Appendix D

Avian Survey Report for the Mulqueeney Ranch Wind Repowering Project

AVIAN SURVEY REPORT FOR THE MULQUEENEY RANCH WIND REPOWERING PROJECT

FINAL

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Contents

Tables and Figures

Acronyms and Abbreviations

APWRA	Altamont Pass Wind Resource Area
AUC	avian use count
CDFW	California Department of Fish and Wildlife
EUC	eagle use count
km	kilometer
m	meter
Mulqueeney	Mulqueeney Wind, LLC
MW	megawatt
PG&E	Pacific Gas and Electric Company
project or proposed project	Mulqueeney Ranch Wind Repowering Project
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

Chapter 1
Introduction

Mulqueeney Wind, LLC (Mulqueeney), a subsidiary of Brookfield Renewables, is conducting avian surveys and assessments in support of the proposed Mulqueeney Ranch Wind Repowering Project (project or proposed project). The project is located within the Altamont Pass Wind Resource Area (APWRA), south of Interstate 580 and roughly straddling Patterson Pass Road in northeastern Alameda County (Figure 1).

This report summarizes avian surveys, assessments, and incidental observations by ICF biologists between mid-June 2019 and mid-June 2020 in the project area or vicinity.

- Avian use surveys using fixed point, 200-meter (m) radius plots.
- Eagle use point count surveys using fixed point, 800 m radius plots.
- An assessment of raptor nesting and perching habitat.
- Ground surveys for eagle and raptor nests.[1]
- An assessment of habitat for tricolored blackbird.
- Surveys for tricolored blackbird colonies.
- Recordings of incidental observations of burrowing owls.

Project Overview

The proposed project would replace approximately 518 old-generation wind turbines installed in the 1990s with up to 36 new wind turbines.[2] The proposed project is expected to use turbines with generating capacities between 2.2 and 4.2 megawatts (MW) to develop a maximum of 80 MW. The exact turbine model has not yet been selected. For purposes of environmental review, Brookfield has identified up to 36 turbine sites and a range of potential turbine specifications. The final configuration would be determined on the basis of site constraints, meteorological data, results of bird use surveys and avian micro-siting considerations, turbine availability, and resulting cost of energy ($/MW-hour).

The project would consist of the components listed below[3] and illustrated in Figure 2.

- Up to 36 new wind turbine generators, towers, foundations, and pad-mounted transformers.

[1] For golden eagle nest surveys, coordination with U.S Geological Survey Staff regarding an ongoing eagle nesting study, was completed and the results are included in this assessment.

[2] The old-generation turbines were removed from the Mulqueeney Ranch project area and the previous project was decommissioned in 2016 by Next Era Energy Resources, the previous project owner, in preparation for repowering.

[3] An operations and maintenance (O&M) building is normally part of proposed projects such as this one; however, in this case, existing O&M space would be leased in the nearby communities of Tracy or Livermore, and no onsite O&M building would be constructed.

- Temporary widening and construction of some new roads (although existing roads would be used to the extent possible).
- A temporary construction area.
- Three permanent meteorological towers.
- A new substation to be built adjacent to Pacific Gas and Electric Company's (PG&E's) Tesla substation.
- A power collection system, including underground electrical lines to connect the turbines to the new substation.

The proposed project is targeted to begin construction in mid-2021.

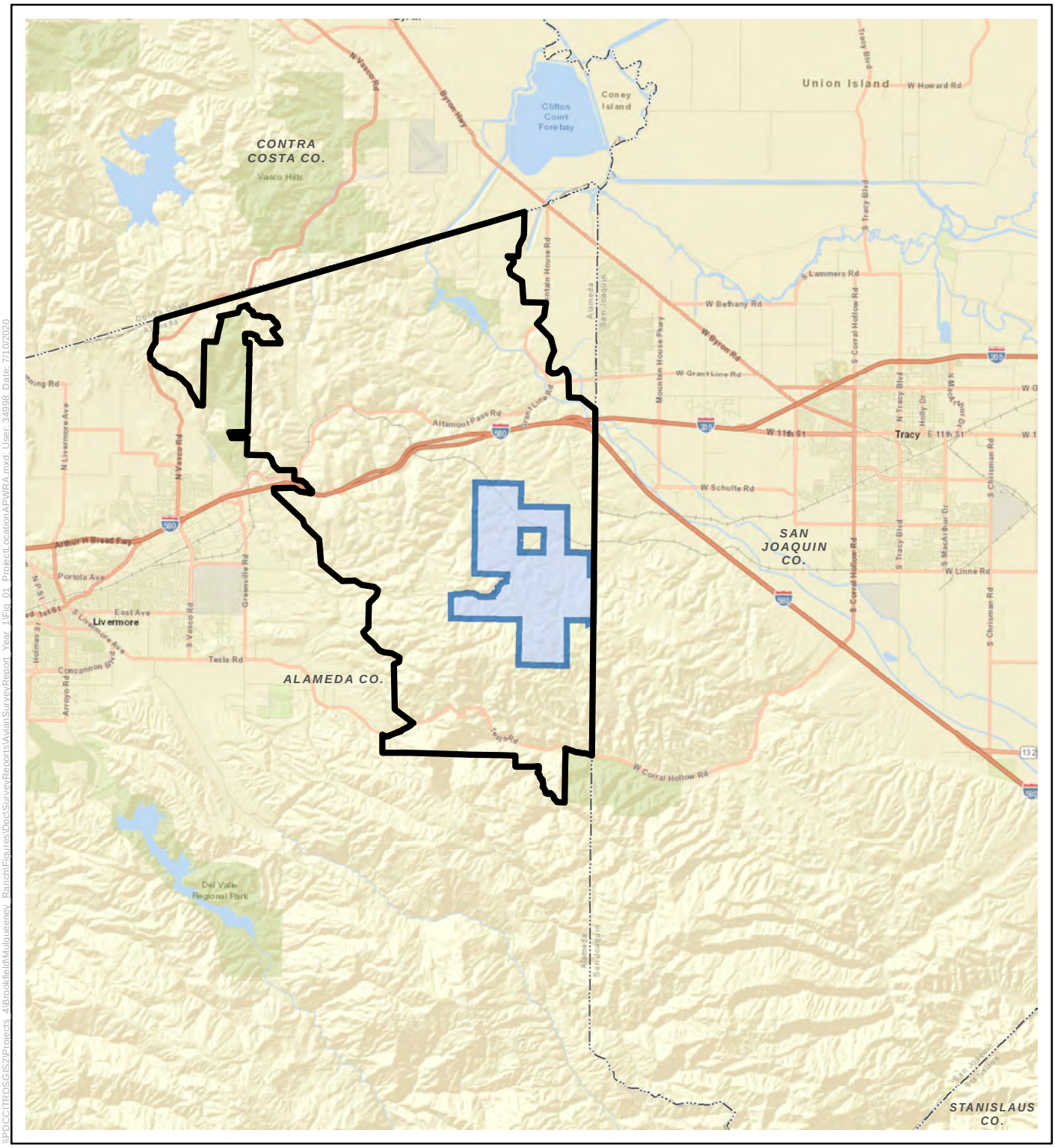
Project Area and Study Areas

The 4,605-acre project area is located in the rural, unincorporated portion of eastern Alameda County and within the APWRA. This area is within the Midway 7.5-minute U.S. Geological Survey (USGS) quadrangle in Township 2 south, Range 3 east, Sections 35, and 36; Township 2 south, Range 4 east, Section 31; Township 3 south, Range 3 east, Sections 1, 2, 11, and 12; and Township 3 south, Range 4 east, Sections 5, 6, 7, 8, 17, and 18 (37°41'33"N, 121°34'47"W is the approximate center of the project area). The project area is the site of an older wind project that has been decommissioned; however, paved and gravel roads remain throughout the site.

The project area is generally characterized by annual grassland and rolling foothills. The mostly treeless project area is steeper on the west and south and gradually flatter to the east where it slopes toward the floor of the Central Valley. Elevations in the project area range from approximately 380 to 1,879 feet above mean sea level. Land uses in the project area and surrounding area consist largely of cattle grazing and wind energy production. Historical land ownership appears to have altered the topography and hydrology in the project area; indicators of such alterations include historical roads and several turbine-powered water pumps and storage facilities.

Twelve land cover types were identified in the project area on the basis of digitized aerial photographs, field observations, and a delineation of aquatic resources. A *land cover type* is defined as the dominant character of the land surface discernible from aerial photographs, as determined by vegetation, water, or human uses. Land cover types are the most widely used units in analyzing ecosystem function, habitat diversity, natural communities, wetlands and streams, and covered species habitat. The 12 land cover types in the project area and their approximate acreages are listed in Table 1. Land cover types in the project area are shown in Figures 3a–3d.

The study area for avian species varied by species and type of survey. Eagle use and avian use counts were conducted within the project area, while raptor and tricolored blackbird surveys were conducted within the project area and immediately adjacent to the project boundaries, where visibility allowed. For golden eagle nests, all eagle nests or pair activity centers are described to a distance of 2 miles from the project area boundaries, consistent with current guidance from the U.S. Fish and Wildlife Service (USFWS; 2020) regarding eagle nest surveys.



Project Boundary
County Boundary
Altamont Pass Wind Resource Area

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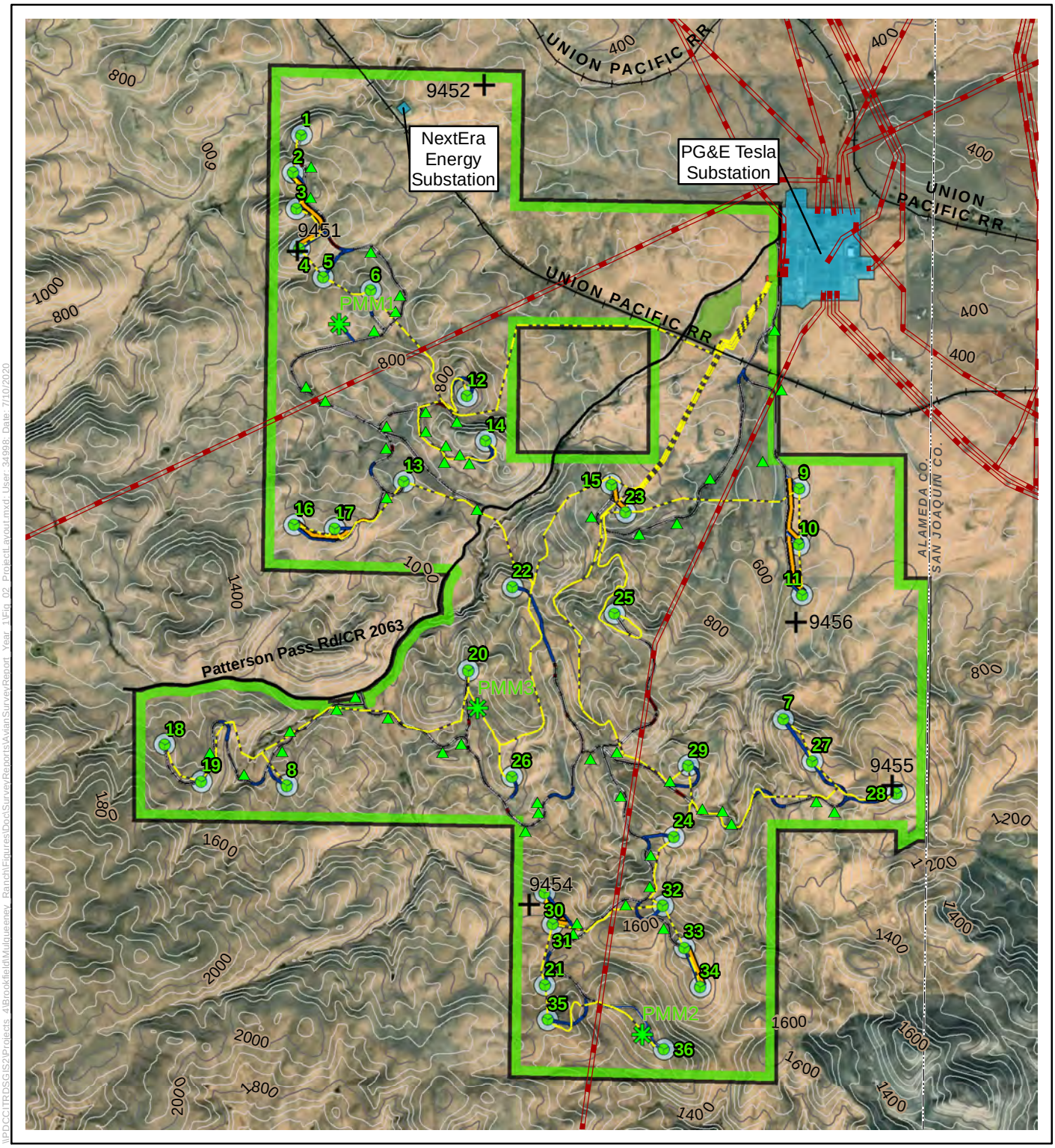
Figure 1
Project Location



Project Boundary

Project Components

- Wind Turbine Generator
- Turbine Pad
- Proposed MET Mast
- Radius Improvement
- Crane Path

- Electrical Collection System
- Existing Access Road -- Widen and Resurface
- Existing Access Road -- Regrade and Widen
- New Access Road
- Temporary Construction Facility

Existing Infrastructure

- Existing Temporary MET Mast (to be removed)
- Existing Transmission

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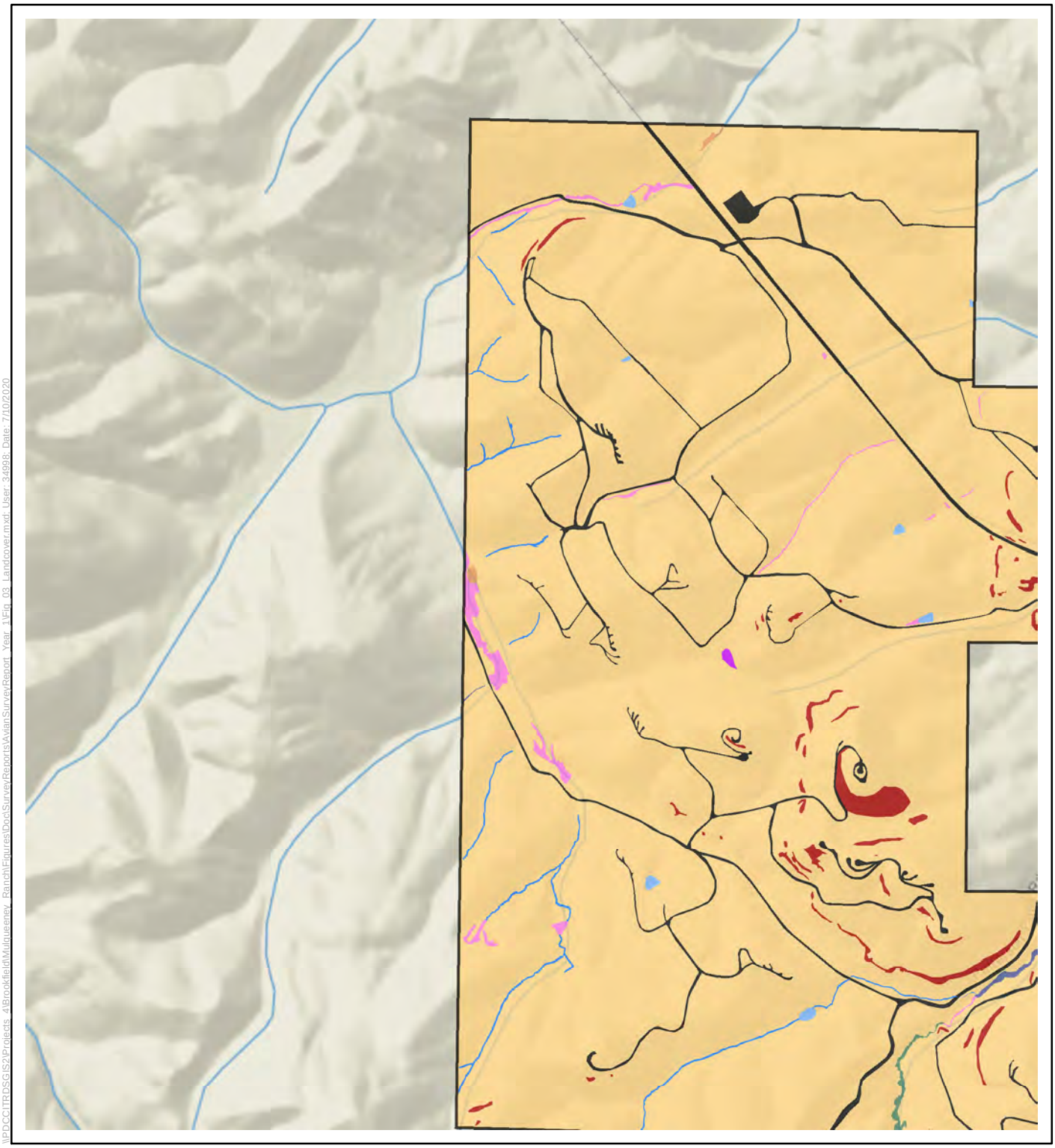
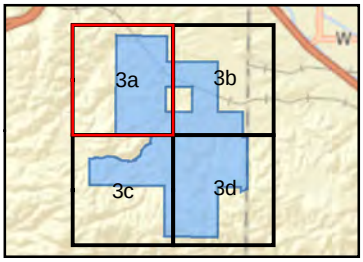
Figure 2
Project Layout



