riparian Reserve Units. Continued monitoring of avian populations before, during, and after the restoration process is needed to document restoration success within the County's properties. Recommendations to achieve these objectives are detailed in the following section.

6 RECOMMENDATIONS

The following recommendations are based on observations from the 2026 avian surveys and factors discussed in this report. These actions would support the County's long-term goals for the Riparian Reserve Units and the BCCE in Clark County:

- As directed by the *Clark County Desert Conservation Program Riparian Reserve Units Management Plan* (Clark County 2023b), the County should continue to purchase parcels along the Virgin and Muddy Rivers, particularly available parcels adjacent to the existing Riparian Reserve Units (if possible), and attempt to purchase parcels along the Meadow Valley Wash.
- Tamarisk that has been killed or has suffered substantial dieback from tamarisk leaf beetles provides little benefit to avian species that require at least some degree of canopy closure for nesting. The County should begin or continue the removal of dead or dying tamarisk from all its Riparian Reserve subunits, provided that tamarisk removal is immediately followed by planting of native vegetation, such as willow and Fremont cottonwood, in suitable areas (SWCA 2017c).

- Additional native species plantings, such as those planted in early 2025 at Bunkerville West, should be considered and are encouraged around existing native habitats. To protect native plants, any plantings, particularly willows, should be protected with cattle exclusion fencing.
- Coordination with the City of Mesquite, Coyote Willows Golf Course, and Casablanca Golf Course may be beneficial in directing more water flow into Mesquite Parcel 1-A. Human-caused water diversions were observed in 2025 and 2026; water in Pulsipher Wash was diverted from the eastern channel to the west approximately 100 m (328 feet) north of the Parcel 1-A boundary. Surface water was limited to the northwest quarter of the site, and areas outside the northwest quarter were generally damp to dry. A 2024 flycatcher nesting area along the west-central border of Parcel 1-A that was inundated and muddy in 2024 was dry in 2025 and 2026.
- Cattle have been observed at all the Riparian Reserve subunits except Muddy River; they should be inhibited from foraging on native plantings, wherever practicable. Cattle exclusion fencing should be erected in any area where native trees are newly planted or planned for planting. At parcels where fencing already exists, such as portions of Mormon Mesa and Bunkerville West Parcels 2-J and 2-M, the County should make sure that all fences and gates are maintained and in proper working order. At Mormon Mesa, cattle have bypassed incomplete or ineffective fencing; maintenance of existing fencing and erection of additional perimeter fencing could prevent future breaches into the parcel.
- The County could plant facultative species such as honey and screwbean mesquite in floodplain areas that lack the hydrology required to support facultative wetland species like willow or cottonwood. Portions of the Riparian Reserve Units are susceptible to scouring floods, as evidenced by conditions recorded in 2019 and 2023. Any restoration plan should take this into account by limiting plantings in flood-prone areas or taking steps to protect planted areas from floods. The potential to create mature habitats at these sites may be limited by the flood risk.
- Because the Virgin River Riparian Reserve Unit is within designated critical habitat for flycatcher, restoration plans should be designed in coordination with the USFWS.
- Avian point counts and species-specific surveys should be continued to help build on baseline data and to track changes in avian populations throughout the land management, restoration, and post-implementation processes. These surveys should use the protocols established for this project to ensure datasets are standardized and comparable.
- If cowbird target netting is employed during future years, netting concentrated during the early part of the flycatcher breeding season when capture rates are highest may ensure that a significant portion of the female cowbirds removed from the site are removed prior to the onset of the flycatcher nesting period and may result in continued higher flycatcher nest success, productivity, and fecundity.
- A combined-method cowbird control program including target netting should be implemented at other known flycatcher breeding sites in Clark County in an attempt to improve flycatcher nesting metrics across southern Nevada.
- Breeding habitat for the MSHCP covered bird species is currently limited or non-existent within the BCCE. Habitat for phainopepla could be created or enhanced with the establishment of more mesquite/acacia habitat, as long as that habitat also includes mistletoe, a required food source for phainopepla. One phainopepla was recorded at the BCCE during both the 2019 and 2022 point counts.

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APPENDIX A

Site Photographs



Figure A-1. Typical narrowleaf willows, Mesquite Parcel 1-A, August 8, 2026.



Figure A-2. Typical narrowleaf willows and tamarisk, Mesquite West, July 26, 2026.



Figure A-3. Overview of green tamarisk, Mesquite West West, June 8, 2026.



Figure A-4. Overview of brown tamarisk, Mesquite West West, July 1, 2026.



Figure A-5. Sandy soil with small-diameter tamarisk and arrowweed, Bunkerville East Parcel 2-D, May 9, 2026.



Figure A-6. Masticated tamarisk, Bunkerville East Parcel 2-E, July 26, 2026.



