Final

Burrowing Owl (*Athene cunicularia*) Survey Report in Support of the Proposed Fallon Range Training Complex Expansion, Nevada

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[*Cover photo*: Burrowing owls associated with a system of burrows on a sandy mound in southern Dixie Valley. Six individuals can be seen in the photograph. Photo: E. Rose, ManTech]

TABLE OF CONTENTS

Acronyms and Abbreviations iv

1.0 INTRODUCTION 5

1.1 Study Area 5

1.2 Burrowing Owl Status, Natural History, Habitat, and Distribution 7

1.3 Previous Occurrences of Burrowing Owls within the Project Area During the Breeding Season (May – August) 10

1.4 Previous Occurrences of Burrowing Owls within the Project Area During the Non-breeding Season (September – April) 10

2.0 METHODS 11

2.1 Ground Surveys 11

2.1.1. Establishment of Survey Routes and Points 11

2.1.2. Ground Survey Methodology 18

2.2 Aerial Surveys 18

2.2.1. Establishment of Aerial Survey Areas and Routes 19

2.2.2. Aerial Survey Methodology 26

3.0 RESULTS 27

3.1 Non-breeding Season Surveys 27

3.1.1. 2018 Surveys 27

3.2 Breeding Season Surveys 29

3.2.1. 2018 Ground Surveys 29

3.2.2. 2019 Ground Surveys 31

3.2.3. 2019 Aerial Surveys 34

3.2.4. Association of Burrowing Owls with Vegetation Communities 36

3.2.5. Identification of Other Burrows 37

3.3 Incidental Observations of Other Nocturnal Avian Species 38

4.0 DISCUSSION 40

4.1 Evidence of Breeding and Seasonality 40

4.2 Aerial Survey Considerations 40

5.0 REFERENCES 42

APPENDICES

Appendix A: Locations of Burrowing Owl Ground Survey Points (2018)

Appendix B: Locations of Burrowing Owl Ground Survey Points (2019)

Appendix C: Photographs of Representative Burrowing Owl Survey Points on Ground-based Routes

List of Figures

Figure 1-1. Regional Location of the Proposed FRTC Expansion Areas 6

Figure 1-2. Burrowing Owl 7

Figure 1-3. Distribution of the Burrowing Owl in North America 7

Figure 1-4. Predicted Seasonal Distribution of the Burrowing Owl in Nevada 9

Figure 2-1. Locations of 2018 Ground-based Burrowing Owl Survey Routes and Points within the Proposed B-16 Expansion Area 14

Figure 2-2. Locations of 2018 and 2019 Ground-based Burrowing Owl Survey Routes and Points within the Proposed B-17 and Southern DVTA Expansion Areas 15

Figure 2-3. Locations of 2018 Ground-based Burrowing Owl Survey Routes and Points within the Proposed B-20 Expansion Area 16

Figure 2-4. Locations of 2018 and 2019 Ground-based Burrowing Owl Survey Routes and Points within the Proposed Northern DVTA Expansion Area 17

Figure 2-5. Tier 1, Tier 2, and Tier 3 Aerial Burrowing Owl Survey Areas within the Proposed B-17 and Southern DVTA Expansion Areas 20

Figure 2-6. Tier 2 and Tier 3 Aerial Burrowing Owl Survey Areas within the Proposed B-16 Expansion Area 21

Figure 2-7. Tier 2 and Tier 3 Aerial Burrowing Owl Survey Areas within the Proposed B-20 Expansion Area 22

Figure 2-8. Tier 2 and Tier 3 Aerial Burrowing Owl Survey Locations within the Proposed Northern DVTA Expansion Area 23

Figure 2-9. Locations of Historical Burrowing Owl Locations within the Proposed FRTC Expansion Areas 24

Figure 2-10. *Left*: MD 500 Helicopter; *Middle*: Photo of Burrowing Owl Taken with Telephoto Lens from Helicopter; *Right*: General North-South Aerial Transect Pattern over Survey Areas 26

Figure 3-1. Burrow Complex and Burrowing Owl Sign Found during 2018 Non-breeding Burrowing Owl Ground Surveys within the Proposed B-16 Expansion Area 27

Figure 3-2. Detections of Burrowing Owls during 2017, 2018, and 2019 Ground and Aerial Surveys within the Proposed B-16 Expansion Area 28

Figure 3-3. Detections of Burrowing Owls during 2017, 2018, and 2019 Ground and Aerial Surveys within the Proposed B-17 Expansion Area 30

Figure 3-4. Detections of Burrowing Owls during 2018 and 2019 Ground and Aerial Surveys within the Proposed B-20 Expansion Area 32

Figure 3-5. Detections of Burrowing Owls during 2017, 2018, and 2019 Ground and Aerial Surveys within the Proposed Northern DVTA Expansion Area 33

Figure 3-6. Incidental Detections of Other Nocturnal Avian Species within the Proposed FRTC Expansion Areas 39

Figure 4-1. Aerial Surveys Provided Evidence of Burrowing Owls and Burrowing Owl Activity: (A) Individual Bird, (B) Whitewash, (C) Tracks, and (D) Pellets 41

List of Tables

Table 1-1. Previous Burrowing Owl Detections within the Existing FRTC Ranges and Proposed FRTC Expansion Areas during the Breeding Season (May – August) 10

Table 1-2. eBird and NDOW Burrowing Owl Records within Northern Nevada during the Non-breeding Season (September – April) 11

Table 2-1. Vegetation Formations and Alliances Found within the Proposed FRTC Expansion Areas 12

Table 2-2. Stratification of 2018 and 2019 Burrowing Owl Ground-based Survey Routes across Vegetation Alliances 13

Table 2-3. Burrowing Owl Ground Survey Effort by Proposed Expansion Area and Survey Year 13

Table 2-4. Establishment of 2019 Tier 2 Aerial Survey Routes Based on Previous Burrowing Owl Detections within Existing FRTC Areas and Proposed FRTC Expansion Areas 19

Table 2-5. Vegetation Alliances Containing Potentially Suitable Burrowing Owl Habitat and Used for Tier 3 Aerial Burrowing Owl Surveys 25

Table 3-1. Survey Effort Summary for 2018 and 2019 Ground-based Burrowing Owl Surveys within Proposed FRTC Expansion Areas 27

Table 3-2. Burrowing Owl Detections during 2018 Breeding Season Ground-based Surveys within Proposed FRTC Expansion Areas 29

Table 3-3. Burrowing Owl Detections during 2019 Breeding Season Ground-based Surveys within the Proposed FRTC Expansion Areas 31

Table 3-4. Summary of 2019 Tiered Aerial Surveys by Tier, Area, Effort, and Date 34

Table 3-5. Summary of 2019 Aerial Surveys by Proposed Expansion Area, Tier, Area, and Effort 34

Table 3-6. Summary of Burrowing Owls and Burrows with Burrowing Owl Sign Detected within the Proposed FRTC Expansion Areas during 2019 Aerial Surveys 35