Project Boundary

Land Cover

- Alkali Wetland
- Nonnative Annual Grassland
- Developed
- Ephemeral Stream
- Freshwater Marsh
- Intermittent Stream
- Pond
- Riparian
- Rock Outcrop
- Scrub
- Scrub Shrub Wetland
- Vernal Pool



Source: ICF 2019

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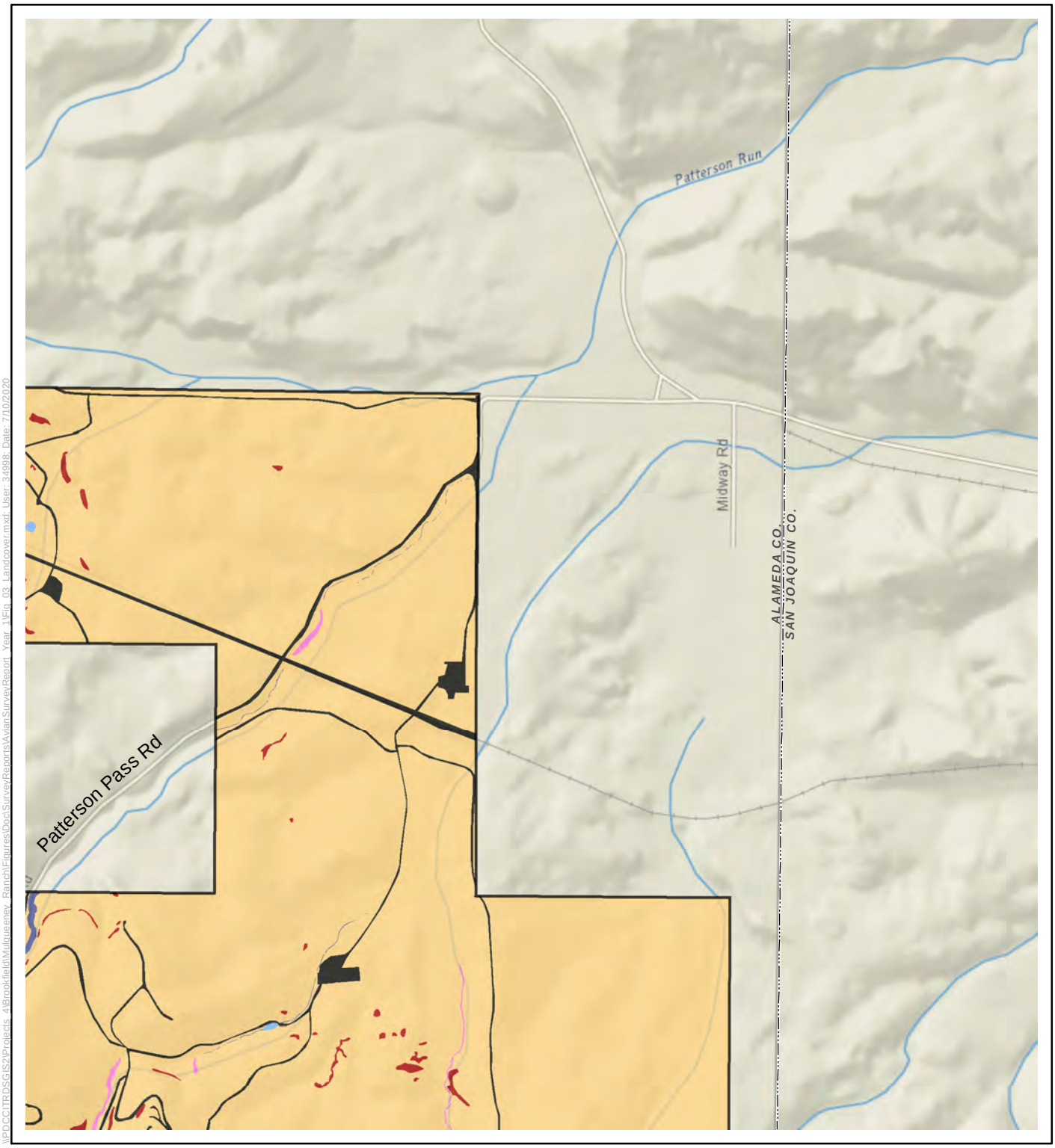
Figure 3a
Land Cover Types in the Project Area



Project Boundary

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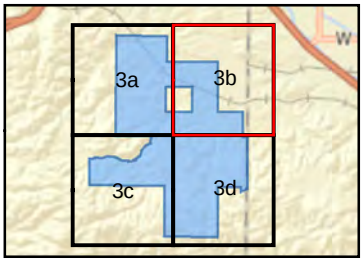

Source: ICF 2019

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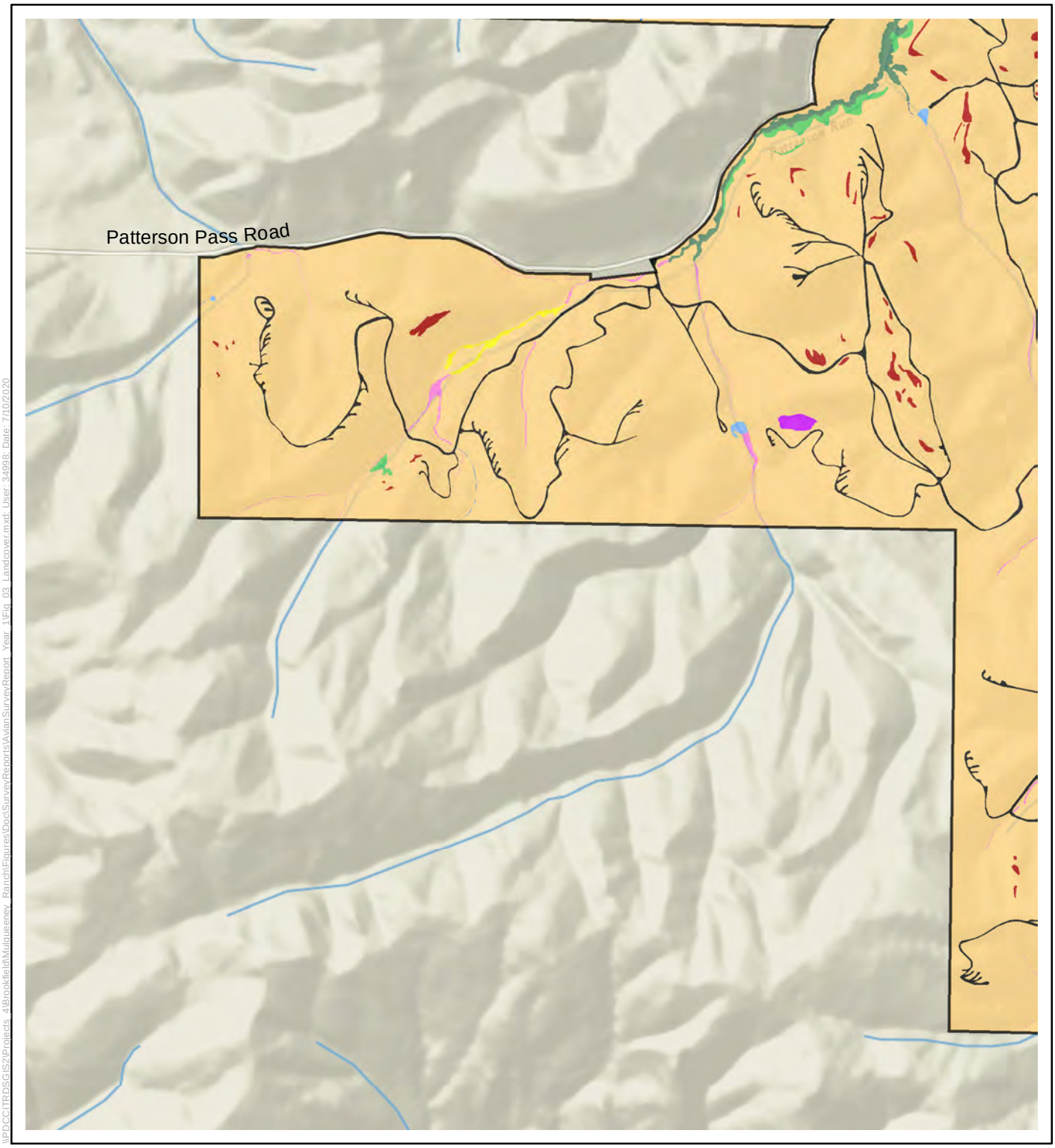
Figure 3b
Land Cover Types in the Project Area



Project Boundary

Land Cover

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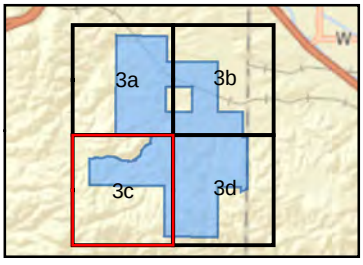

Source: ICF 2019

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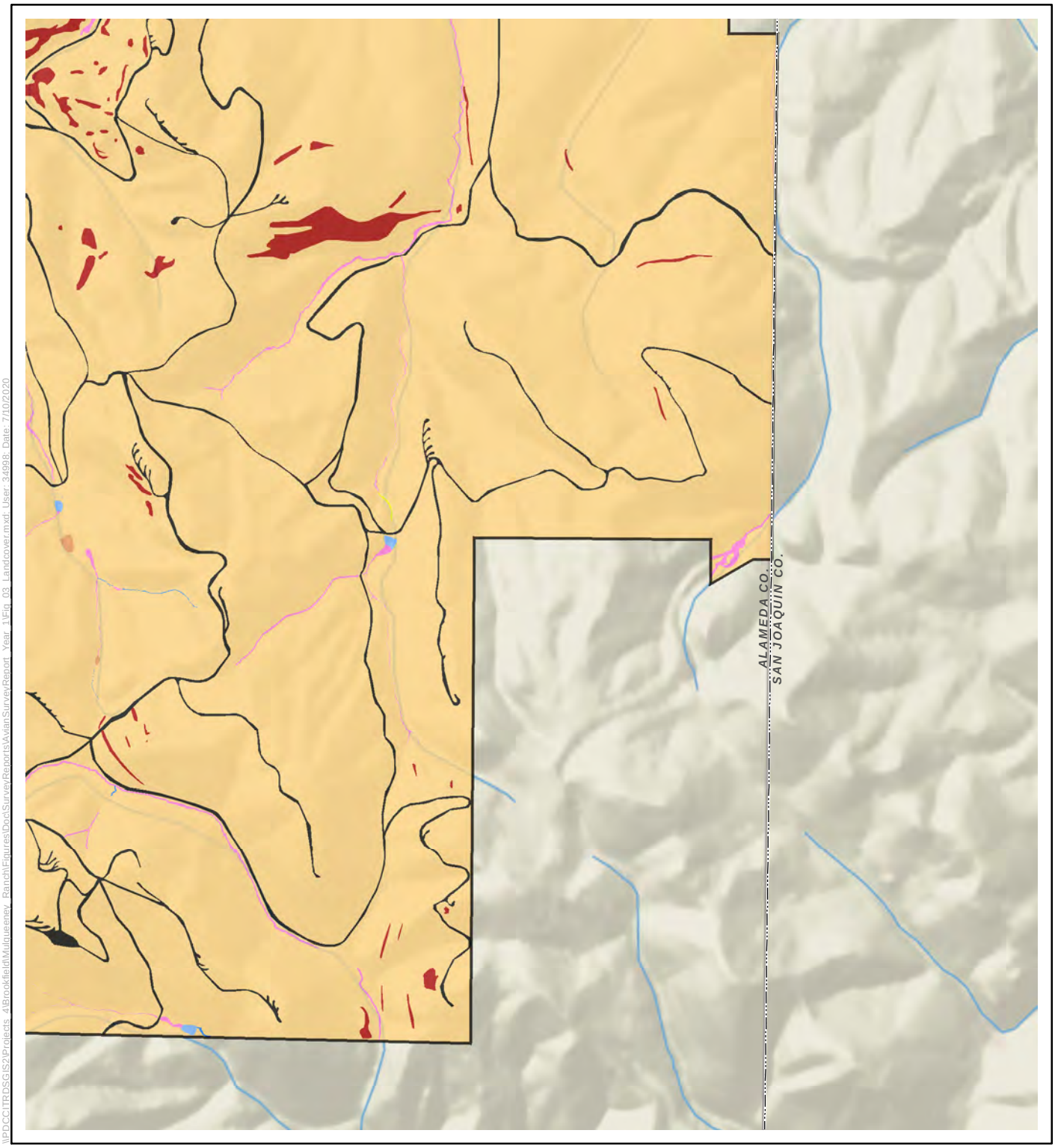
Figure 3c
Land Cover Types in the Project Area



Project Boundary

Land Cover

- Alkali Wetland
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- Intermittent Stream
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- Riparian
- Rock Outcrop
- Scrub
- Scrub Shrub Wetland
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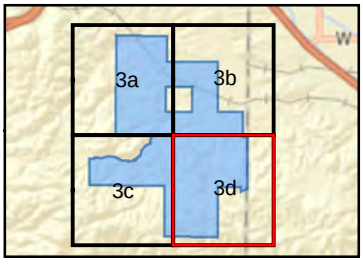

Source: ICF 2019

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Figure 3d
Land Cover Types in the Project Area

As noted in Table 1, nonnative annual grassland is the predominant habitat in the project area, making up almost 95% of the total project area. Although riparian and wetland types are a minor component of the total area, these habitats can provide important habitat for avian species and were considered in the selection of avian use count locations as described in Chapter 3, *Methods*.

Table 1. Approximate Acreages of Land Cover Types in the Project Area

Land Cover Type	Acres
Nonnative annual grassland	4,371.03
Alkali wetland	15.52
Freshwater marsh	1.15
Riparian	7.34
Scrub-shrub wetland	1.68
Vernal pool	1.62
Pond	3.71
Intermittent stream	2.43
Ephemeral stream	2.30
Scrub	3.81
Rock outcrop	47.72
Developed	147.10
Total	**4,605.41**

Chapter 2
Methods

Avian Use Surveys

Count Locations

Avian use surveys were conducted consistent with guidelines recommended in Tier 3 of USFWS's *Land-Based Wind Energy Guidelines* (U.S. Fish and Wildlife Service 2012). To cover available habitat types within the project area, surveys were conducted at eight avian use count (AUC) locations. Due to a low diversity of differing habitat types in the project area, four of the AUC locations were within upland annual grassland areas, and the remaining four AUC locations were within a narrow riparian strip along Patterson Pass Road (Figure 4). Each AUC location consisted of surveys within a 200 m radius survey plot. Photographs of AUC locations are provided in Appendix A.