Figure A-7. Tamarisk, Bunkerville East Parcel 2-G, August 3, 2026.



Figure A-8. Narrowleaf willows, Goodding's willows, and mesquite, Bunkerville East Parcel 2-G, August 3, 2026.



Figure A-9. Vegetation trampled and browsed by cattle at river's edge, Bunkerville East Parcel 2-G, August 3, 2026.



Figure A-10. Dry pond with sapling tamarisk, Bunkerville East Parcel 2-N, April 29, 2026.



Figure A-11. Yellow tamarisk and Goodding's willows, Bunkerville East Parcel 2-N, August 3, 2026.



Figure A-12. Sapling arrowweed and tamarisk, Bunkerville West Parcel 2-I, May 11, 2026.



Figure A-13. Tamarisk at a flycatcher and cuckoo survey area, Bunkerville West Parcel 2-I, August 3, 2026.



Figure A-14. Overview of Goodding's and narrowleaf willow patch, Bunkerville West Parcel 2-M, June 21, 2022.



Figure A-15. Dead or dying Goodding's willows, Bunkerville West Parcel 2-M, August 3, 2026.



Figure A-16. Cattle-browsed cattails, Bunkerville West Parcel 2-M, August 3, 2026.



Figure A-17. Cattail and narrowleaf willows trampled and browsed by cattle, Bunkerville West Parcel 2-M, August 3, 2026.



Figure A-18. Arrowweed and tamarisk scrub with dry soils, Bunkerville West Parcel 2-M, May 11, 2026.



Figure A-19. Riparian scrub, Riverside Parcel 3-A, August 5, 2026.



Figure A-20. Honey and screwbean mesquite survey area, Riverside Parcel 3-A, August 5, 2026.



Figure A-21. Inundated mesquite and mule-fat in cuckoo survey area, Riverside Parcel 3-A, July 22, 2026.



Figure A-22. Water pooling at edge of cuckoo survey area, Riverside Parcel 3-A, August 5, 2026.



Figure A-23. Masticated tamarisk area at Mormon Mesa Parcel 5-A, April 30, 2026.



Figure A-24. Example habitat within Mormon Mesa Parcel 5-A restoration plot, May 23, 2017.



Figure A-25. Example habitat within Mormon Mesa Parcel 5-A restoration plot, June 21, 2017.



Figure A-26. Example habitat within Mormon Mesa Parcel 5-A restoration plot, July 5, 2026.



Figure A-27. Example habitat within Mormon Mesa Parcel 5-A restoration plot, July 5, 2026.



Figure A-26. Backwater slough along Mormon Mesa South subunit eastern boundary, May 15, 2022.



Figure A-27. Dead or dying tamarisk, Mormon Mesa South Parcel 6-A, April 30, 2026.



Figure A-30. Planted oak trees with big saltbush, Muddy River Parcel B, August 5, 2026.



Figure A-31. Pine plantings, Muddy River Parcel A, August 5, 2026.



Figure A-32. Standing dead California fan palms after drill and fill treatment, Muddy River Parcel B, May 12, 2026.



Figure A-33. Creosote bush scrub, Muddy River Parcel F, May 13, 2026.



Figure A-34. Honey mesquite, Muddy River Parcel F, August 5, 2026.



Figure A-35. Mesquite and Mojave seablite–dominated area, Muddy River Parcel H, May 13, 2026.

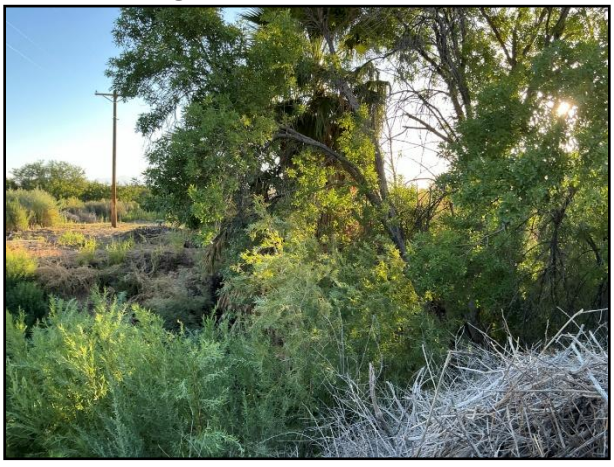


Figure A-36. Riparian habitat at edge of Muddy River, Muddy River Parcel E, August 5, 2026.



Figure A-37. Creosote bush and burrobush at BCCE point-count location 29, March 25, 2026.



Figure A-38. Creosote bush and burrobush at BCCE point-count location 15, April 16, 2026.



Figure A-39. Dense cholla at BCCE point-count location 33, March 25, 2026.