Table 3-7. Summary of Burrowing Owls and Active and Inactive Burrows Detected within the Proposed FRTC Expansion Areas during 2019 Aerial Surveys 35

Table 3-8. 2017, 2018, and 2019 Burrowing Owl Breeding Season Detections Summarized by Vegetation Community 36

Table 3-9. Burrowing Owl and Active Burrow Density by Vegetation Alliance within the Proposed FRTC Expansion Areas from 2019 Aerial Surveys* 37

Acronyms and Abbreviations

ac	acre(s)
BLM	Bureau of Land Management
DFW	Department of Fish and Wildlife
DNR	Department of Natural Resources
DoN	U.S. Department of the Navy
DVTA	Dixie Valley Training Area
FRTC	Fallon Range Training Complex
ft	foot/feet
GBBO	Great Basin Bird Observatory
ha	hectare(s)
hr	hour(s)
km^2	square kilometer(s)
m	meter(s)
NAS	Naval Air Station
NDOW	Nevada Department of Wildlife
NNHP	Nevada Natural Heritage Program
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
WAP	Wildlife Action Plan

1.0 INTRODUCTION

Naval Air Station (NAS) Fallon manages the Fallon Range Training Complex (FRTC), which currently encompasses a combination of withdrawn and acquired lands totaling approximately 223,600 acres (ac) (90,490 hectares [ha]) of military training land located near Fallon, Nevada (Figure 1-1). The FRTC is the United States (U.S.) Department of the Navy's (DoN or Navy) premier integrated strike warfare training complex, supporting air units and special operations forces in a variety of mission areas. Since World War II, the Navy has extensively used the ranges and airspace of the FRTC to conduct military air warfare and ground training, including live-fire training activities. However, the current training areas are insufficient for implementation of realistic training scenarios and do not provide required buffers for public safety. In order to effectively meet these needs, the Navy proposes to modernize the land and airspace configurations of the FRTC. The Navy is currently proposing to expand the land administered by NAS Fallon by approximately 680,000 ac (275,200 ha). The proposed expansion area is composed of four discontinuous areas associated with four of the current training ranges (ranges B-16, B-17, B-20, and Dixie Valley Training Area [DVTA]) (Figure 1-1):

- The area west of B-16 is the proposed B-16 expansion area.
- The area surrounding B-20 is the proposed B-20 expansion area.
- The areas west and east of B-17 and south of Highway 50, and areas north of Highway 50 surrounding the DVTA are the proposed DVTA expansion areas.
- The area south of B-17 and Highway 50 and east of B-17 is the proposed B-17 expansion area.

Currently, the Navy is preparing an Environmental Impact Statement (EIS) to assess the potential environmental effects of the proposed FRTC expansion. In support of the EIS, Naval Facilities Engineering Command, Southwest contracted ManTech International Corporation to perform a variety of ecological surveys to inventory the flora and fauna within the proposed FRTC expansion areas. This report details the results of burrowing owl (*Athene cunicularia*) surveys conducted in 2018 under contract N62742-14-D-1863, Task Order N6247317F4650 and in 2019 under Task Order N6247317F4650, Modification #P00001 (Figure 1-1).

1.1 STUDY AREA

The study area is defined as the area within and adjacent to the proposed FRTC expansion areas and includes portions of Churchill, Mineral, Nye, Pershing, and Lyon counties (Figure 1-1). It lies within the geographic feature known as the Great Basin, particularly the Great Basin Desert. The Great Basin Desert is the largest desert in the U.S., roughly bounded by the Sierra Nevada – Cascade mountain ranges to the west and the Rocky Mountains to the east. Between these large mountain ranges are a series of basins interspersed by smaller, north-south running mountain ranges. This desert covers roughly 158,000 square miles (409,218 square kilometers [km^2]) of southern Idaho, southeastern Oregon, western Utah, eastern California, and nearly all of Nevada (MacMahon 1985). The Great Basin Desert is a high, cold desert, with most of its elevations over 4,000 feet (ft) 1,200 meters [m]), and most of its precipitation in the form of snow, although rain showers can occur throughout the year (Sowell 2001).