Survey Duration and Frequency

Each AUC location was surveyed once per month for 30 minutes over a period of 1 year.[4] Surveys were conducted within the first 4 hours after sunrise. The order in which the AUC locations are surveyed was rotated systematically to ensure that each location was surveyed during a range of survey hours.

Count and Behavior Data

Prior to the initiation of surveys, biologist(s) conducted a site visit and familiarized themselves with horizontal and vertical distance estimation using rangefinders. Where land-use allowed, the 200 m boundary and several distance intervals within the plot were marked with flagging for distance reference.

Surveys were conducted for 30 minutes at each AUC location and covered the entire 360-degree viewshed. Every 60 seconds, the biologist scanned the viewshed and recorded the number of each species seen and/or heard, height above ground, and a distance category from the point at which the observation was made in addition to behavior (flying through, gliding, soaring, column soaring, flapping, contouring, stilling/kiting/hovering, diving, interacting, perching, landing, displaying, or copulating). Age and sex were noted whenever possible. If the bird observed was perching, the type of perching structure (e.g., tree, fencepost, telephone pole, etc.) and height (m) were also recorded. To ensure that all perched birds within the observation area were identified, a scan of the entire plot was conducted with binoculars immediately before and after the 30-minute count survey period. Data were recorded on a digital map and datasheet using the Collector app on iPad tablets with GPS capabilities.

[4] Due to shelter-in-place orders issued in response to COVID-19, surveys were not conducted from mid-March 2020 to the end of April 2020.

If avian abundance was high during the survey, the biologist prioritized recording observations of (1) the four APWRA focal species—golden eagle, red-tailed hawk, American kestrel, and burrowing owl, followed by (2) special-status species.

Weather data including wind direction and speed (maximum and average), extent of cloud cover, precipitation, visibility, and temperature were recorded at the beginning of each survey. Surveys were not conducted when the average wind speed reached more than 55 kilometers (km) per hour or if there was heavy rain or fog.

Eagle Use Surveys

Point Count Locations

Eagle use survey locations were selected to be consistent with the survey protocols recommended in Appendix C of USFWS's Eagle Conservation Plan Guidance (2013). Surveys were conducted at eight eagle use count (EUC) locations that together cover approximately 50% of the area within 1 km of proposed turbine locations. The USFWS guidance recommends a minimum spatial coverage of 30% of the area within 1 km of proposed turbine locations. EUC locations consisted of three-dimensional survey plots with an 800 m radius that extended 200 m vertically and that were placed in areas that provide good visibility of the project area and vicinity (Figure 5). Photographs of EUC locations are provided in Appendix B.

Survey Duration and Frequency

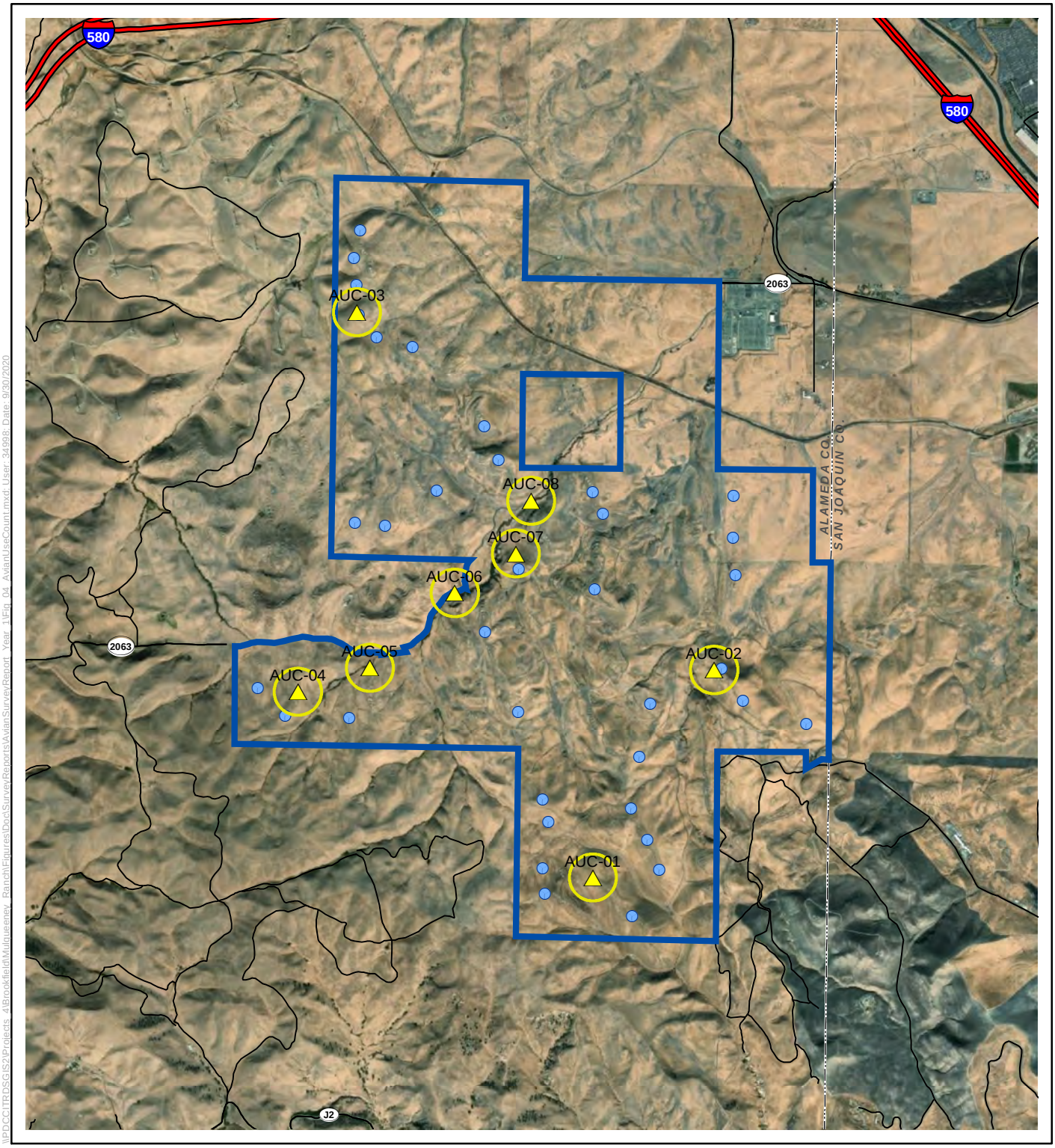
The USFWS eagle conservation plan guidance recommends counts of at least 1 hour in duration. Surveys at each EUC location were conducted for a 1-hour duration, consistent with the guidance, and each EUC location was surveyed twice per month over a 1-year period.[5] Surveys were distributed across daylight hours (e.g., morning = sunrise–1100 hours; afternoon = 1101–1600 hours; evening = 1601 hours–sunset), and the biologists changed the starting point at the beginning of each survey cycle to ensure that each EUC location was surveyed during a range of daylight hours.

Count and Behavior Data

Prior to the initiation of surveys, the biologist(s) conducted a site visit and familiarized themselves with horizontal and vertical distance estimation using rangefinders. Where land-use allowed for it, the 800 m boundary and several distance intervals within the plot were marked with flagging for distance reference.

The biologist(s) conducted systematic scans of the EUC plot alternating between the use of binoculars and scans via the unaided eye to detect close and distant eagles. Checks for eagles flying overhead were also performed. All eagles using the area were recorded and their flight paths mapped using the Collector app on iPad tablets with GPS capabilities. The time and position of each eagle was recorded on the aerial imagery with the visible EUC plot layer. Following a point count survey, the duration of observation of each eagle flying within the plot was summarized in number

[5] Due to shelter-in-place orders resulting from COVID-19, surveys were not conducted from mid-March to the end of April 2020.



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- Turbine
- Project Boundary
- County Boundary
- Primary Road
- Local Road
- Avian Use Count (AUC) Location
- AUC 200m Buffer

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0 0.5 1 Miles

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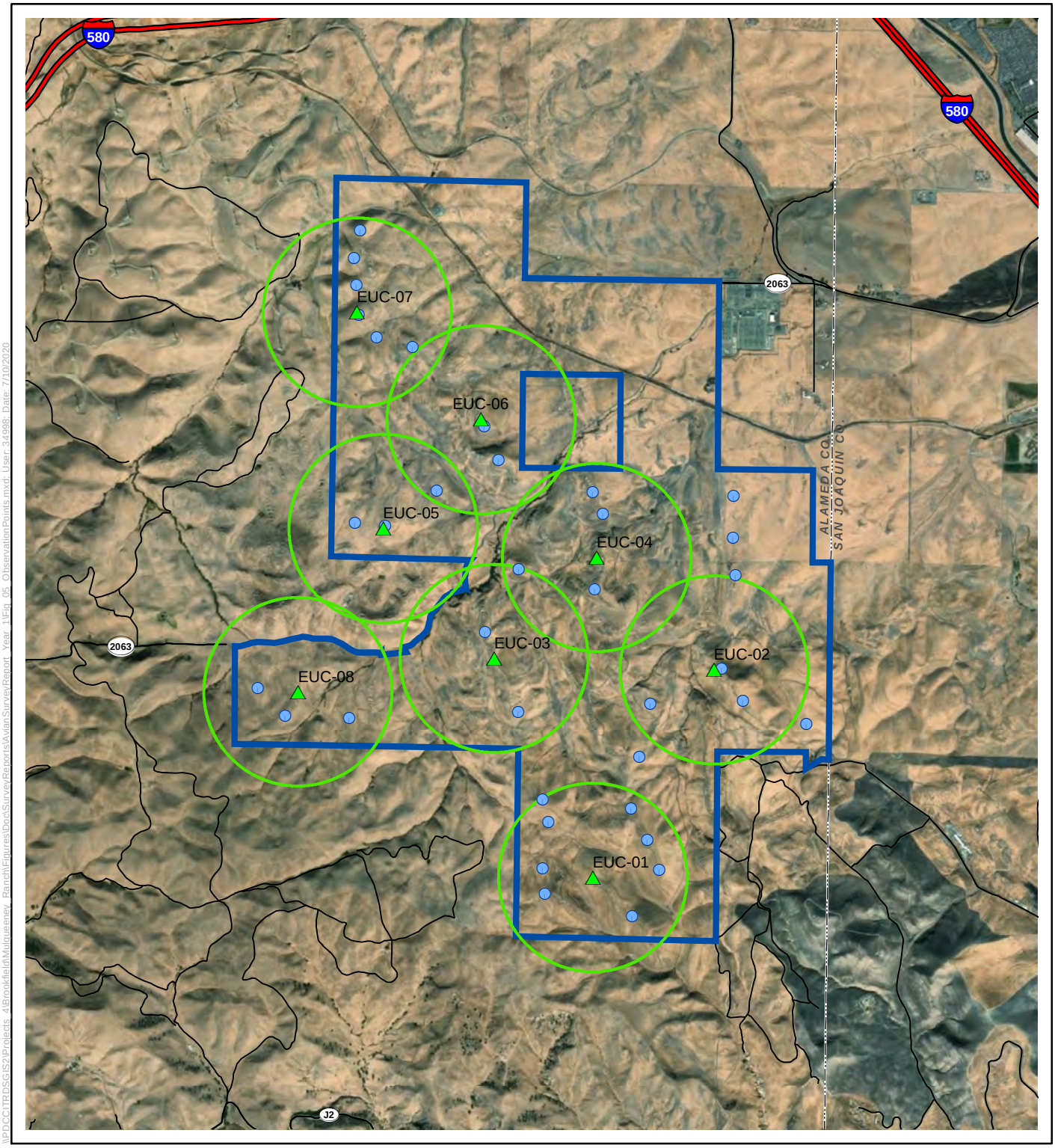
Figure 4
Avian Use Count Locations



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Turbine
Project Boundary
County Boundary
Primary Road
Local Road

Eagle Use Count (EUC) Location
EUC 800m Buffer

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0 0.5 1 Miles

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Figure 5
Eagle Use Count Locations

of minutes, rounded to the next highest integer (e.g., an eagle observed flying in the plot for 1 minute and 10 seconds is 2 eagle-minutes). Perched eagles were mapped, but observations of perched eagles were excluded from the summary of eagle-minutes for a count (only eagles in flight were included in the summary of eagle-minutes). The following data were also collected.

- The age class of individual eagles (juvenile, immature/subadult, adult, or unknown).
- An estimation of the horizontal and vertical distance of each eagle-minute.
- Weather data including wind direction and speed, extent of cloud cover, precipitation, and temperature. Surveys were to be conducted regardless of weather conditions unless visibility was less than 800 m horizontally and 200 m vertically.
- Behavior and activity during each eagle-minute including soaring flight, unidirectional flapping-gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or bird species, undulating/territorial flight, perched, or other.

Following each survey, all data were entered into a database and checked for errors by the biologist(s) who conducted the surveys.

Eagle and Raptor Habitat Assessment and Nest Surveys

Biologists conducted an assessment of available raptor nesting and roosting habitat in the project area. All trees, tree stands, transmission lines, and rock outcrops were mapped in the project area and within 2 miles of the project area.

Following the nesting habitat assessment, biologists conducted surveys for nesting raptors by thoroughly scanning all potential nesting structures and habitats with binoculars and approaching on foot where necessary and accessible. Nest activity was determined by scanning structures from a distance to check for adult presence before slowly approaching in a vehicle or on foot. In many cases, nests were located high in transmission towers, and determining activity (i.e., presence of eggs or chicks) was not feasible. Where accessible, the biologists approached the base of the nest structures to check for signs of active nesting, which include presence of fresh whitewash, pellets, and/or prey items. All nest structures, regardless of their activity, were mapped and recorded in Collector for future use and reference.

Additionally, USGS has been conducting golden eagle population monitoring within the Altamont Pass region (Kolar and Wiens 2017; Wiens and Kolar 2019), as well as within the northern Diablo Range (Wiens et. al. 2015). Surveys for evidence of occupancy and reproduction were conducted by USGS in 2014–2016, 2018, and 2020. Methods used by USGS are described in USGS (2019) and are not described fully here, but generally they involved surveys within a randomly selected grid of survey cells to record the location, number, age, and behaviors of all golden eagles detected. Perches, flight paths, territorial displays, and nest location were recorded to determine activity centers used by eagle pairs. ICF biologists coordinated with USGS staff to obtain data on nesting eagles and pair activity centers within 2 miles of the project area for the study up to the 2018 survey year and to obtain the results of surveys conducted in 2019 and 2020 (Wiens pers. comm.; Kolar pers. comm. [a]).

Tricolored Blackbird Habitat Assessment and Surveys

Biologists also conducted an assessment of available nesting habitat for tricolored blackbirds. All ephemeral streams, freshwater march, ponds, scrub, and scrub-shrub wetlands were digitized and then systematically surveyed by biologists by approaching the areas on foot. Before approaching, binocular surveys were conducted within these specific habitats to better confirm potential tricolored blackbird presence. Once these areas were approached on foot, the biologists continued to monitor for tricolored blackbird activity. If tricolored blackbird presence was confirmed within an area, colony size estimations were conducted. Tricolored blackbird presence within the remaining study area was also noted.

Additionally, the California Department of Fish and Wildlife (CDFW) provided information on two tricolored blackbird nesting colonies recorded to the south of the project area (Grefsrud pers. comm.), which are included in this report in Chapter 3, *Results*.

Burrowing Owl Observations

Systematic surveys for burrowing owls were not conducted; however, biologists recorded any burrowing owls observed when conducting other assessments or surveys. Areas of California ground squirrel aggregations were also noted and recorded, as ground squirrel burrows provide suitable nesting and wintering habitat for burrowing owls.

Chapter 3
Results

Avian Use Surveys

Avian use surveys were conducted on 20 days between June 2019 and June 2020 for a total of 24 hours of surveys. Appendix C provides a list of survey dates, locations surveyed, and the biologists who conducted the surveys. A total of 2,812 individuals and 56 different species were recorded (Table 2). Western meadowlark was the most commonly observed species, constituting approximately 32% of all observations. Other commonly observed species included common raven (approximately 8% of all observations), house finch, (approximately 7% of all observations), and European starling (approximately 7% of all observations).