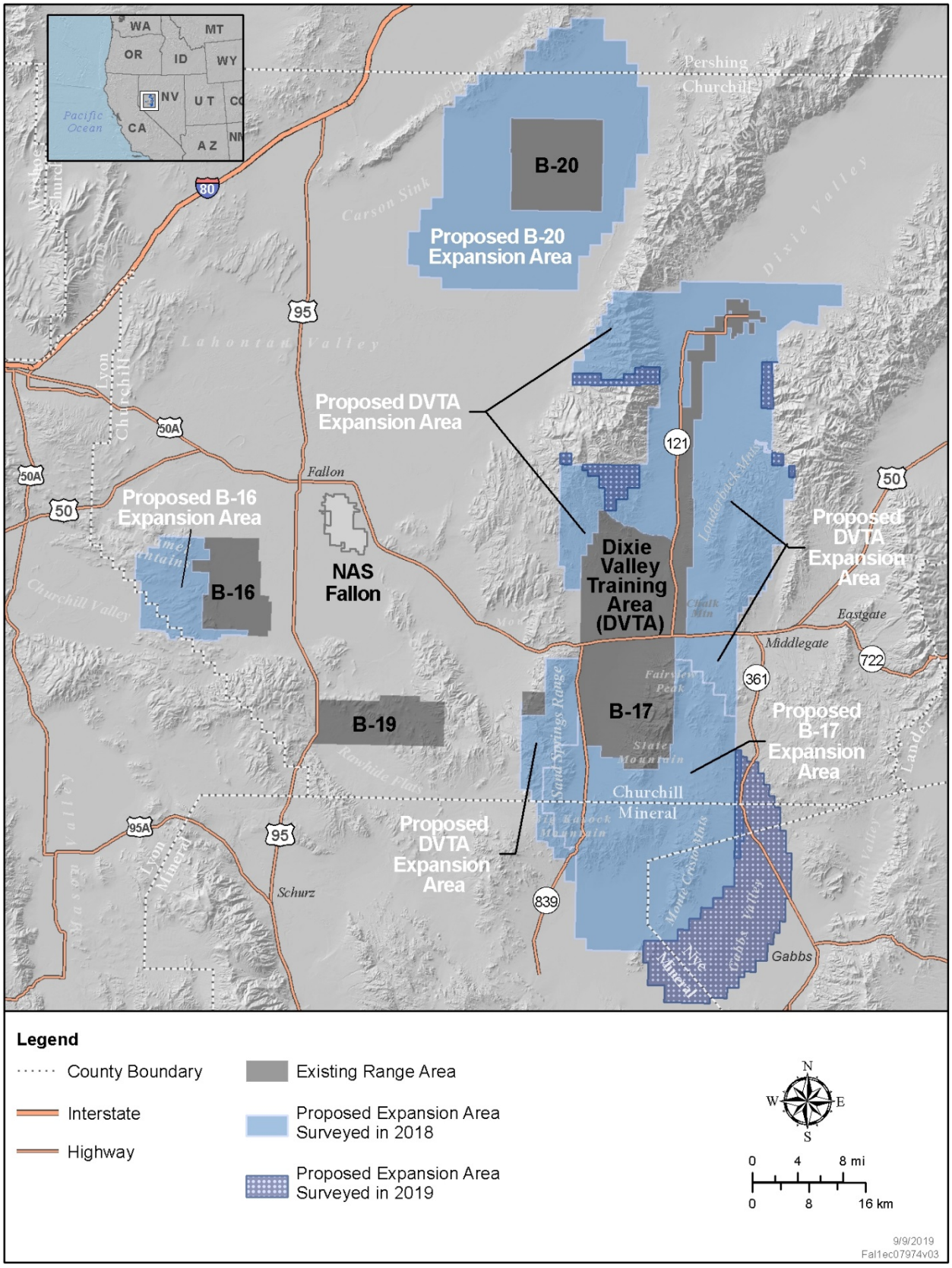

Figure 1-1. Regional Location of the Proposed FRTC Expansion Areas

1.2 BURROWING OWL STATUS, NATURAL HISTORY, HABITAT, AND DISTRIBUTION

The burrowing owl is a small (length 9.5 inches [24 centimeters {cm}], wing span 21 inches [53 cm], weight 5 ounces [142 grams]), long-legged, ground-dwelling owl that nests in underground burrows (Figure 1-2). It is generally crepuscular but can be active both day and night. It is iconic within grasslands and arid regions throughout the western U.S., Florida, southern portions of the western Canadian provinces, Mexico, and the Caribbean (Poulin et al. 2011) (Figure 1-3).

Figure 1-2. Burrowing Owl
(Photo: A. Vernon)

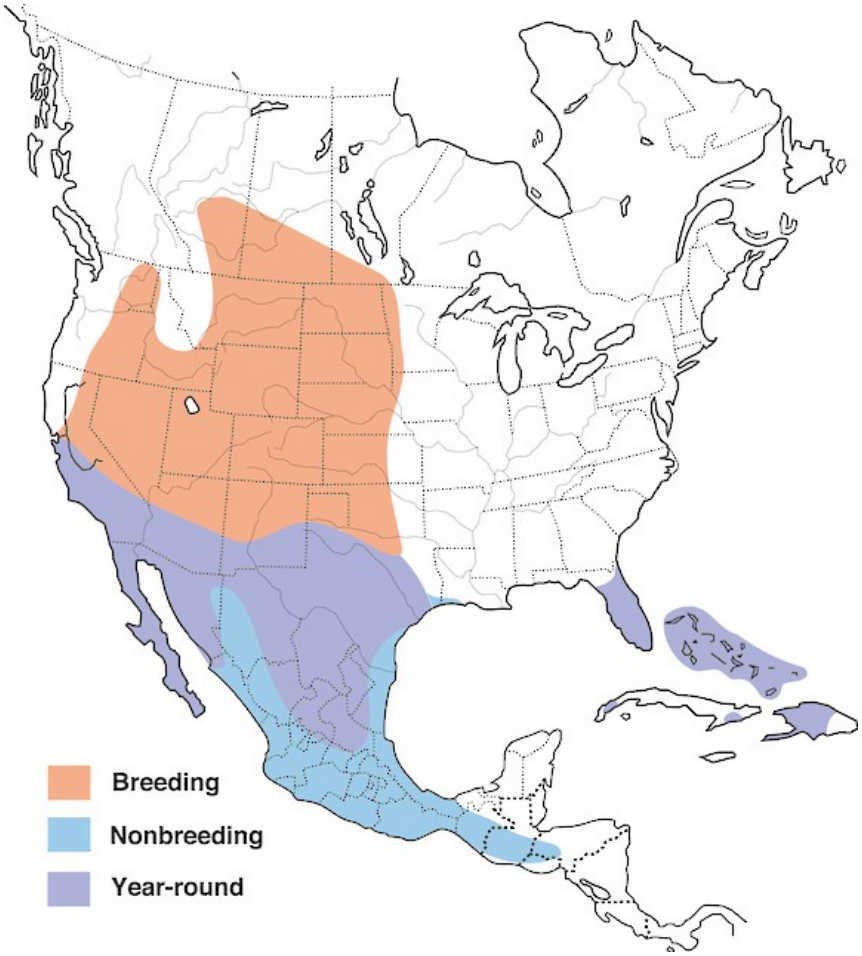

Figure 1-3. Distribution of the Burrowing Owl in North America
(*Source*: Poulin et al. 2011)

Burrowing owl populations throughout much of the species' range have experienced strong declines during the past half century (Poulin et al. 2011; Sauer et al. 2017). As a result, collaboration between local organizations as well as state and federal governments has facilitated a variety of conservation efforts, including reintroduction programs, artificial burrow programs, habitat protection, and protective legislation. The species is protected under the Migratory Bird Treaty Act and is currently listed as a Bird of

Conservation Concern by the U.S. Fish and Wildlife Service (USFWS) (USFWS 2008). Although the species is not listed under the Endangered Species Act (ESA), it was previously considered a potential candidate for listing under the ESA and remains a species of conservation concern throughout much of its range. Notably, it is listed as endangered in Minnesota (Minnesota Department of Natural Resources [DNR] 2013); threatened in Colorado (Colorado Parks and Wildlife 2018); a candidate for state listing in Washington (Washington Department of Fish and Wildlife [DFW] 2018); a Species of Concern or Sensitive Species in California (California DFW 2018), Montana (Montana Natural Heritage Program 2016), Oregon (Oregon DFW 2016), and Utah (Utah DNR 2017); and a Protected Bird and Species of Greatest Conservation Need in Wyoming (Wyoming Game and Fish Department 2017). In Nevada, the burrowing owl is a Bureau of Land Management (BLM) Sensitive Species (BLM 2017), Conservation Priority Species under the Nevada Wildlife Action Plan (WAP) (Nevada WAP Team 2013), and ranked by the Nevada Natural Heritage Program (NNHP) as vulnerable (breeding) (NNHP 2018a).

The species uses a wide variety of habitats within arid and semi-arid environments, with some populations exhibiting seasonal migrations, as well as seasonal shifts in habitat use. The breeding season generally extends from middle March to late August, with birds in the northern portions of the range initiating nests a couple of weeks later than those in the southern portion of their range (Poulin et al. 2011). Breeding habitats are characterized by gently sloping topography with well-drained soils, sparse vegetation, and extensive bare ground (Dechant et al. 2002; Poulin et al. 2011). Importantly, burrowing owl densities are typically greatest in areas with high densities of mammal burrows or other ground cavities (Klute et al. 2003; Poulin et al. 2005). Throughout their range, the western burrowing owl nests in burrows created by prairie dogs (*Cynomys* spp.), ground squirrels (*Spermophilus* spp.), yellow-bellied marmots (*Marmota flaviventris*), woodchucks (*Marmota monax*), skunks, foxes, coyotes (*Canis latrans*), and American badgers (*Taxidea taxus*), in addition to natural and man-made cavities (Poulin et al. 2011).

Information about burrowing owl habitat use during the non-breeding season (September through April) is limited; however, burrowing owls are known to exhibit high breeding site fidelity across years (Rich 1984). While some populations within south-central Nevada have been shown to use the same burrows for roosting during the non-breeding season that they used during the breeding season, others show increased use of agricultural fields and culverts during non-breeding months (Poulin et al. 2011). However, the Nevada Bird Count program efforts suggest that throughout much of northern Nevada, burrowing owls are typically present only during the breeding season and are not present during the non-breeding season (Figure 1-4) (Herron et al. 1985; Ryser 1985; Great Basin Bird Observatory [GBBO] 2010). Notably, eBird records within northern Nevada counties are extremely uncommon during the non-breeding months. From 2009 through 2016, only 23 individuals were reported outside of Clark, Lincoln, Nye, Esmeralda, and Mineral counties during the non-breeding season (see Section 1.4) (Fink et al. 2018).

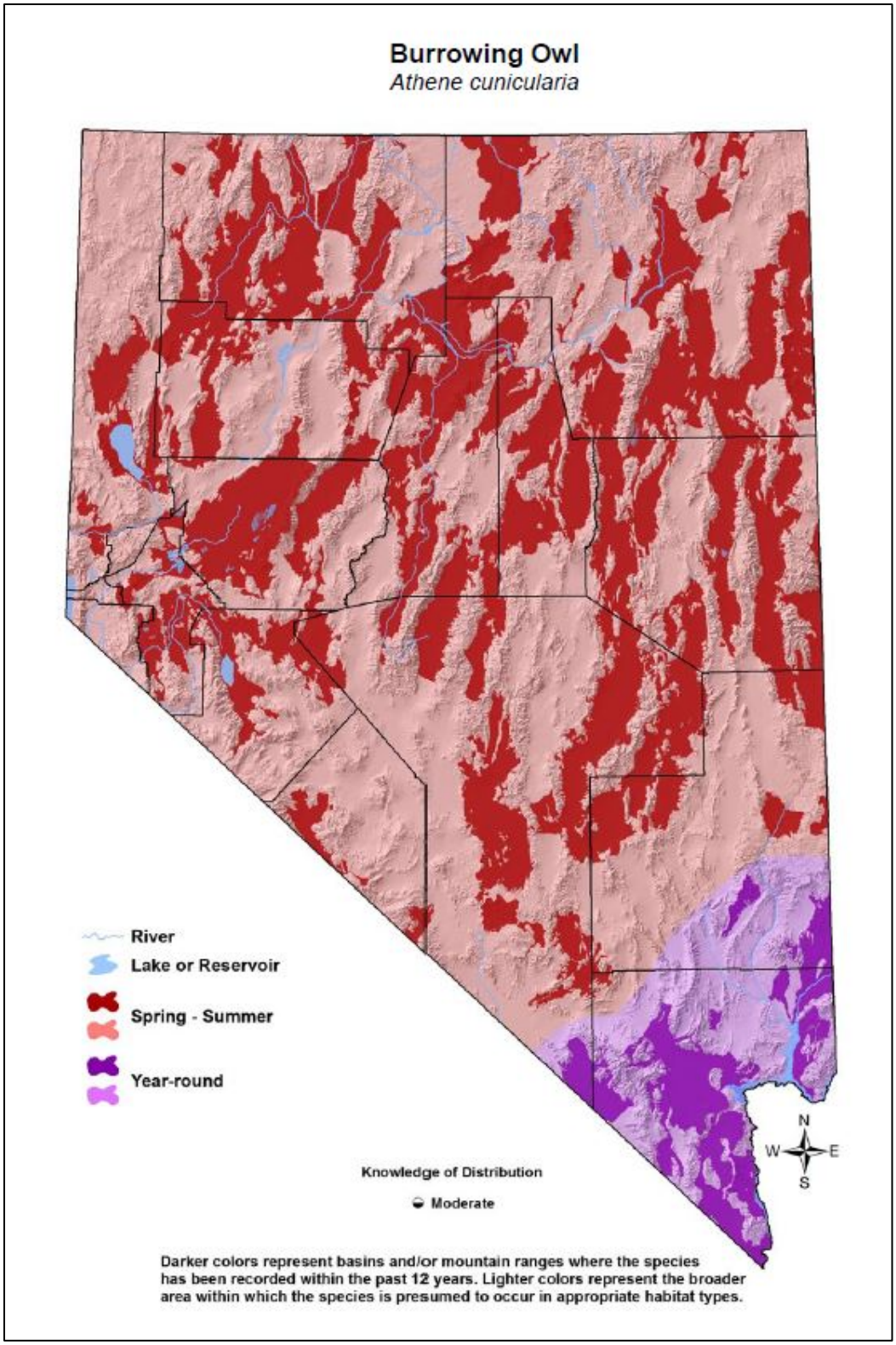

Figure 1-4. Predicted Seasonal Distribution of the Burrowing Owl in Nevada

(*Notes*: Predictions are based on records prior to 2010; reproduced from the *Nevada Comprehensive Bird Conservation Plan* species account [GBBO 2010]).

In general, Breeding Bird Survey data suggest that relative abundance is typically low outside of the shortgrass prairie ecosystem. Despite declining trend estimates throughout much of the species range for the period from 1996 to 2015, some populations have stabilized more recently (2005 to 2015) (Sauer et al. 2017). Within Nevada, burrowing owl trends are unclear, but populations are thought to be stable (GBBO 2010; Sauer et al. 2017). Breeding Bird Surveys suggests that this species is uncommon (0-25% probability of occurrence) within Nevada, but can be found throughout the state, including within the proposed FRTC expansion areas (GBBO 2010; DoN 2019a). Substantial portions of the Great Basin Desert, including areas within and around the proposed FRTC expansion areas, have potentially suitable burrowing owl habitat.