The most commonly observed species during the spring were western meadow lark, red-winged blackbird, and horned lark. The most commonly observed species during the summer were western meadow lark and mourning dove. The most commonly observed species during the fall were western meadowlark, savannah sparrow, and European starling. The most commonly observed species during the winter were western meadowlark and common raven. Six of the species identified in Table 2 are considered special-status in California. Tables 3 and 4 summarize avian use by AUC location.

A total of 10 species of raptors and 120 individuals were observed during avian use surveys (Table 4). Overall, raptors constituted approximately 4% of all birds observed. The most commonly observed raptors were golden eagle (33 observations), red-tailed hawk (29 observations), and turkey vulture (23 observations). Together, these three species made up more than 70% of all raptors that were observed. Several species, Swainson's hawk, peregrine falcon, and prairie falcon were only observed one to three times during the course of the surveys. Overall, AUC-03 had the greatest diversity of raptors (N=6) and the most individual raptor observations (N=56), while AUC-08 had the least diversity of raptors (N=2) and the least individual raptor observations (N=3).

Eagle Use Surveys

From June 2019 to June 2020, a total of 169 hours of eagle use surveys were conducted at eight EUC locations in the project area (Table 5). Although nearly all eagle observations were golden eagles, one bald eagle observation was made during eagle use surveys at EUC-04 in January 2020. All golden eagle observations and flight paths are provided in Figure 6. The results of observations of golden eagles are summarized below, and a list of all eagle observations is provided in Appendix D.

Table 2. Number of Individuals Observed and Use for All Avian Species Recorded during Avian Use Counts

	Spring		Summer		Fall		Winter	
Species (Common Name)	Obs.	Comp.	Obs.	Comp.	Obs.	Comp.	Obs.	Comp.
American crow	0	0.00%	0	0.00%	11	1.99%	0	0.00%
American kestrel	0	0.00%	5	1.39%	4	0.72%	2	0.24%
American pipet	0	0.00%	0	0.00%	6	1.09%	0	0.00%
American robin	0	0.00%	0	0.00%	0	0.00%	1	0.12%
Anna's hummingbird	1	0.09%	0	0.00%	1	0.18%	0	0.00%
Ash-throated flycatcher	4	0.37%	0	0.00%	0	0.00%	0	0.00%
Bald eagle (SE, FP, BGEPA) [a]	0	0.00%	7	1.94%	0	0.00%	0	0.00%
Barn swallow	0	0.00%	4	1.11%	1	0.18%	0	0.00%
Bewick's wren	0	0.00%	0	0.00%	10	1.81%	0	0.00%
Black phoebe	2	0.19%	11	3.05%	11	1.99%	27	3.27%
Brewer's blackbird	0	0.00%	34	9.42%	2	0.36%	3	0.36%
Brown-headed cowbird	0	0.00%	5	1.39%	0	0.00%	0	0.00%
Bushtit	14	1.30%	0	0.00%	0	0.00%	0	0.00%
California quail	3	0.28%	0	0.00%	0	0.00%	3	0.36%
California thrasher	1	0.09%	0	0.00%	0	0.00%	0	0.00%
California towhee	25	2.33%	12	3.32%	2	0.36%	10	1.21%
Cliff swallow	3	0.28%	0	0.00%	0	0.00%	0	0.00%
Common raven	41	3.82%	13	3.60%	41	7.43%	137	16.61%
European starling	55	5.12%	4	1.11%	71	12.86%	59	7.15%
Ferruginous hawk	0	0.00%	0	0.00%	0	0.00%	7	0.85%
Golden eagle (FP, BGEPA) [a]	1	0.09%	4	1.11%	5	0.91%	23	2.79%
Golden-crowned sparrow	0	0.00%	0	0.00%	2	0.36%	0	0.00%
Hairy woodpecker	5	0.47%	0	0.00%	0	0.00%	1	0.12%
Horned lark	90	8.38%	8	2.22%	38	6.88%	22	2.67%
House finch	78	7.26%	45	12.47%	25	4.53%	43	5.21%

	Spring		Summer		Fall		Winter	
Species (Common Name)	Obs.	Comp.	Obs.	Comp.	Obs.	Comp.	Obs.	Comp.
House wren	45	4.19%	31	8.59%	0	0.00%	18	2.18%
Killdeer	2	0.19%	0	0.00%	3	0.54%	0	0.00%
Lark sparrow	1	0.09%	17	4.71%	0	0.00%	0	0.00%
Lesser goldfinch	4	0.37%	3	0.83%	0	0.00%	52	6.30%
Loggerhead shrike (SSC) [a]	5	0.47%	3	0.83%	6	1.09%	1	0.12%
Mallard	4	0.37%	0	0.00%	0	0.00%	0	0.00%
Merlin	0	0.00%	0	0.00%	1	0.18%	0	0.00%
Mourning dove	95	8.85%	50	13.85%	0	0.00%	14	1.70%
Northern flicker	1	0.09%	0	0.00%	5	0.91%	7	0.85%
Northern mockingbird	0	0.00%	2	0.55%	0	0.00%	0	0.00%
Nuttall's woodpecker	8	0.74%	6	1.66%	5	0.91%	15	1.82%
Peregrine falcon (FP) [a]	0	0.00%	0	0.00%	0	0.00%	4	0.48%
Prairie falcon	0	0.00%	0	0.00%	1	0.18%	1	0.12%
Red-tailed hawk	0	0.00%	3	0.83%	1	0.18%	25	3.03%
Red-winged blackbird	156	14.53%	1	0.28%	0	0.00%	7	0.85%
Rock pigeon	0	0.00%	2	0.55%	0	0.00%	0	0.00%
Rock wren	8	0.74%	5	1.39%	0	0.00%	0	0.00%
Ruby-crowned kinglet	0	0.00%	0	0.00%	0	0.00%	4	0.48%
Rufous hummingbird	0	0.00%	1	0.28%	0	0.00%	0	0.00%
Savannah sparrow	0	0.00%	1	0.28%	117	21.20%	0	0.00%
Say's phoebe	0	0.00%	1	0.28%	7	1.27%	5	0.61%
Spotted towhee	0	0.00%	1	0.28%	0	0.00%	8	0.97%
Swainson's hawk (ST) [a]	0	0.00%	3	0.83%	0	0.00%	0	0.00%
Tricolored blackbird (ST) [a]	1	0.09%	0	0.00%	0	0.00%	0	0.00%
Turkey vulture	6	0.56%	13	3.60%	1	0.18%	3	0.36%
Western bluebird	0	0.00%	0	0.00%	0	0.00%	13	1.58%
Western meadowlark	414	38.55%	62	17.17%	126	22.83%	286	34.67%
Western scrub-jay	0	0.00%	4	1.11%	0	0.00%	0	0.00%

Species (Common Name)	Spring		Summer		Fall		Winter	
	Obs.	Comp.	Obs.	Comp.	Obs.	Comp.	Obs.	Comp.
White-crowned sparrow	0	0.00%	0	0.00%	49	8.88%	24	2.91%
White-throated swift	1	0.09%	0	0.00%	0	0.00%	0	0.00%
Total	**1,074**	**100.00%**	**361**	**100.00%**	**552**	**100.00%**	**825**	**100.00%**

Abbreviations:

Comp. = composition = percentage of individuals of the species per the total number of individuals observed.

Obs. = observation(s) = number of individuals observed.

[a] Considered special-status in California:

SE = state-listed endangered.

ST = state-listed threatened.

FP = fully protected in California.

BGEPA = protected under the Bald and Golden Eagle Protection Act.

SSC = species of special concern.

Table 3. Avian Use, Species Richness, Species Composition, and Survey Effort per Avian Use Count Location in the Project Area

Location	Spring					Summer					Fall					Winter				
	Min.	Obs.	Use	# Sp.	Comp.	Min.	Obs.	Use	# Sp.	Comp.	Min.	Obs.	Use	# Sp.	Comp.	Min.	Obs.	Use	# Sp.	Comp.
AUC-01	40	46	1.15	3	0.05	60	6	0.10	4	0.07	40	38	0.95	3	0.054	40	83	2.08	7	0.13
AUC-02	20	22	1.10	4	0.07	60	2	0.03	2	0.04	40	28	0.70	9	0.161	40	22	0.55	9	0.16
AUC-03	40	144	3.60	5	0.09	60	22	0.37	8	0.14	40	32	0.80	5	0.089	40	188	4.70	5	0.09
AUC-04	40	79	1.98	4	0.07	60	28	0.47	3	0.05	40	38	0.95	9	0.161	40	37	0.93	9	0.16
AUC-05	40	270	6.75	10	0.18	60	55	0.92	13	0.23	40	170	4.25	10	0.179	40	96	2.40	10	0.18
AUC-06	40	128	3.20	12	0.21	60	70	1.17	15	0.27	40	67	1.68	11	0.196	40	129	3.23	11	0.20
AUC-07	60	140	2.33	17	0.30	60	81	1.35	12	0.21	40	59	1.48	7	0.125	40	29	0.73	7	0.13
AUC-08	40	247	6.18	17	0.30	60	97	1.62	13	0.23	40	120	3.00	12	0.214	40	241	6.03	12	0.21

Abbreviations:

Min. = minutes of survey.

Obs. = number of observations.

Use = number of observations per minute of survey.

Sp. = number of species recorded.

Comp. = number of species recorded at the stations per number of total species recorded in the project area that season.

Table 4. Avian Species Recorded by Avian Use Count Location

Species name	Location								Total
	AUC-01	AUC-02	AUC-03	AUC-04	AUC-05	AUC-06	AUC-07	AUC-08	
American crow	–	–	–	11	–	–	–	–	**11**
American kestrel [a]	3	3	–	1	1	–	1	2	**11**
American pipet	–	3	–	–	–	–	3	–	**6**
American robin	–	–	–	–	–	–	–	1	**1**
Anna's hummingbird	–	–	–	1	–	–	–	1	**2**
Ash-throated flycatcher	–	–	–	–	–	–	2	2	**4**
Bald eagle [a]	–	–	7	–	–	–	–	–	**7**
Barn swallow	–	–	1	–	3	–	–	1	**5**
Bewick's wren	–	–	–	–	–	8	–	2	**10**
Black phoebe	–	–	–	–	8	3	1	39	**51**
Brewer's blackbird	–	–	–	–	16	–	20	3	**39**
Brown-headed cowbird	–	–	–	–	4	1	–	–	**5**
Bushtit	–	–	–	–	–	–	–	14	**14**
California quail	–	–	–	–	–	–	–	6	**6**
California thrasher	–	–	–	–	–	–	1	–	**1**
California towhee	–	–	–	–	6	21	–	22	**49**
Cliff swallow	–	–	–	–	–	–	3	–	**3**
Common raven	12	23	122	10	8	12	22	23	**232**
European starling	8	–	1	–	6	1	2	171	**189**
Ferruginous hawk [a]	–	5	–	2	–	–	–	–	**7**
Golden eagle [a]	–	3	24	5	1	–	–	–	**33**
Golden-crowned sparrow	–	–	–	–	–	2	–	–	**2**
Hairy woodpecker	–	–	–	–	–	4	–	2	**6**
Horned lark	20	1	25	37	2	2	71	–	**158**
House finch	7	–	5	–	2	77	24	76	**191**
House wren	–	–	–	–	–	38	–	56	**94**
Killdeer	–	–	–	–	–	–	2	3	**5**
Lark sparrow	–	–	–	–	–	–	18	–	**18**

Species name	Location								Total
	AUC-01	AUC-02	AUC-03	AUC-04	AUC-05	AUC-06	AUC-07	AUC-08	
Lesser goldfinch	–	–	–	–	–	3	1	55	**59**
Loggerhead shrike	–	1	–	–	–	9	2	3	**15**
Mallard	–	–	–	–	–	1	3	–	**4**
Merlin [a]	–	–	–	1	–	–	–	–	**1**
Mourning dove	–	–	–	–	11	27	12	109	**159**
Northern flicker	–	–	–	–	1	3	–	9	**13**
Northern mockingbird	–	–	–	–	–	1	–	1	**2**
Nuttall's woodpecker	–	–	–	–	3	10	–	21	**34**
Peregrine falcon [a]	–	–	4	–	–	–	–	–	**4**
Prairie falcon [a]	–	1	–	–	1	–	–	–	**2**
Red-tailed hawk [a]	1	–	16	2	–	10	–	–	**29**
Red-winged blackbird	–	–	2	–	152	–	8	2	**164**
Rock pigeon	–	–	–	–	–	–	–	2	**2**
Rock wren	–	–	–	–	1	1	11	–	**13**
Ruby-crowned kinglet	–	–	–	–	–	4	–	–	**4**
Rufous hummingbird	–	–	–	–	–	1	–	–	**1**
Savannah sparrow	7	3	1	8	56	13	30	-	**118**
Say's phoebe	-	-	1	-	3	4	1	4	**13**
Spotted towhee	-	-	-	-	-	9	-	-	**9**
Swainson's hawk [a]	1	-	1	-	-	-	1	-	**3**
Tricolored blackbird	-	-	-	-	-	-	-	1	**1**
Turkey vulture [a]	3	2	4	8	2	1	2	1	**23**
Western bluebird	-	-	12	-	-	-	-	1	**13**
Western meadowlark	111	29	160	96	286	93	68	45	**888**
Western scrub-jay	-	-	-	-	3	1	-	-	**4**
White-crowned sparrow	-	-	-	-	13	33	-	27	**73**
White-throated swift	-	-	-	-	-	1	-	-	**1**
Totals	**173**	**74**	**386**	**182**	**589**	**394**	**309**	**705**	**2,812**

[a] Raptor species (California Department of Fish and Wildlife 2020).

Table 5. Survey Effort, Use of the Project Area, and Frequency of Observations for Golden Eagles within Survey Plots

	Spring					Summer					Fall					Winter				
Location	**Hrs.**	**Obs.**	**Min.**	**Use**	**Freq.**	**Hrs.**	**Obs.**	**Min.**	**Use**	**Freq.**	**Hrs.**	**Obs.**	**Min.**	**Use**	**Freq.**	**Hrs.**	**Obs.**	**Min.**	**Use**	**Freq.**
EUC-01	4	0	0	0.00	0%	7	5	19	2.71	71%	5	0	0	0.00	0%	6	6	13	2.17	100%
EUC-02	4	4	4	1.00	100%	7	6	5	0.71	86%	5	0	0	0.00	0%	6	8	26	4.33	133%
EUC-03	4	0	0	0.00	0%	7	10	34	4.86	143%	5	1	2	0.40	20%	6	3	5	0.83	50%
EUC-04	4	5	3	0.75	125%	7	10	27	3.86	143%	5	2	2	0.40	40%	6	3	7	1.17	50%
EUC-05	4	0	0	0.00	0%	7	12	15	2.14	171%	4	4	9	2.25	100%	7	3	5	0.71	43%
EUC-06	4	4	7	1.75	100%	7	14	26	3.71	200%	4	1	5	1.25	25%	7	4	16	2.29	57%
EUC-07	4	8	12	3.00	200%	7	13	23	3.29	186%	4	11	19	4.75	275%	7	11	59	8.43	157%
EUC-08	4	2	0	0.00	50%	7	8	14	2.00	114%	5	2	3	0.60	40%	7	8	21	3.00	114%

Abbreviations:
Obs. = number of observations.
Min. = minutes eagles observed.
Use = number of observations per minute of survey.
Freq. = percentage of surveys during which the species was recorded.

Comparison with Altamont Pass Wind Resource Area

Surveys to document avian use have been completed over time throughout the APWRA. Methods have varied from those used in this study. However, the surveys have generally involved a similar overall approach: the establishment of observation points with a set observation period and biologists recording birds seen or heard within a defined survey radius. Alameda County's final monitoring report, published in 2016, describes the methods used to conduct avian use surveys across the APWRA between 2005 and 2013 (ICF International 2016). Surveys varied over time during that period from 10-minute point counts, up to 30-minute counts, and from 47 to 92 point count locations, depending on the survey year (ICF International 2016). Survey distance also varied over time from 500 m to 800 m radii. Avian use data were reliably recorded in all years of the study only for the four APWRA focal species (burrowing owl, golden eagle, red-tailed hawk, and American kestrel), while avian use for all species was reliably recorded throughout the 2013 monitoring year (ICF International 2016). To assess bird use, the number of observations per minute of survey was calculated to account for differences in survey duration over the course of the surveys. In total, more than 12,000 surveys were conducted between 2005 and 2013 in the APWRA.