1.3 Previous Occurrences of Burrowing Owls within the Project Area During the Breeding Season (May – August)

There are limited records of burrowing owl activity within or in the vicinity of the proposed FRTC expansion areas during either the breeding or non-breeding seasons. During avian surveys of the existing FRTC ranges in 2007, one burrowing owl was detected in the existing B-19 range in May, two individuals were detected in the existing DVTA in June, and one individual was detected in the existing DVTA in July; evidence of breeding was not indicated (Table 1-1) (NAS Fallon 2008). During 2017 nocturnal owl surveys in support of the proposed FRTC expansion, 13 individuals were detected during the breeding season: 9 within the proposed B-17 expansion area, 3 within the proposed B-16 expansion area, and 1 within the proposed DVTA expansion area (Table 1-1) (DoN 2019a). Burrowing owls were also observed on the existing B-17 range during spring 1997 (March 22 – May 25) but the exact number, date, and location of the observation(s) were not given (NAS Fallon 1997). In addition, eBird data includes three locations of burrowing owls in the study area and outside of existing or proposed FRTC expansion areas: one 10 miles south of Fallon and 6 miles east of the existing B-16 in August 2012; one 17 miles northeast of Fallon and 7 miles south of the proposed B-20 expansion area in May 2013; and one 10 miles east-northeast of Fallon and 12 miles west of the proposed DVTA expansion area in May 2015 and May 2016 (Fink et al. 2018). There are no NNHP or Nevada Department of Wildlife (NDOW) records of burrowing owls within or in the vicinity of the proposed FRTC expansion areas during the breeding season (NDOW 2018; NNHP 2018b).

Table 1-1. Previous Burrowing Owl Detections within the Existing FRTC Ranges and Proposed FRTC Expansion Areas during the Breeding Season (May – August)

Date	No. of Individuals	Area		Source
		Proposed Expansion	Existing Range	
May 29, 2007	1		B-19	NAS Fallon 2008
June 14, 2007	2		DVTA	NAS Fallon 2008
July 21, 2007	1		DVTA	NAS Fallon 2008
May 10, 2017	8	B-17		DoN 2019a
June 7, 2017	1	DVTA		DoN 2019a
July 24, 2017	1	B-17		DoN 2019a
July 26, 2017	3	B-16		DoN 2019a

1.4 Previous Occurrences of Burrowing Owls within the Project Area During the Non-breeding Season (September – April)

Based on NDOW, NAS Fallon, and eBird records from 1987-2016, there have been 16 records of 23 individual burrowing owls within northern Nevada during the non-breeding season (September through April) (Table 1-2) (NAS Fallon 1997; Fink et al. 2018; NDOW 2018). Of those 16 records, only 4 were within

the study area of Churchill, Mineral, Nye, Pershing, and Lyon counties. The NDOW database includes two 1987 records and one 2000 record of an unknown number of burrowing owls within northern Nevada, including one occurrence within the existing DVTA (NDOW 2018). Burrowing owls were also observed on the existing B-17 range during spring 1997 (March 22 – May 25) but the exact number, date, or location of the observation(s) were not given (NAS Fallon 1997). There are no NNHP records of burrowing owls within or in the vicinity of the proposed FRTC expansion areas during the non-breeding season (NNHP 2018b).

Table 1-2. eBird and NDOW Burrowing Owl Records within Northern Nevada during the Non-breeding Season (September – April)

Observation Date	No. of Individuals	County	Source
March 1987	Unknown	Washoe	NDOW 2018
April 1987	Unknown	Churchill*	NDOW 2018
March 2000	Unknown	Lander	NDOW 2018
April 2007	Unknown	Churchill‡	NAS Fallon 2008
September 2009	1	Elko	Fink et al. 2018
March 2011	1	Churchill†	Fink et al. 2018
September 2012	1	Elko	Fink et al. 2018
October 2012	1	Washoe	Fink et al. 2018
April 2013	1	Humboldt	Fink et al. 2018
March 2014	1	Elko	Fink et al. 2018
April 2014	2	Washoe	Fink et al. 2018
April 2015	2	Washoe	Fink et al. 2018
April 2015	2	Churchill§	Fink et al. 2018
October 2015	1	White Pine	Fink et al. 2018
January 2016	1	Washoe	Fink et al. 2018
March 2016	1	Washoe	Fink et al. 2018
April 2016	2	Washoe	Fink et al. 2018
September 2016	1	Humboldt	Fink et al. 2018
October 2016	4	Washoe	Fink et al. 2018
November 2016	1	Washoe	Fink et al. 2018

Notes: *Record within the existing DVTA.
‡Record within the existing B-17.
†Record 17 miles northeast of Fallon, 7 miles south of the proposed B-20 expansion area, and 8 miles west of the proposed DVTA expansion area.
§Record 10 miles east-northeast of Fallon and 12 miles west of the proposed DVTA expansion area.

2.0 METHODS

Breeding and non-breeding season surveys were conducted in 2018 using ground-based burrowing owl survey methods. Breeding season surveys were conducted in 2019 using ground and aerial survey methods. Based on the scarcity of burrowing owl records within the study area from September through April, the lack of detections during 2018 surveys, and the published literature indicating that burrowing owls leave northern Nevada during the winter, non-breeding surveys were not conducted in 2019. Ground survey methods are discussed in Section 2.1 and aerial survey methods are discussed in Section 2.2.

2.1 GROUND SURVEYS

2.1.1. Establishment of Survey Routes and Points

Much of the proposed FRTC expansion areas contains the general habitat characteristics in which burrowing owls are found (i.e., gently sloping with well-drained soils, sparse vegetation, and extensive

bare ground). Within Nevada, sagebrush and salt desert habitats are among the most common places to find this species (Poulin et al. 2011). Although the presence of burrows and suitable prey can be important drivers of burrowing owl breeding sites (Klute et al., 2003; Poulin et al. 2005; Hall et al. 2009), GBBO data show that 44% of observations occurred in sagebrush habitat, 22% in grasslands, 21% in salt desert scrub, and 9% in agricultural areas (GBBO 2010).

Based on the previously conducted vegetation mapping effort in support of the proposed FRTC expansion, a total of 26 vegetation alliances from 7 formations were recorded within the proposed expansion areas (Table 2-1) (DoN 2019b). For the 2018 and 2019 ground-based surveys, survey routes were determined based on multiple criteria, including vegetation alliance (i.e., burrowing owl habitat preference), proposed expansion area, and past burrowing owl detections. Of the 26 vegetation alliances identified within the proposed expansion areas, 16 were targeted for burrowing owl surveys (Table 2-2).

Table 2-1. Vegetation Formations and Alliances Found within the Proposed FRTC Expansion Areas

FORMATION Alliance	Proposed Expansion Area			
	B-16	B-17	B-20	DVTA
COOL SEMI-DESERT SCRUB & GRASSLAND				
Bailey's Greasewood Shrubland	X	X	X	X
Black Sagebrush Steppe & Shrubland		X	X	X
Wyoming Big Sagebrush Dry Steppe & Shrubland	X	X		X
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland		X	X	X
Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland	X	X	X	X
Shadscale Saltbush Scrub	X	X	X	X
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	X	X	X	X
Cheatgrass Ruderal Grassland		X	X	X
Nevada Joint-fir Scrub		X		X
Yellow Star-thistle-Dyer's Woad-Prickly Russian Thistle Ruderal Annual Forb	X	X	X	X
Winterfat Steppe & Dwarf Shrubland		X	X	
Fourwing Saltbush – Rubber Rabbitbrush Desert Wash				X
Bud Sagebrush Shrubland		X		
SALT MARSH				
Microphytic Playa		X	X	X
Intermountain Greasewood Wet Shrubland	X	X	X	X
Mojave Seablite - Red Swampfire Alkaline Wet Scrub		X	X	X
Western Wildrye Alkaline Wet Meadow			X	X
Saltgrass Alkaline Wet Meadow		X		X
COOL TEMPERATE FOREST & WOODLAND				
Great Basin Singleleaf Pinyon - Utah Juniper/Shrub Woodland				X
Utah Juniper/Shrub Woodland		X		X
WARM DESERT & SEMI-DESERT SCRUB & GRASSLAND				
Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub		X	X	X
Fremont's Smokebush - Nevada Smokebush Desert Wash Scrub	X	X		
TEMPERATE FLOODED & SWAMP FOREST				
Ruderal Tamarisk Riparian Scrub				X
Great Basin Fremont Cottonwood Riparian Forest				X
SHRUB & HERB WETLAND FORMATION				
Western Baltic Rush - Mexico Rush Wet Meadow				X
TEMPERATE TO POLAR FRESHWATER MARSH, WET MEADOW & SHRUBLAND				
Arroyo Willow Wet Shrubland				X

Source: DoN 2019b.

Table 2-2. Stratification of 2018 and 2019 Burrowing Owl Ground-based Survey Routes across Vegetation Alliances

Vegetation Alliance	Total Area (ac)	% Total Area	Survey Points (2018)	Survey Points (2019)	Total
Bailey's Greasewood Shrubland	334,009	44.0	96	101	**197**
Intermountain Greasewood Wet Shrubland	69,802	9.2	14	12	**26**
Wyoming Big Sagebrush Dry Steppe & Shrubland	47,778	6.3	8	3	**11**
Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub	19,380	2.6	13	17	**30**
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	16,683	2.2	10	5	**15**
Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland	11,567	1.5	1	0	**1**
Shadscale Saltbush Scrub	5,445	0.7	1	0	**1**
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	5,253	0.7	1	0	**1**
Mojave Seablite - Red Swampfire Alkaline Wet Scrub	6,740	0.9	5	0	**5**
Cheatgrass Ruderal Grassland	2,929	0.4	1	0	**1**
Arroyo Willow Wet Shrubland	346	<0.1	0	1	**1**
Black Sagebrush Steppe & Shrubland	57,595	7.6	0	6	**6**
Great Basin Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland	30,038	4.0	0	15	**15**
Utah Juniper / Shrub Understory Woodland	9,353	1.2	0	3	**3**
Western Baltic Rush - Mexican Rush Wet Meadow	228	<0.1	0	1	**1**
Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	1,912	0.3	0	21	**21**
Total	**619,058**		**150**	**185**	**335**

Source: DoN 2019b.

Survey routes were placed within each of the proposed expansion areas (B-16, B-17, B-20, and DVTA), and sampling efforts were focused in areas with gently sloping topography within valley bottoms, along sandy washes, and in other areas with sandy soils, including the dune habitats that result from sediment accretion around playa perimeters. As a result of the habitat selection criteria, surveys were established along 67 routes (30 in 2018 and 37 in 2019), each consisting of 5 survey points for a total of 335 survey points within potential and known burrowing owl habitat (Table 2-3; Figure 2-1 through Figure 2-4). Appendices A and B provide the coordinates of all survey points and the vegetation alliance in which they occur. Photographs of habitat that is representative of each route can be found in Appendix C.

Table 2-3. Burrowing Owl Ground Survey Effort by Proposed Expansion Area and Survey Year

	B-16	B-17	B-20	DVTA	Total
Routes					
2018	4	8	4	14	**2048**
2019	0	28	0	9	**37**
Total	**4**	**36**	**4**	**23**	**67**
Survey Points					
2018	20	40	20	70	**2168**
2019	0	140	0	45	**185**
Total	**20**	**180**	**20**	**115**	**335**

All survey points were located a minimum of 1,640 ft [500 m] apart along secondary roads. This point spacing was used to minimize the potential for double counting individuals. As a general rule the maximum detection distance is <820 ft [250 m] (Wolf et al. 1995).