In terms of the number of species detected, 77 avian species were detected within the APWRA during the County's study, compared to 56 species during this study. Comparing the percentage of surveys in which APWRA focal species were detected, the study area recorded lower than average detections for all species compared to the APWRA-wide study (Table 6). No burrowing owls were observed during standard bird use surveys for this study; however, burrowing owls were observed incidentally in the project area by biologists as discussed in this report.

Table 6. Percentage of Surveys in Which Focal Species Were Detected

Species	Altamont Pass Wind Resource Area (average of all years, 2005–2013)	Mulqueeney Ranch Project Area (average, June 2019–June 2020)
American kestrel	7–21% (average 15%)	2–5% (average 3%)
Burrowing owl	1–3 % (average 1%)	0%[a]
Golden eagle	10–23% (average 16%)	1–23 % (average 8%)
Red-tailed hawk	22–75% (average 41%)	0–25 % (average 7%)

[a] Burrowing owl surveys were not conducted, but this species was observed incidentally during other surveys at the avian use count locations.

In order to further compare golden eagle use observed during this study to golden eagle use within the APWRA, eagle detections and bird survey sessions from the 2005–2013 dataset were used. The total eagle minutes observed by observation point and year were summed, then divided by the total observation minutes by observation point to calculate the total flight minutes observed/hour. While the observation area and observation session times varied between studies as described above, this method gives an overview of golden eagle use standardized across the APWRA during the 2005–2014 survey period (Figure 7).

Eagle use within the Mulqueeney project area was analyzed using the same method to calculate flight minutes/hour of observation for comparison with the APWRA (Figure 6). Golden eagle use of the Mulqueeney project area is generally consistent with the results of the APWRA-wide study (i.e., eagle use is between 0 and 2 flight minutes/hour both within the project area and throughout the

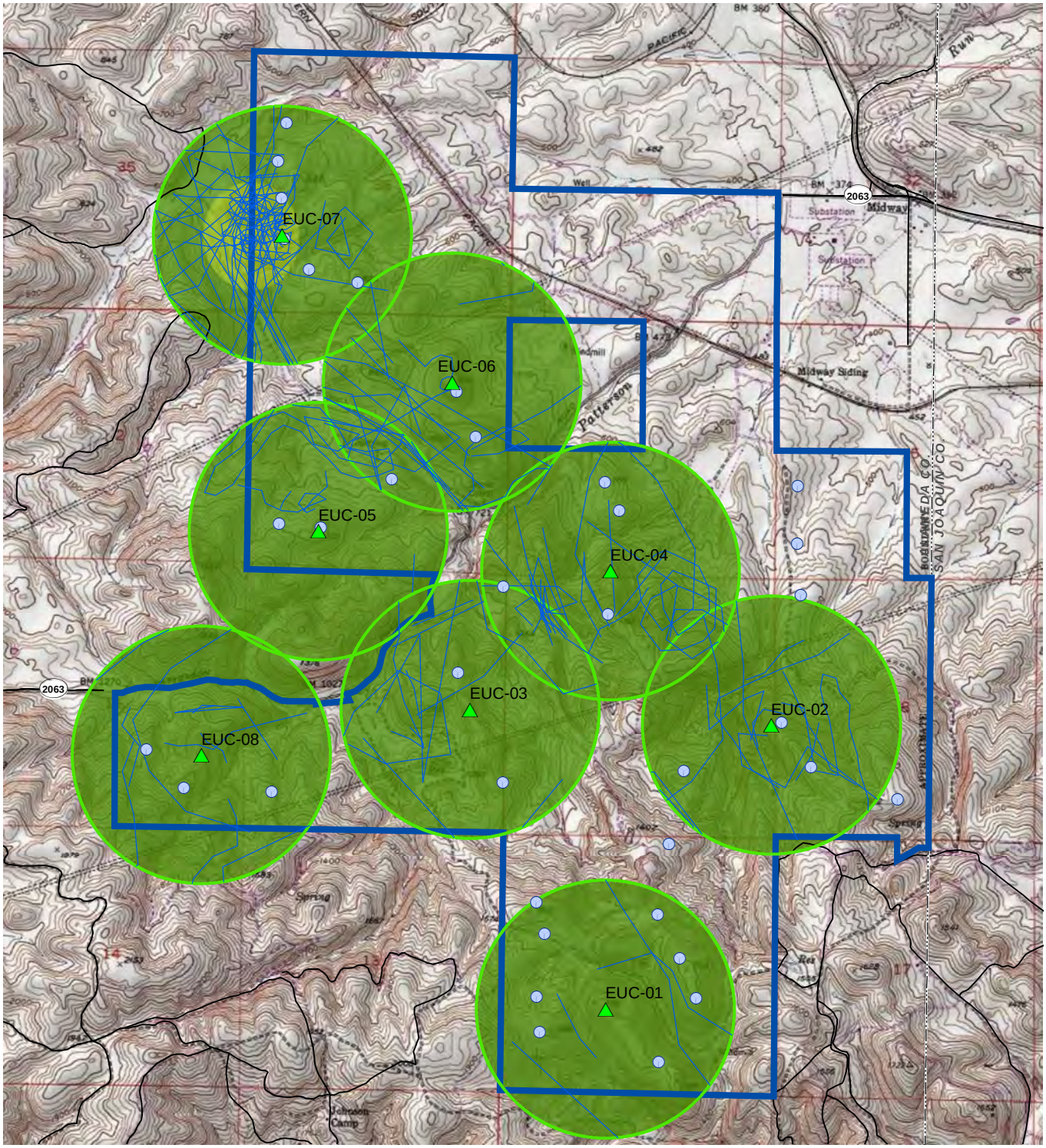
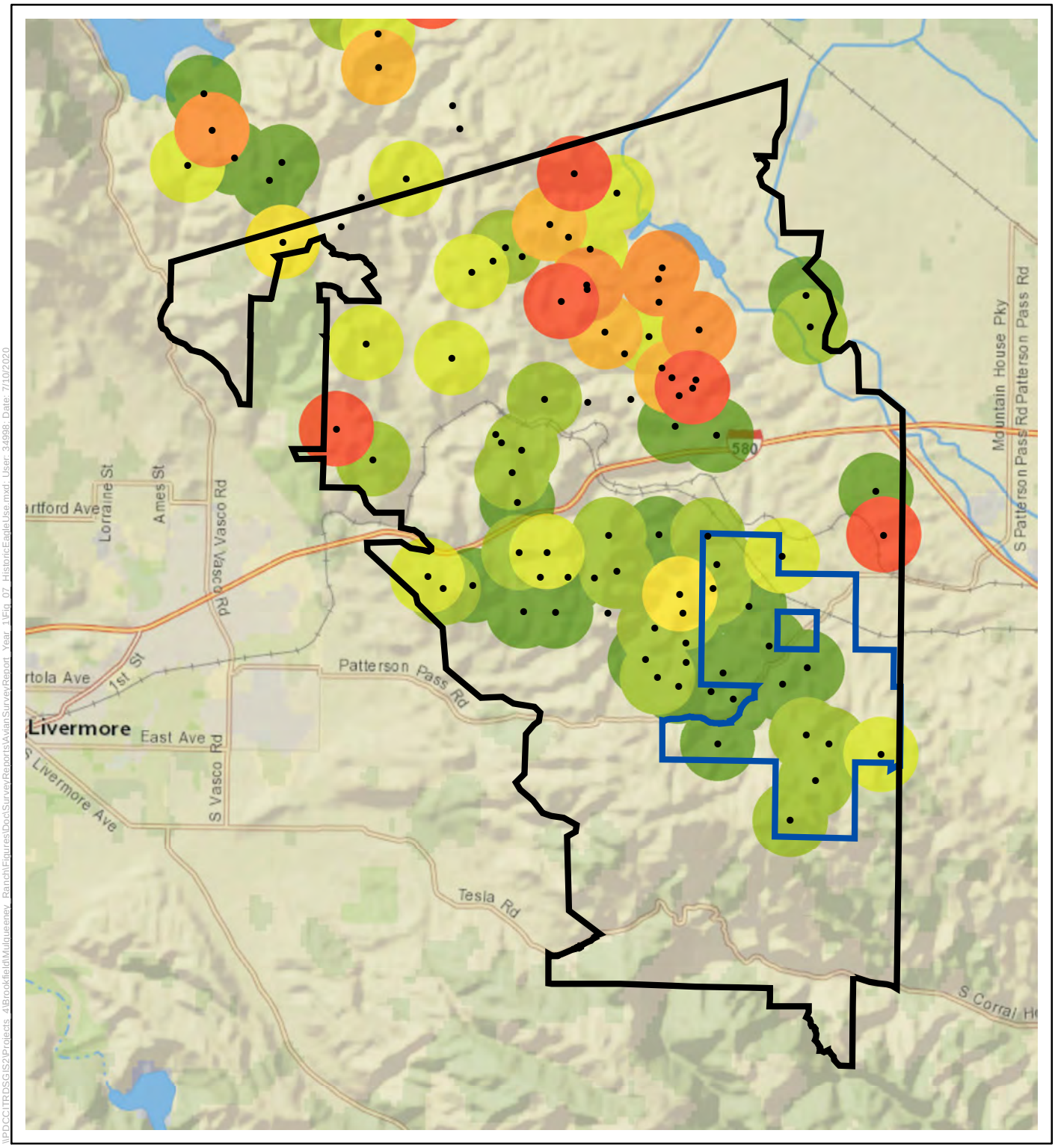


Figure 6
Golden Eagle Flight Paths



Observation Point
Project Boundary
Altamont Pass Wind Resource Area

Eagle Use (Minutes/Hour)

0	>3 - 4
>0 - 1	>4 - 5
>1 - 2	>5 - 6
>2 - 3	>6

ICF

N

0 0.5 1 Miles

1:120,000

Figure 7
Analysis of Eagle Use in the Altamont Pass Wind Resource Area, 2005-2014

APWRA on average). Eagle use of the APWRA is generally significantly higher in the northern and northeastern portions of the APWRA (greater than 4 minutes/hour in many instances), compared to the Mulqueeney project area (which is between 0 and 2 minutes/hour). Lastly, the results of this analysis also appear generally consistent with the results of GPS tracking of golden eagles within the Altamont Pass region conducted by Bell (2019), which generally indicates a higher amount of eagle use within the northern portions of the APWRA compared to the southern portions of the APWRA.

Raptor Nest Surveys

ICF biologists identified 4 active raptor nests and 12 unoccupied raptor stick nests located in transmission towers and trees throughout the project area or within approximately 1,000 feet of the project area (Table 7, Figure 8). One Swainson's hawk territory was observed around a nest structure (Table 7, Figure 8), and ICF biologists conducted several visits to monitor the nest structure for activity. One adult Swainson's hawk was observed on a nest structure during the initial survey on May 13, 2020. The nest was monitored on May 29, 2020, and it was determined to be potentially active as a Swainson's hawk pair was observed displaying territorial behavior and defending the nest from a red-tailed hawk. Adults were also observed perching on the nest during this survey. A second monitoring visit of the Swainson's hawk nest was conducted on June 8, 2020. No activity was observed at the nest. The nest appeared to be in poor condition, and there was no sign of either Swainson's hawk adult during the visit. A final monitoring visit was conducted on June 30, 2020; a few small sticks remained but the majority of the nest was no longer present. Two active common raven nests were also observed during nesting raptor surveys (Table 7, Figure 8), one in a Peruvian pepper tree and one in a transmission tower.

Table 7. Condition and Nest Status of All Known Raptor Nests within the Project Area

Nest ID	Lat/Lon	Species[a]	Substrate	Nest Status	Observation	Condition[b]	Young	Type of Young
MUL-19	[redacted]	GHOW	Windmill	Active	Adult incubating	Excellent	–	–
MUL-14	[redacted]	SWHA	Cottonwood tree	Inactive[c]	Territorial behavior but nest determined to be inactive/no longer present	–	–	–
MUL-7	[redacted]	RTHA	Transmission tower	Active	Adult incubating	Excellent	–	–
MUL-21	[redacted]	RTHA	Transmission tower	Active	Adult incubating	Excellent	–	–
MUL-22	[redacted]	RTHA	Transmission tower	Active	Young present	Excellent	1	Fledgling
MUL-2	[redacted]	RTHA	Palm tree	Inactive	Adult flew off nest structure, but no activity was observed during subsequent visits	–	–	–
MUL-5	[redacted]	UNRA	Cottonwood tree	Inactive	–	–	–	–
MUL-8	[redacted]	UNRA	Transmission tower	Inactive	–	–	–	–
MUL-10	[redacted]	UNRA	Tree	Inactive	–	–	–	–
MUL-13	[redacted]	UNRA	Tree	Inactive	–	–	–	–
MUL-9	[redacted]	UNRA	Transmission tower	Inactive	–	–	–	–
MUL-16	[redacted]	UNRA	Transmission tower	Inactive	–	–	–	–
MUL-17	[redacted]	UNRA	Transmission tower	Inactive	–	–	–	–

Nest ID	Lat/Lon	Species[a]	Substrate	Nest Status	Observation	Condition[b]	Young	Type of Young
MUL-6	[redacted]	UNRA	Transmission tower	Inactive	–	–	–	–
MUL-12	[redacted]	UNRA	Tree	Inactive	–	–	–	–
MUL-4	[redacted]	UNRA	Transmission tower	Inactive				
MUL-15	[redacted]	CORA	Peruvian pepper tree	Active	–	–	–	–
MUL-20	[redacted]	CORA	Transmission tower	Active	–	–	–	–

[a] GHOW = great horned owl; SWHA = Swainson's hawk; UNRA = unknown raptor; RTHA = red-tailed hawk; GOEA = golden eagle; CORA = common raven.

[b] Excellent = nest is in excellent condition; Good = nest is in use or in need of only minor attention in order to be used; Fair = nest is not dilapidated but needs some repair in order to be used; Poor = nest is dilapidated and would require significant repair to be used.

[c] Territorial Swainson's hawk activity was observed around a nest structure during the initial survey. However, subsequent monitoring efforts found the nest structure to be reduced to a few sticks and no Swainson's hawks present.

Golden Eagle Nest Surveys

USGS surveyors have documented seven territories (consisting of documented nests and/or pair activity centers[6] depending on the year of the survey) within 2 miles of the project area (Table 8, Figure 9). Most recently, an additional territory was located at Site 300 south of the project area, and an additional nest was located in a tree on the project site, adjacent to Patterson Pass Road, which was attributed to the Midway Road territory. The nest contained young in 2020; however, it failed in June 2020 due to unknown causes (Kolar pers. comm. [b]).

Table 8. Golden Eagle Nests and Pair Activity Centers Recorded within 2 Miles of the Project Area

Territory	Type	Substrate Type	Year(s) Used
Patterson Pass	Nest	Tree	2016, 2018, 2019, 2020
	PAC	Unknown	2014, 2015, 2016, 2018, 2019
Tesla	Nest	Tree	2019
	PAC	Unknown	2014, 2015, 2016, 2018, 2019
Midway Road	Nest	Tree	2020
	PAC	Unknown	2014, 2015, 2016, 2018, 2019
Patterson Road	Nest	Tree	2020
	PAC	Unknown	2018,2019
Deetz Ranch/Jess Ranch [b]	PAC	Unknown	2018, 2019
Altamont Pass [b]	PAC	Unknown	2018, 2019
Site 300 [c]	PAC	Unknown	2020

Abbreviation:
PAC = pair activity center.

[a] This nest was documented during the 2020 survey year and was attributed to the "Midway Road" Territory (Kolar pers. comm. [c]).

[b] The Deetz Ranch/Jess Ranch and Altamont Pass PACs are located within 2 miles of the project site but more than 2 miles from proposed turbine locations.

[c] The Site 300 territory was documented during the 2020 survey year; however, USGS could not determine nesting for this pair due to access limitations on the adjacent Lawrence Livermore National Laboratory facility (Kolar pers. comm. [d]).