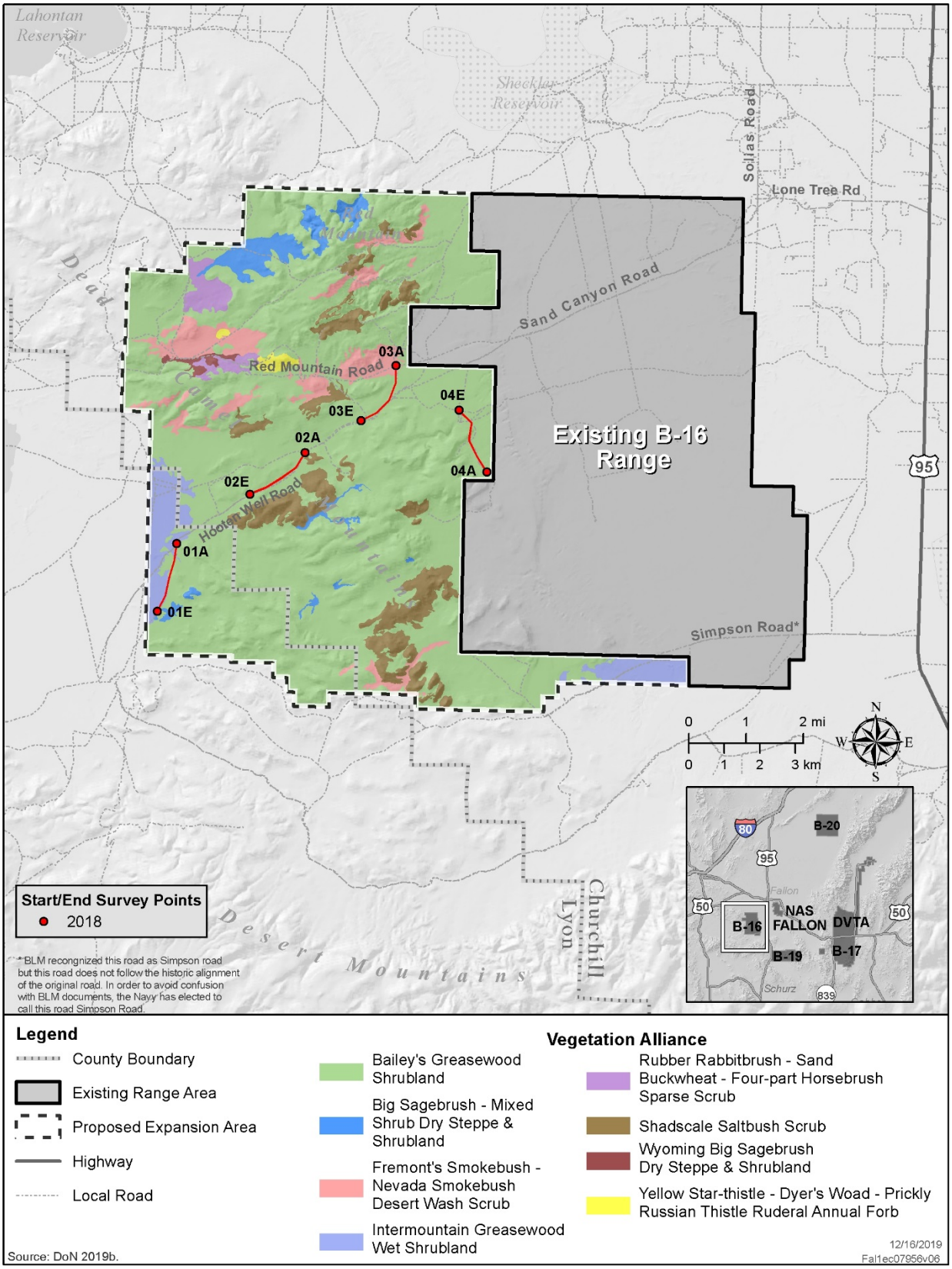

Figure 2-1. Locations of 2018 Ground-based Burrowing Owl Survey Routes and Points within the Proposed B-16 Expansion Area

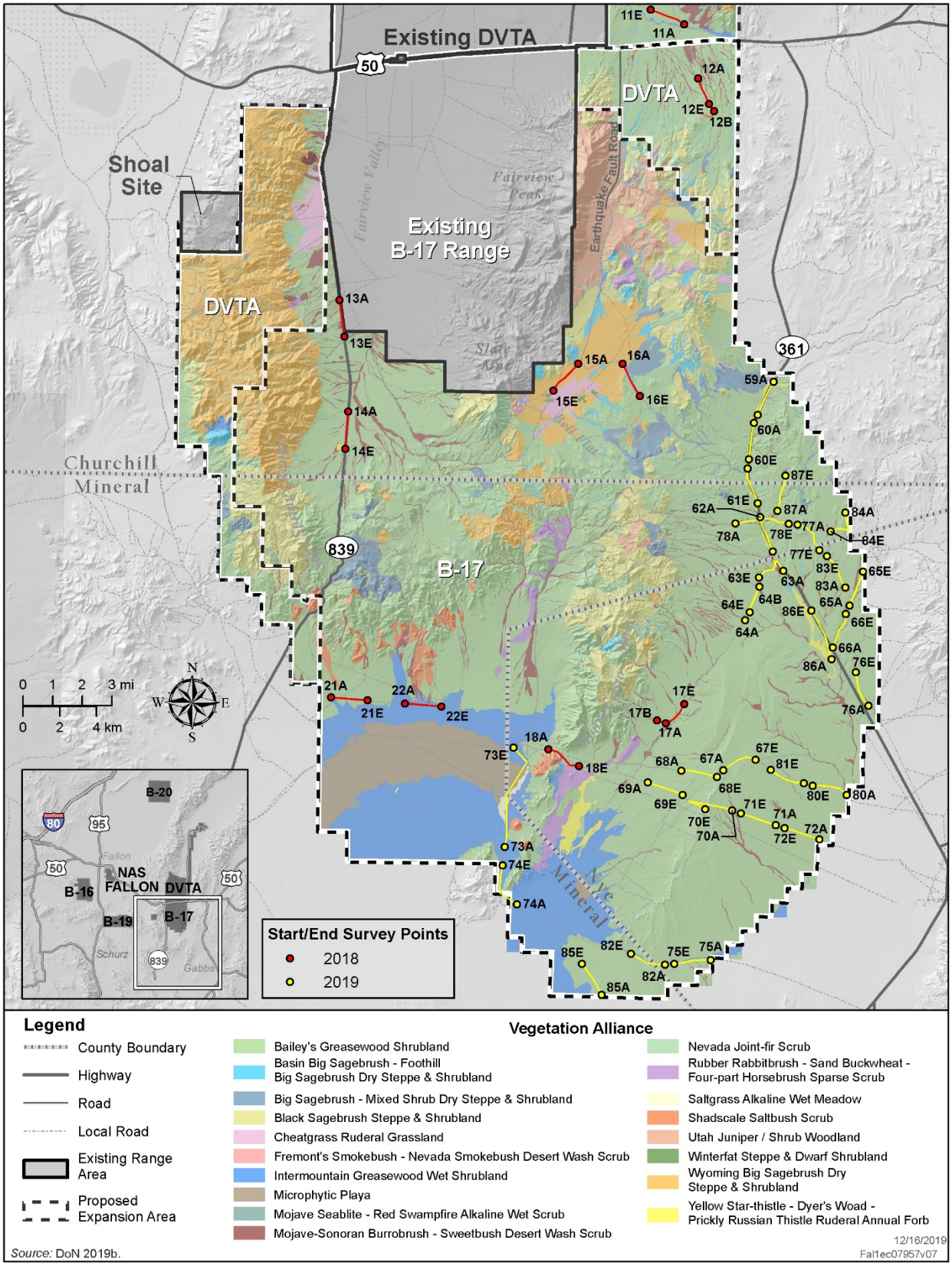

Figure 2-2. Locations of 2018 and 2019 Ground-based Burrowing Owl Survey Routes and Points within the Proposed B-17 and Southern DVTA Expansion Areas