Tricolored Blackbird Surveys

CDFW has reported two colonies (TRBL-1 and TRBL-2) just to the south of the project area (Table 9, Figure 10). Nesting activity was observed at both locations in 2018, and each colony contained approximately 50 individuals during the nesting season. CDFW biologists noted that nesting was complete at by June 20, 2018, and fledglings were observed at both colonies. CDFW biologists observed nesting activity at colony location TRBL-1 on April 24, 2019 and recorded approximately 50 individuals. Nesting was complete by July 3, 2019. No nesting activity was observed at colony location TRBL-2 in 2019. (Grefsrud pers. comm.)

[6] Pair activity centers defined by Wiens (2015) as "a nest with young, focal area of copulations, territorial displays, fledged young, or perches."

MUL-22
MUL-21
MUL-15
MUL-17
MUL-16
MUL-14
MUL-18
MUL-19
MUL-20
MUL-07
MUL-06
MUL-05
MUL-13
MUL-12
MUL-04
MUL-02
MUL-10
MUL-09
MUL-08

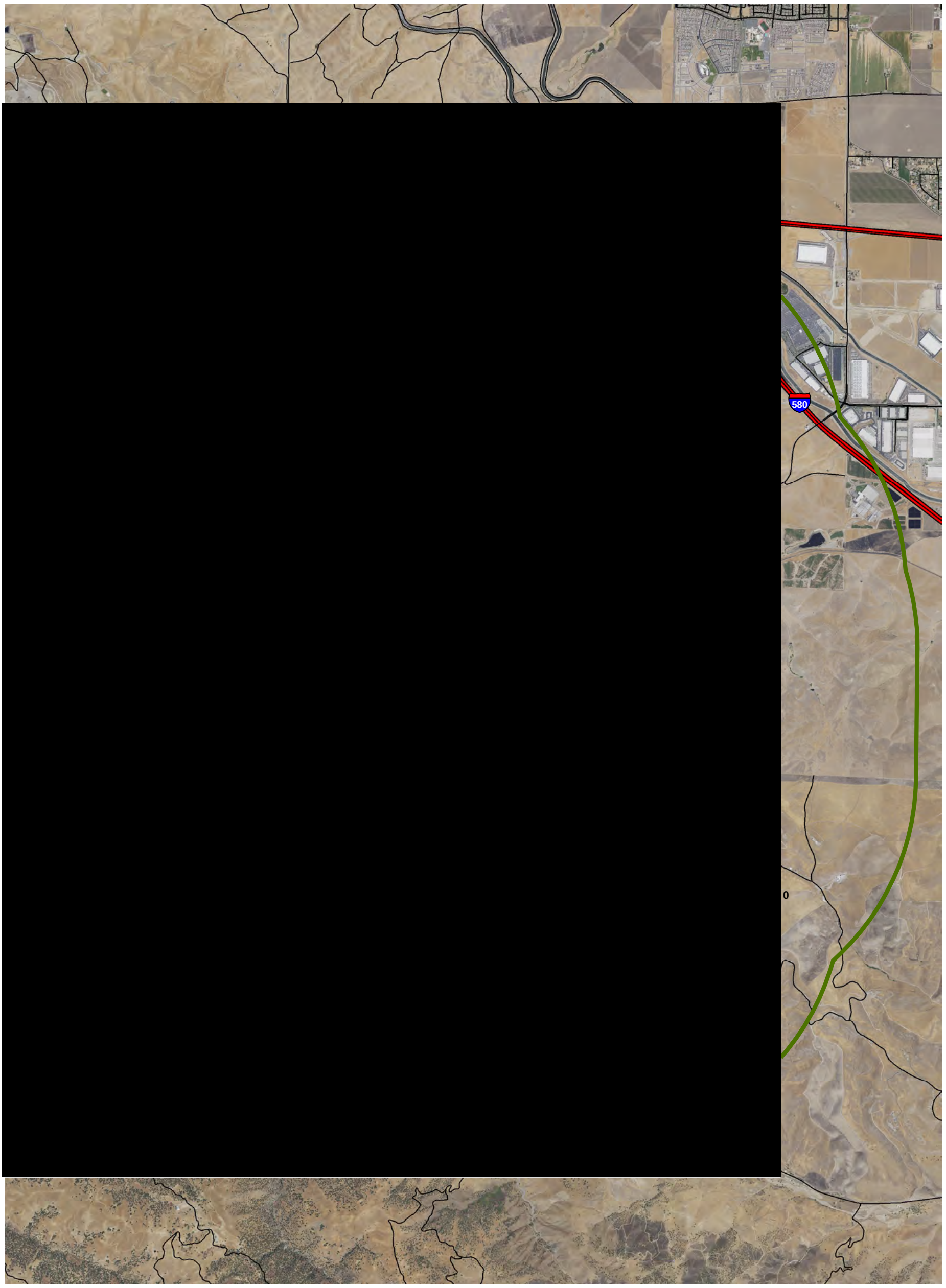
Project Boundary
Proposed Turbine
Transmission Tower
Tree
Nesting Habitat/Tree Stands
Rock Outcrop/Barren Ground

Surveyed Raptor Nests
Common Raven
Great Horned Owl
Red-tailed Hawk
Swainson's Hawk
Unknown Raptor

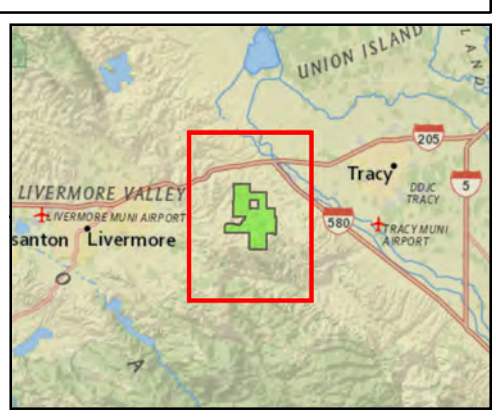
0 0.5 1 Miles

1:24,000

Figure 8
Raptor Nests and Nesting Habitat



Project Boundary
Project Boundary -- 2-mile Buffer
Golden Eagle Nest
Golden Eagle Pair Activity Center
Proposed Turbine
1-Mile Turbine Buffer
Primary Road
Secondary Road
Local Road
==== Vehicular Trail (4WD)



0 0.5 1 Miles

1:50,000

Figure 9
Nesting Habitat in and around the Project Area

ICF biologists observed a flock of approximately 50 tricolored blackbirds (TRBL-3) within the project area during the initial tricolored blackbird survey on May 13, 2020 (Table 9, Figure 10). The tricolored blackbirds were located in a pond with dense emergent cattails in the southwest portion of the project area. Individual tricolored blackbirds were calling and displaying territorial behavior, and red-winged blackbirds were also present within the flock. The pond was surveyed again on June 26, 2020, but no tricolored blackbirds were present (only a flock of red-winged blackbirds was observed). The pond may provide suitable roosting or nesting habitat for tricolored blackbirds, and surveys are planned to be conducted in 2021. Lastly, one tricolored blackbird was observed during avian use surveys at AUC-08 (Figure 4).

Table 9. Tricolored Blackbird Observations within the Vicinity of the Project Area

Observation ID	Location (Lat/Lon)	Date	Number of Individuals	Observation
TRBL-1	[redacted]	5/3/2018 5/9/2018 6/1/2018 6/20/2018 4/24/2019	50	CDFW observed nesting activity in 2018 and 2019.[a]
TRBL-2	[redacted]	5/3/2018 5/9/2018 6/20/2018	50	CDFW observed nesting activity in 2018.[a]
TRBL-3	[redacted]	5/13/2020	50	Individuals calling and displaying territorial behavior during May survey; no tricolored blackbirds present during June survey.

[a] Grefsrud pers. comm.

Burrowing Owl Observations

Biologists recorded owls in six locations during avian use surveys conducted between June 2019 and June 2020. During the May 13 and 14 surveys, two burrows were observed and recorded. Whitewash, pellets, and feathers were present at these burrow entrances, indicating that they were actively being used by burrowing owls (Table 10, Figure 10).

Table 10. Burrowing Owl Observations within the Project Area

Observation ID	Location (Lat/Lon)	Date	Number of Individuals	Observation
BUOW-1	[redacted]	6/27/2019	1	Owl flew from the hill down to the pond area.
BUOW-2	[redacted]	6/27/2019	1	–
BUOW-3	[redacted]	6/27/2019	1	–
BUOW-4	[redacted]	9/11/2019	4	Four owls in close proximity to one another.
BUOW-5	[redacted]	9/11/2019	4	Four owls in close proximity to one another
BUOW-6	[redacted]	9/11/2019	1	One owl in burrow.
BUOW-7	[redacted]	5/13/2020	0	Pellets and whitewash present at burrow entrance. No owls observed.
BUOW-8	[redacted]	5/13/2020	0	Pellets and whitewash present at burrow entrance. No owls observed.

Other Wildlife Observations

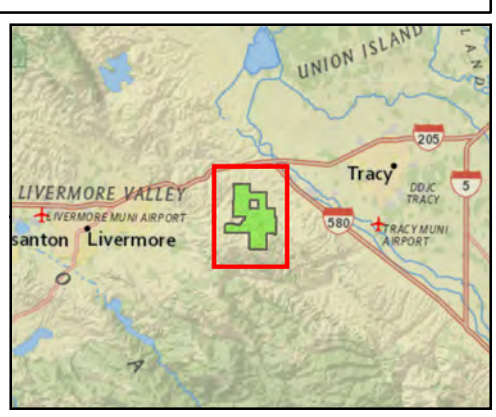
One sandhill crane was observed on May 12, 2020, flying over AUC-06. The individual was observed flying outside of the normal observation area at a height of more than 200 meters, making it impossible to identify subspecies.

One California condor (federally and state endangered and state fully protected) was observed on August 12, 2019, flying with two common ravens over EUC-02 during the golden eagle use survey. The individual was observed soaring at approximately 25–30 m vertical height. Distinguishing features of the condor included long, splayed primaries ("fingers"); large, bald pink patch directly below the head (most likely its neck tucked in); large, gray feet that were obviously larger than any turkey vulture or golden eagle; and distinctive large size. These characteristics indicated it was neither a turkey vulture nor a golden eagle. The condor flew into the valley directly west of EUC-02 where it soared over the opposite hillside and chased a coyote for approximately 2–3 minutes. The bird then flew south of EUC-02 and disappeared out of sight over the adjacent hills. No wing tags were observed on the condor.

The locations of ground squirrel activity centers and ground squirrel burrows were recorded because of the ecological benefit they provide to golden eagles, red-tailed hawks, and burrowing owls. Ground squirrels are a key prey item of golden eagles and red-tailed hawks, and their burrows provide important nesting and wintering habitat for burrowing owls, Very low ground squirrel abundance was observed in the project area south of Patterson Pass Road. High concentrations of ground squirrel activity were observed in three areas under the proposed turbine layout: in the narrow valley just west of Turbines 1 through 5, within a swale and small drainage between Turbines 18 and 19, and along a drainage east of Turbine 26 (Figure 2; Estep 2020).

BUOW-06
BUOW-07
BUOW-02
BUOW-10
BUOW-09
BUOW-08
BUOW-01
BUOW-03
BUOW-05
TRBL-03
BUOW-04
[redacted]

Project Boundary
Proposed Turbine
Transmission Tower
Tree
Nesting Habitat/Tree Stands
Rock Outcrop/Barren Ground
Incidental Burrowing Owl Observation
Tricolored Blackbird Observation (Grefsrud pers. comm.)



0 1,000 2,000 Feet
1:30,000

Figure 10
Other Avian Species

\\PDC\ITPDSGIS2\Projects_4\Brookfield\Mulqueeny_Ranch\Figures\PostSurveyReport\AvianSurveyReport_Year_1\Fig_10_OtherAvianSpecies.mxd User: 34998 Date: 7/13/2020

Chapter 4
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Personal Communications

Grefsrud, Marcia. Environmental Scientist, California Department of Fish and Wildlife. Email to Brad Schafer, Principal/Biologist, ICF—May 19, 2020.

Kolar, Patrick [a]. Golden Eagle Study—Field Coordinator, Diablo Study Area. Email to Brad Schafer, Principal/Biologist, ICF— March 10, 2020.

Kolar, Patrick [b]. Golden Eagle Study—Field Coordinator, Diablo Study Area. Email to Brad Schafer, Principal/Biologist, ICF— June 9, 2020.

Kolar, Patrick [c]. Golden Eagle Study—Field Coordinator, Diablo Study Area. Email to Brad Schafer, Principal/Biologist, ICF— July 2, 2020.

Kolar, Patrick [d]. Golden Eagle Study—Field Coordinator, Diablo Study Area. Email to Brad Schafer, Principal/Biologist, ICF— July 21, 2020.

Wiens, David. Supervisory Research Wildlife Biologist, USGS Forest and Rangeland Ecosystem Science Center. Email to Brad Schafer, Principal/Biologist, ICF— February 25, 2020.

Chapter 5
Preparers

Name	**Project Role**
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Rachel Gardiner	Biologist, ICF
Caityln Bishop	Biologist, ICF
Stephen Barlow	Biologist, ICF
Jason Thoene	GIS Analyst, ICF

Appendix A

Photographs of Avian Use Count Locations

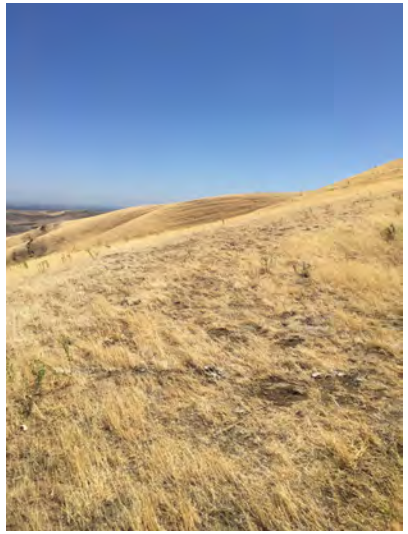
Location AUC-01, looking north.

Location AUC-01, looking south.

Location AUC-01, looking east.

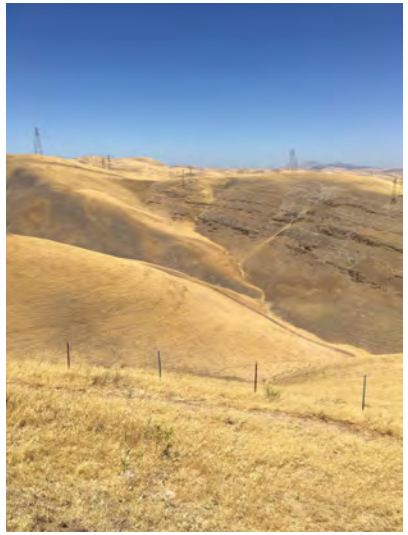
Location AUC-01, looking west.

Location AUC-02, looking north.



Location AUC-02, looking south.

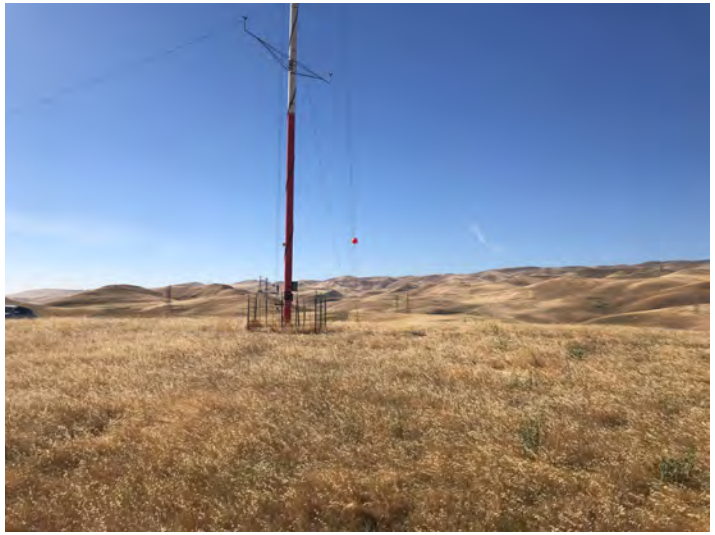
Location AUC-02, looking east.



Location AUC-02, looking west.

Location AUC-03, looking north.

Location AUC-03, looking south.



Location AUC-03, looking east.

Location AUC-03, looking west.

Location AUC-04, looking north.

Location AUC-04, looking south.

Location AUC-04, looking east.

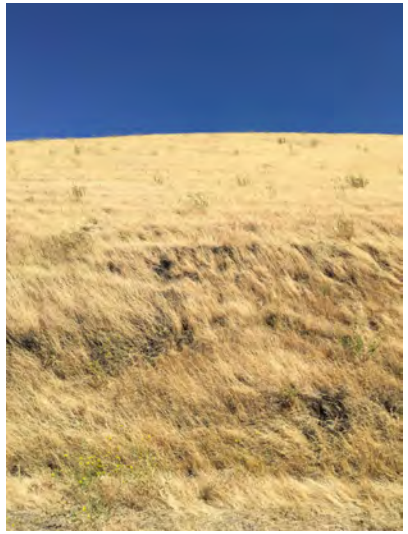
Location AUC-04, looking west.

Graphics ... 00215.20 (7-16-2020) tag

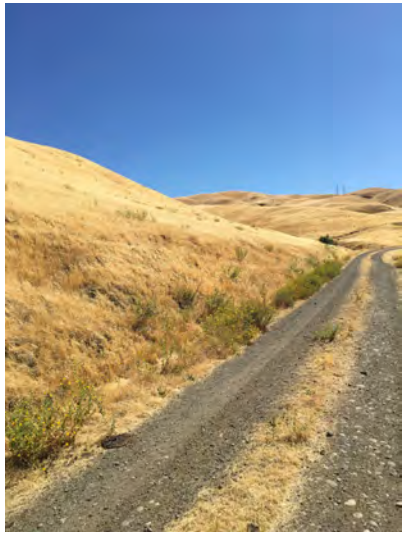
ICF

Appendix A
Avian Use Count Locations

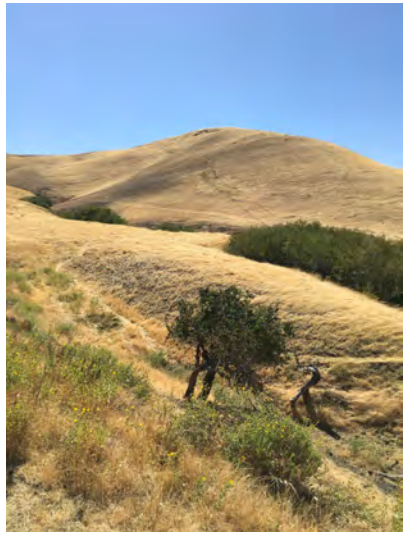
Location AUC-05, looking north.



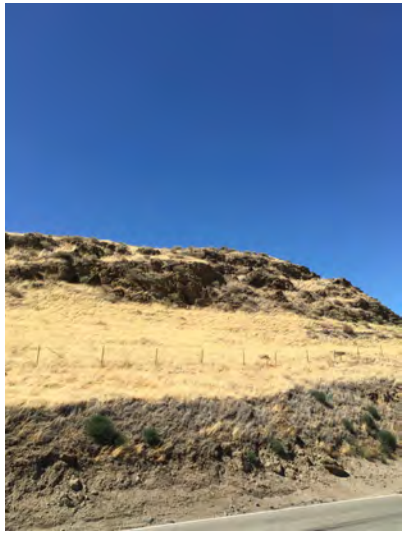
Location AUC-05, looking south.



Location AUC-05, looking east.

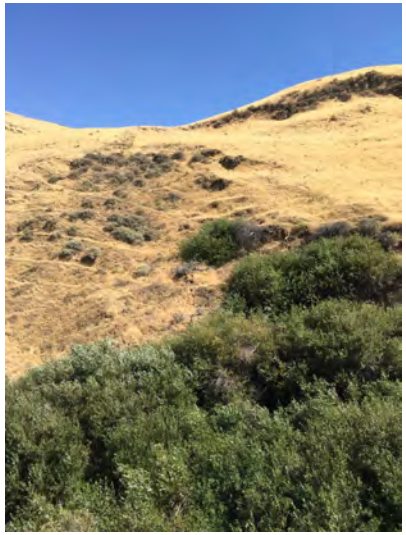


Location AUC-05, looking west.

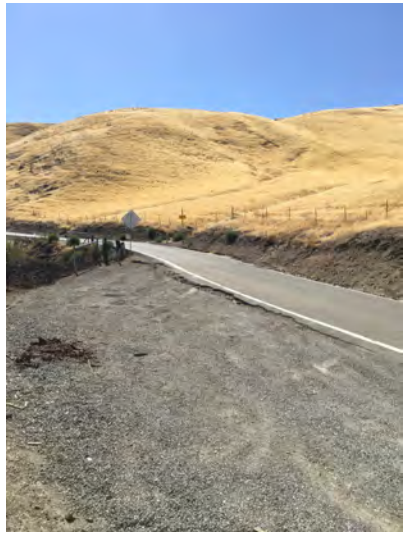


Location AUC-06, looking north.

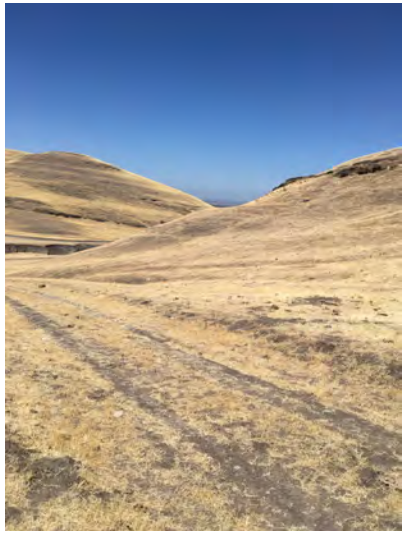
Location AUC-06, looking south.



Location AUC-06, looking east.



Location AUC-06, looking west.



Location AUC-07, looking north.

Location AUC-07, looking south.

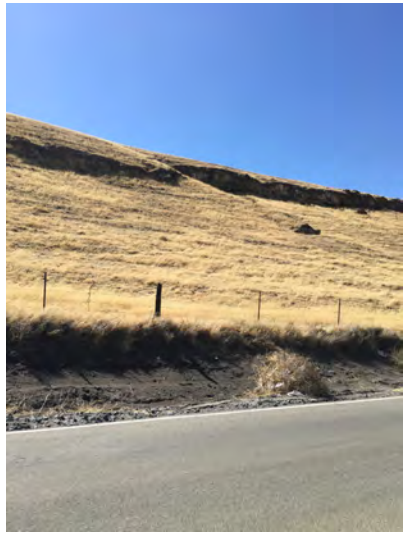
Location AUC-07, looking east.

Location AUC-07, looking west.

Location AUC-08, looking north.

Location AUC-08, looking south.

Location AUC-08, looking east.



Location AUC-08, looking west.

Appendix B

Photographs of Eagle Use Count Locations

Location EUC-01, looking north.

Location EUC-01, looking south.

Location EUC-01, looking east.

Location EUC-01, looking west.

Graphics ... 00215.20 (7-16-2020) tag

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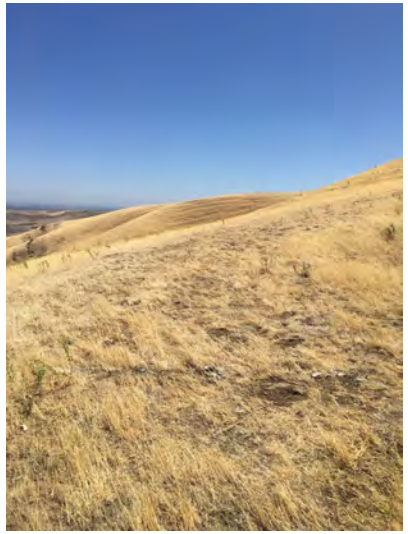
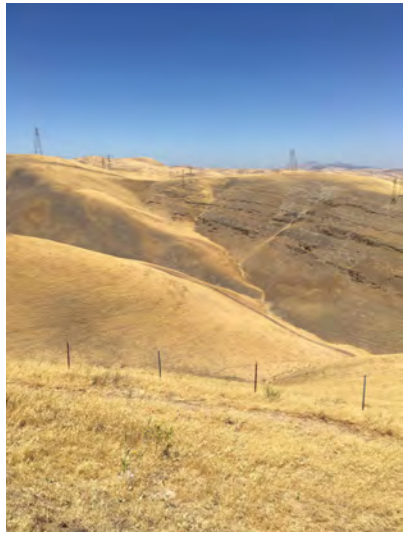
Appendix B
Eagle Use Count Locations

Location EUC-02, looking north.



Location EUC-02, looking south.

Location EUC-02, looking east.



Location EUC-02, looking west.

Graphics ... 00215.20 (7-16-2020) tag

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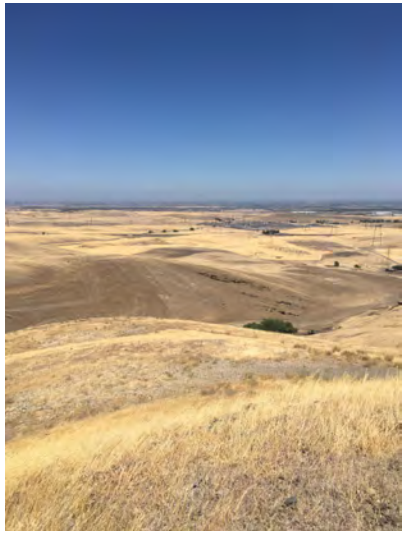
Appendix B
Eagle Use Count Locations

Location EUC-03, looking north.

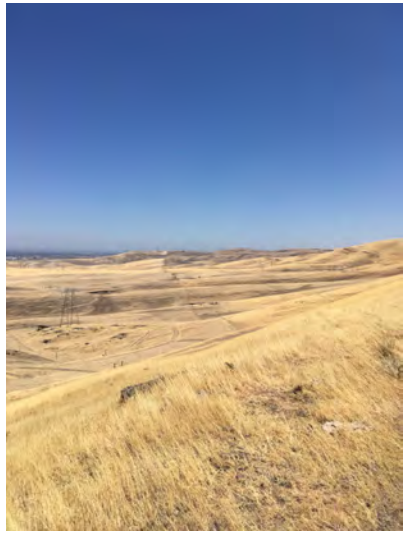
Location EUC-03, looking south.

Location EUC-03, looking east.

Location EUC-03, looking west.

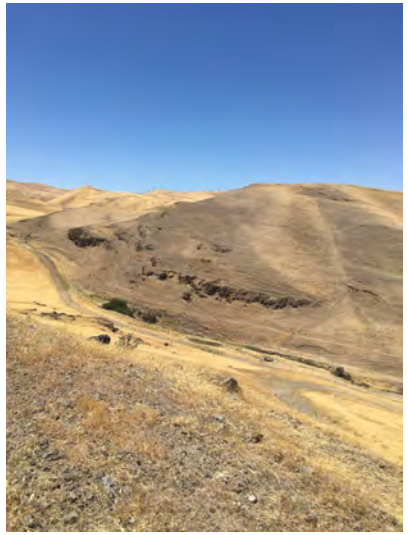


Location EUC-04, looking north.



Location EUC-04, looking south.

Location EUC-04, looking east.



Location EUC-04, looking west.

Location EUC-05, looking north.

Location EUC-05, looking south.

Location EUC-05, looking east.

Location EUC-05, looking west.

Location EUC-06, looking north.

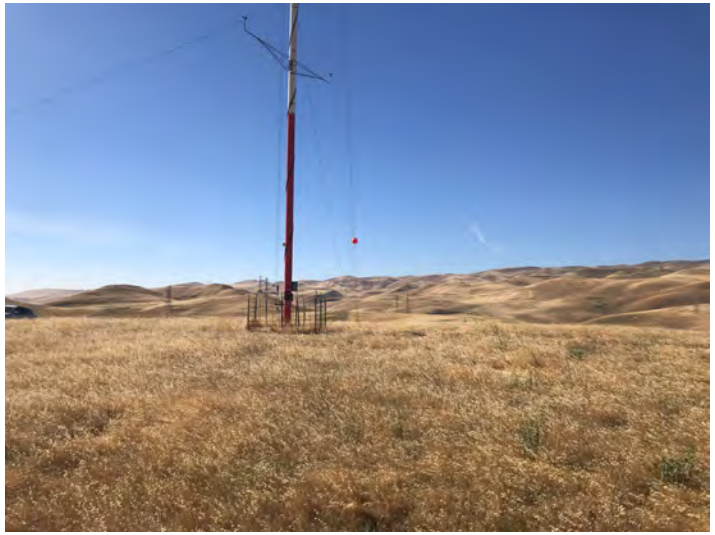
Location EUC-06, looking south.

Location EUC-06, looking east.

Location EUC-06, looking west.

Location EUC-07, looking north.

Location EUC-07, looking south.



Location EUC-07, looking east.

Location EUC-07, looking west.

Location EUC-08, looking north.

Location EUC-08, looking south.

Location EUC-08, looking east.

Location EUC-08, looking west.

Graphics ... 00215.20 (7-16-2020) tag

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Appendix B
Eagle Use Count Locations

Appendix C
List of Surveys

Appendix C-1. List of Avian Use Surveys

Date	Location	Biologist
June 26, 2019	AUC-01	Stephen Barlow
June 27, 2019	AUC-02, AUC-06, AUC-07	Stephen Barlow
June 28, 2019	AUC-03, AUC-04, AUC-05, AUC-08	Stephen Barlow
July 31, 2019	AUC-01, AUC-02, AUC-03, AUC-04, AUC-05, AUC-06, AUC-07, AUC-08	Caitlyn Bishop
August 13, 2019	AUC-04, AUC-05, AUC-06, AUC-08	Caitlyn Bishop
August 14, 2019	AUC-01, AUC-02, AUC-03, AUC-07	Caitlyn Bishop
September 27, 2019	AUC-01, AUC-02	Caitlyn Bishop
September 28, 2019	AUC-03, AUC-04, AUC-05, AUC-06, AUC-07, AUC-08	Caitlyn Bishop
October 29, 2019	AUC-04, AUC-05, AUC-06, AUC-08	Stephen Barlow
October 30, 2019	AUC-01, AUC-02, AUC-07	Stephen Barlow
October 31, 2019	AUC-03	Stephen Barlow
January 23, 2020	AUC-08	Stephen Barlow
January 24, 2020	AUC-02, AUC-04, AUC-05, AUC-07, AUC-08	Caitlyn Bishop
January 24, 2020	AUC-01, AUC-03, AUC-06	Stephen Barlow
February 5, 2020	AUC-03	Caitlyn Bishop
February 25, 2020	AUC-01, AUC-02	Caitlyn Bishop
February 26, 2020	AUC-04, AUC-05, AUC-06, AUC-07, AUC-08	Caitlyn Bishop
May 11, 2020	AUC-03	Stephen Barlow
May 12, 2020	AUC-08	Stephen Barlow
May 12, 2020	AUC-01, AUC-06, AUC-04, AUC-05	Caitlyn Bishop
May 12, 2020	AUC-02, AUC-07	Stephen Barlow
June 8, 2020	AUC-01, AUC-02	Stephen Barlow
June 8, 2020	AUC-05, AUC-06, AUC-08	Caitlyn Bishop
June 9, 2020	AUC-03, AUC-04, AUC-07	Caitlyn Bishop

Appendix C-2. List of Eagle Use Surveys

Date	Location	Biologist
June 19, 2019	EUC-03, EUC-05	Stephen Barlow
June 19, 2019	EUC-06, EUC-07	Caitlyn Bishop
June 20, 2019	EUC-01, EUC-02, EUC-04, EUC-08	Caitlyn Bishop
June 26, 2019	EUC-01, EUC-02, EUC-03, EUC-04	Stephen Barlow
June 27, 2019	EUC-06, EUC-08	Stephen Barlow
June 28, 2019	EUC-05, EUC-07	Stephen Barlow
July 10, 2019	EUC-01, EUC-02, EUC-03, EUC-04, EUC-08	Stephen Barlow
July 11, 2019	EUC-05, EUC-06, EUC-07	Stephen Barlow
July 30, 2019	EUC-01, EUC-02, EUC-03, EUC-04	Caitlyn Bishop
July 31, 2019	EUC-05, EUC-06, EUC-07, EUC-08	Caitlyn Bishop
August 12, 2019	EUC-01, EUC-02, EUC-03, EUC-04, EUC-08	Caitlyn Bishop
August 13, 2019	EUC-05, EUC-06, EUC-07	Caitlyn Bishop
August 26, 2019	EUC-02, EUC-03, EUC-04, EUC-08	Caitlyn Bishop
August 27, 2019	EUC-01, EUC-05, EUC-06, EUC-07	Caitlyn Bishop

Date	Location	Biologist
September 9, 2019	EUC-01, EUC-02, EUC-04, EUC-08	Stephen Barlow
September 11, 2019	EUC-03, EUC-05, EUC-06, EUC-07	Stephen Barlow
September 27, 2019	EUC-01, EUC-02	Caitlyn Bishop
September 28, 2019	EUC-03, EUC-04, EUC-05, EUC-06, EUC-07, EUC-08	Caitlyn Bishop
October 18, 2019	EUC-02, EUC-03, EUC-04, EUC-08	Caitlyn Bishop
October 20, 2019	EUC-05, EUC-06, EUC-07	Caitlyn Bishop
October 21, 2019	EUC-01	Caitlyn Bishop
October 29, 2019	EUC-02, EUC-04, EUC-08	Stephen Barlow
October 30, 2019	EUC-01, EUC-03	Stephen Barlow
October 31, 2019	EUC-05, EUC-06, EUC-07	Stephen Barlow
November 15, 2019	EUC-05, EUC-06, EUC-07	Caitlyn Bishop
November 16, 2019	EUC-01, EUC-02, EUC-03, EUC-08	Caitlyn Bishop
November 17, 2019	EUC-04	Caitlyn Bishop
November 26, 2019	EUC-01, EUC-02, EUC-03, EUC-04, EUC-08,	Stephen Barlow
December 20, 2019	EUC-05, EUC-06, EUC-07, EUC-08	Stephen Barlow
January 3, 2020	EUC-05, EUC-06, EUC-07	Caitlyn Bishop
January 5, 2020	EUC-02, EUC-03, EUC-04, EUC-08	Caitlyn Bishop
January 6, 2020	EUC-01	Caitlyn Bishop
January 7, 2020	EUC-01, EUC-05, EUC-06, EUC-07	Stephen Barlow
January 8, 2020	EUC-02, EUC-03, EUC-04, EUC-08	Stephen Barlow
January 23, 2020	EUC-03, EUC-04, EUC-08	Stephen Barlow
January 24, 2020	EUC-01, EUC-02	Caitlyn Bishop
January 24, 2020	EUC-05, EUC-06, EUC-07	Stephen Barlow
February 4, 2020	EUC-05, EUC-07	Caitlyn Bishop
February 5, 2020	EUC-03, EUC-04, EUC-06, EUC-08	Caitlyn Bishop
February 6, 2020	EUC-01, EUC-02	Caitlyn Bishop
February 25, 2020	EUC-01, EUC-02, EUC-03, EUC-04	Caitlyn Bishop
February 26, 2020	EUC-05, EUC-06, EUC-07, EUC-08	Caitlyn Bishop
March 11, 2020	EUC-03, EUC-05, EUC-06, EUC-07, EUC-08	Caitlyn Bishop
March 13, 2020	EUC-01, EUC-02, EUC-04	Caitlyn Bishop
May 11, 2020	EUC-05, EUC-06, EUC-07	Stephen Barlow
May 12, 2020	EUC-01, EUC-03, EUC-08	Caitlyn Bishop
May 12, 2020	EUC-02, EUC-04	Stephen Barlow
May 28, 2020	EUC-01, EUC-03, EUC-04, EUC-08	Caitlyn Bishop
May 28, 2020	EUC-02	Stephen Barlow
May 29, 2020	EUC-05, EUC-06, EUC-07	Caitlyn Bishop
June 8, 2020	EUC-01, EUC-02	Stephen Barlow
June 8, 2020	EUC-03, EUC-04, EUC-08	Caitlyn Bishop
June 9, 2020	EUC-05, EUC-06, EUC-07	Caitlyn Bishop
June 26, 2020	EUC-01, EUC-02, EUC-04	Caitlyn Bishop
June 27, 2020	EUC-03	Caitlyn Bishop
June 30, 2020	EUC-05, EUC-06, EUC-07, EUC-08	Stephen Barlow

Appendix D

Eagle Observation Dates, Behaviors, and Flight Times

Appendix D. Eagle Observation Dates, Eagle Behaviors, and Flight Times

Observation Date	Location	Behavior	Species	Flight Time in RSA (min.)[a]	Total Viewing Minutes
June 19, 2019	EUC-07	Soaring flight	Golden eagle	6	14
June 19, 2019	EUC-07	Perch	Golden eagle	44	44
June 19, 2019	EUC-06	Soaring flight	Golden eagle	4	11
June 19, 2019	EUC-05	Soaring flight	Golden eagle	0	5
June 19, 2019	EUC-05	Unidirectional flapping/gliding	Golden eagle	0	3
June 19, 2019	EUC-03	Soaring flight	Golden eagle	15	29
June 19, 2019	EUC-03	Soaring flight	Golden eagle	0	1
June 19, 2019	EUC-03	Soaring flight	Golden eagle	6	8
June 19, 2019	EUC-03	–	Golden eagle	0	3
June 20, 2019	EUC-08	Soaring flight	Golden eagle	3	5
June 20, 2019	EUC-04	Soaring flight	Golden eagle	2	3
June 20, 2019	EUC-02	Soaring flight	Golden eagle	4	7
June 26, 2019	EUC-04	Soaring flight	Golden eagle	1	1
June 26, 2019	EUC-03	Soaring flight	Golden eagle	2	4
June 26, 2019	EUC-02	Soaring flight	Golden eagle	0	3
June 27, 2019	EUC-06	Soaring flight	Golden eagle	5	12
June 27, 2019	EUC-06	Perch	Golden eagle	1	1
June 27, 2019	EUC-08	Soaring flight	Golden eagle	2	3
June 27, 2019	EUC-08	Unidirectional flapping/gliding	Golden eagle	3	6
June 28, 2019	EUC-07	Soaring flight	Golden eagle	7	12
June 28, 2019	EUC-07	Perch	Golden eagle	1	1
June 28, 2019	EUC-05	Perch	Golden eagle	2	2
July 10, 2019	EUC-08	Perch	Golden eagle	1	1
July 10, 2019	EUC-04	Soaring flight	Golden eagle	4	4
July 10, 2019	EUC-04	Stooping or diving at other eagle	Golden eagle	7	10
July 10, 2019	EUC-03	Soaring flight	Golden eagle	5	10
July 10, 2019	EUC-02	Soaring flight	Golden eagle	1	3
July 10, 2019	EUC-01	Soaring flight	Golden eagle	2	7
July 11, 2019	EUC-07	Soaring flight	Golden eagle	6	15
July 11, 2019	EUC-07	Soaring flight	Golden eagle	2	6
July 11, 2019	EUC-07	Soaring flight	Golden eagle	2	6
July 11, 2019	EUC-07	Perch	Golden eagle	1	1
July 11, 2019	EUC-06	Soaring flight	Golden eagle	1	10
July 11, 2019	EUC-05	Stooping or diving at prey	Golden eagle	0	3
July 30, 2019	EUC-04	Soaring flight	Golden eagle	11	11
July 30, 2019	EUC-04	Unidirectional flapping/gliding	Golden eagle	2	2
July 30, 2019	EUC-03	Soaring flight	Golden eagle	3	3
July 30, 2019	EUC-01	Soaring flight	Golden eagle	11	11

Observation Date	Location	Behavior	Species	Flight Time in RSA (min.)[a]	Total Viewing Minutes
July 30, 2019	EUC-01	Kiting/hovering	Golden eagle	6	6
July 31, 2019	EUC-06	Soaring flight	Golden eagle	5	5
July 31, 2019	EUC-06	Unidirectional flapping/gliding	Golden eagle	9	11
July 31, 2019	EUC-06	Perch	Golden eagle	4	4
July 31, 2019	EUC-05	Soaring flight	Golden eagle	4	4
July 31, 2019	EUC-08	Soaring flight	Golden eagle	2	5
July 31, 2019	EUC-08	Unidirectional flapping/gliding	Golden eagle	0	3
August 12, 2019	EUC-03	Soaring flight	Golden eagle	3	5
August 13, 2019	EUC-05	Soaring flight	Golden eagle	6	10
August 13, 2019	EUC-05	Unidirectional flapping/gliding	Golden eagle	3	3
August 26, 2019	EUC-08	Soaring flight	Golden eagle	4	5
August 26, 2019	EUC-08	Perch	Golden eagle	26	26
September 9, 2019	EUC-04	Soaring flight	Golden eagle	0	3
September 9, 2019	EUC-02	Soaring flight	Golden eagle	0	3
September 11, 2019	EUC-07	Soaring flight	Golden eagle	0	3
September 11, 2019	EUC-07	Unidirectional flapping/gliding	Golden eagle	0	3
September 11, 2019	EUC-07	Perch	Golden eagle	0	0
September 11, 2019	EUC-06	Soaring flight	Golden eagle	0	3
September 11, 2019	EUC-06	Unidirectional flapping/gliding	Golden eagle	2	3
September 11, 2019	EUC-06	Perch	Golden eagle	1	1
September 11, 2019	EUC-05	Soaring flight	Golden eagle	0	3
September 11, 2019	EUC-05	Unidirectional flapping/gliding	Golden eagle	1	3
September 11, 2019	EUC-05	Unidirectional flapping/gliding	Golden eagle	1	3
September 11, 2019	EUC-05	Perch	Golden eagle	1	1
September 11, 2019	EUC-05	Perch	Golden eagle	1	1
September 28, 2019	EUC-07	Soaring flight	Golden eagle	7	8
September 28, 2019	EUC-07	Soaring flight	Golden eagle	7	13
September 28, 2019	EUC-07	Unidirectional flapping/gliding	Golden eagle	1	3
September 28, 2019	EUC-05	Soaring flight	Golden eagle	3	3
October 21, 2019	EUC-07	Soaring flight	Golden eagle	4	4
October 29, 2019	EUC-04	Soaring flight	Golden eagle	0	3
October 30, 2019	EUC-03	Soaring flight	Golden eagle	2	3
October 31, 2019	EUC-07	Unidirectional flapping/gliding	Golden eagle	0	2
November 15, 2019	EUC-06	Soaring flight	Golden eagle	5	5
November 15, 2019	EUC-05	Soaring flight	Golden eagle	4	5
November 15, 2019	EUC-05	Soaring flight	Golden eagle	2	2
November 15, 2019	EUC-05	Perch	Golden eagle	13	13
November 26, 2019	EUC-08	Soaring flight	Golden eagle	0	5
November 26, 2019	EUC-08	Unidirectional flapping/gliding	Golden eagle	3	5

Observation Date	Location	Behavior	Species	Flight Time in RSA (min.)[a]	Total Viewing Minutes
November 26, 2019	EUC-04	Unidirectional flapping/gliding	Golden eagle	2	3
November 26, 2019	EUC-04	Perch	Golden eagle	14	14
January 5, 2020	EUC-08	Soaring flight	Golden eagle	3	4
January 5, 2020	EUC-04	Soaring flight	Bald eagle	2	2
January 7, 2020	EUC-05	Unidirectional flapping/gliding	Golden eagle	0	3
January 8, 2020	EUC-04	Soaring flight	Golden eagle	1	5
January 8, 2020	EUC-03	Unidirectional flapping/gliding	Golden eagle	0	4
January 24, 2020	EUC-07	Soaring flight	Golden eagle	1	6
January 24, 2020	EUC-05	Soaring flight	Golden eagle	2	5
February 4, 2020	EUC-07	Soaring flight	Golden eagle	12	12
February 5, 2020	EUC-08	Soaring flight	Golden eagle	5	7
February 5, 2020	EUC-04	Soaring flight	Golden eagle	5	5
February 5, 2020	EUC-03	Soaring flight	Golden eagle	5	9
February 6, 2020	EUC-01	Soaring flight	Golden eagle	8	8
February 25, 2020	EUC-04	Soaring flight	Golden eagle	1	2
February 25, 2020	EUC-03	Soaring flight	Golden eagle	0	4
February 25, 2020	EUC-02	Soaring flight	Golden eagle	2	4
February 25, 2020	EUC-02	Soaring flight	Golden eagle	4	5
February 25, 2020	EUC-02	Soaring flight	Golden eagle	4	5
February 25, 2020	EUC-02	Soaring flight	Golden eagle	5	6
February 25, 2020	EUC-02	Soaring flight	Golden eagle	5	6
February 25, 2020	EUC-02	Soaring flight	Golden eagle	1	1
February 25, 2020	EUC-02	Unidirectional flapping/gliding	Golden eagle	3	3
February 25, 2020	EUC-02	Unidirectional flapping/gliding	Golden eagle	2	2
February 25, 2020	EUC-01	Unidirectional flapping/gliding	Golden eagle	4	5
February 26, 2020	EUC-07	Soaring flight	Golden eagle	8	12
February 26, 2020	EUC-08	Soaring flight	Golden eagle	6	6
March 11, 2020	EUC-07	Soaring flight	Golden eagle	1	2
March 11, 2020	EUC-07	Soaring flight	Golden eagle	11	12
March 11, 2020	EUC-07	Soaring flight	Golden eagle	13	14
March 11, 2020	EUC-07	Soaring flight	Golden eagle	13	14
March 11, 2020	EUC-06	Soaring flight	Golden eagle	8	8
March 11, 2020	EUC-06	Soaring flight	Golden eagle	7	7
March 11, 2020	EUC-06	Unidirectional flapping/gliding	Golden eagle	1	1
March 11, 2020	EUC-06	Perch	Golden eagle	15	15
March 11, 2020	EUC-06	Perch	Golden eagle	7	7
March 11, 2020	EUC-05	Soaring flight	Golden eagle	3	3
March 11, 2020	EUC-08	Soaring flight	Golden eagle	7	11
March 11, 2020	EUC-08	Soaring flight	Golden eagle	0	8

Observation Date	Location	Behavior	Species	Flight Time in RSA (min.)[a]	Total Viewing Minutes
March 11, 2020	EUC-08	Soaring flight	Golden eagle	0	11
March 13, 2020	EUC-01	Soaring flight	Golden eagle	1	1
March 13, 2020	EUC-01	Soaring flight	Golden eagle	0	4
March 13, 2020	EUC-01	Soaring flight	Golden eagle	0	3
May 11, 2020	EUC-07	Soaring flight	Golden eagle	1	2
May 11, 2020	EUC-07	Unidirectional flapping/gliding	Golden eagle	1	3
May 11, 2020	EUC-06	Perch	Golden eagle	38	38
May 12, 2020	EUC-04	Soaring flight	Golden eagle	1	8
May 12, 2020	EUC-04	Soaring flight	Golden eagle	0	3
May 12, 2020	EUC-02	Soaring flight	Golden eagle	1	3
May 12, 2020	EUC-02	Unidirectional flapping/gliding	Golden eagle	2	4
May 28, 2020	EUC-04	Soaring flight	Golden eagle	2	2
May 28, 2020	EUC-02	Soaring flight	Golden eagle	1	14
May 29, 2020	EUC-07	Soaring flight	Golden eagle	5	6
May 29, 2020	EUC-07	Kiting/hovering	Golden eagle	0	2
May 29, 2020	EUC-06	Soaring flight	Golden eagle	7	7
May 29, 2020	EUC-06	Perch	Golden eagle	31	31
June 9, 2020	EUC-07	Soaring flight	Golden eagle	0	4

Abbreviations:
GOEA = golden eagle.
RSA = rotor-swept area.
[a] A value of "0" indicates that an eagle was observed during the EUC survey but was perched.