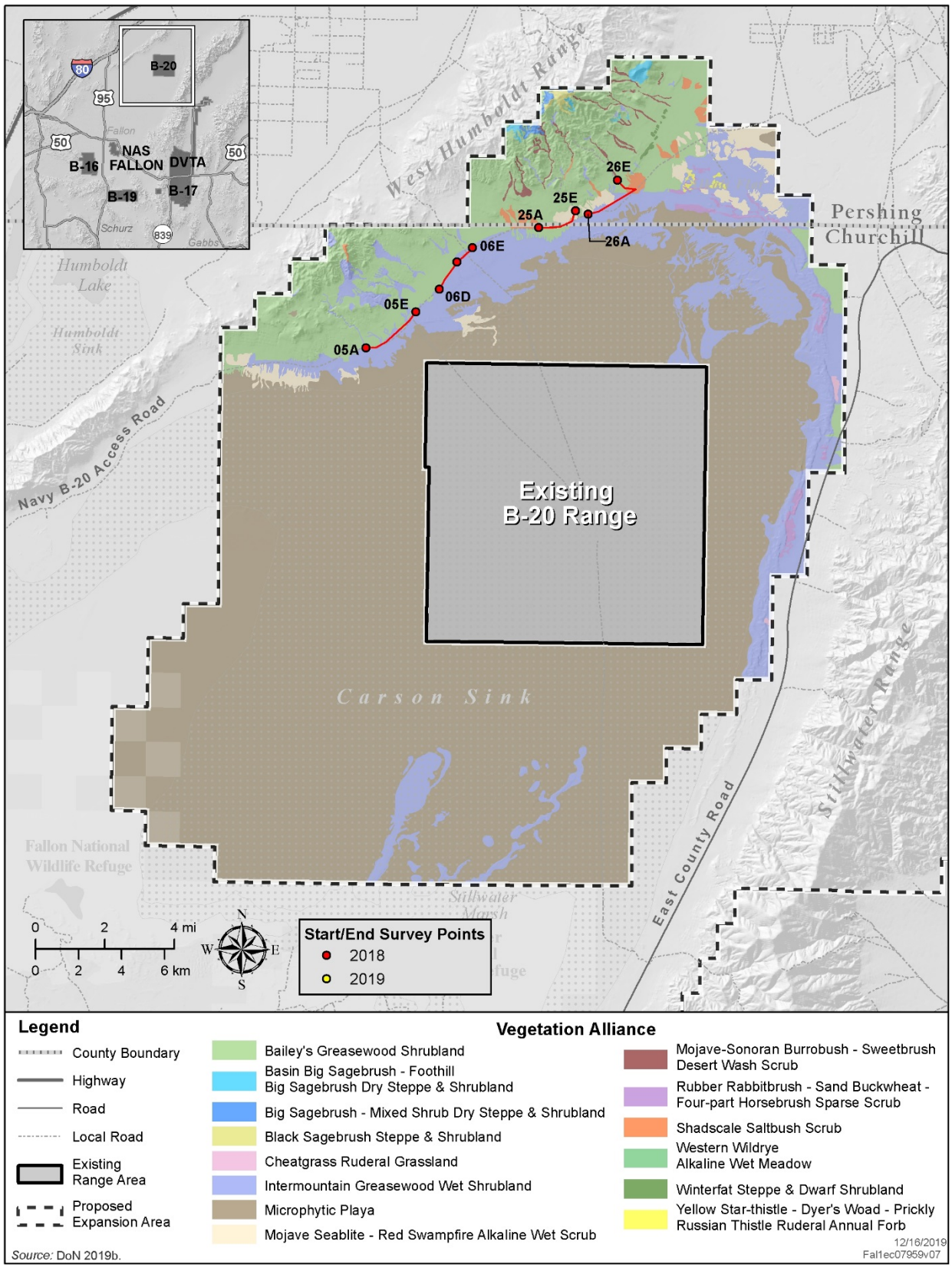

Figure 2-3. Locations of 2018 Ground-based Burrowing Owl Survey Routes and Points within the Proposed B-20 Expansion Area

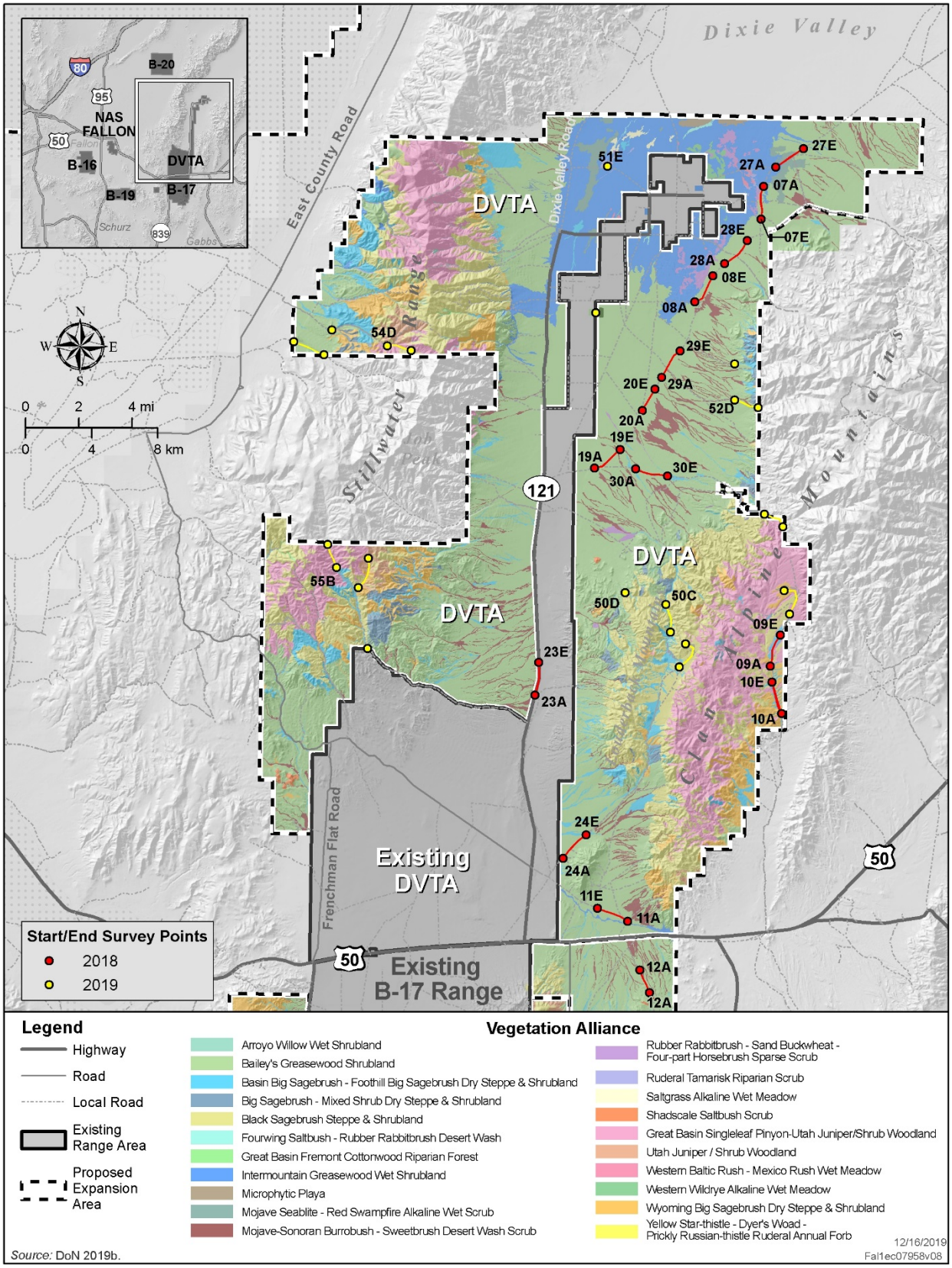

Figure 2-4. Locations of 2018 and 2019 Ground-based Burrowing Owl Survey Routes and Points within the Proposed Northern DVTA Expansion Area

2.1.2. Ground Survey Methodology

Ground-based point count methods adhered to the general recommendations of Ralph et al. (1995) and included broadcasting burrowing owl vocalizations to increase response rates. All surveys were conducted around sunrise (1 hour [hr] before to 2 hr after sunrise) or sunset (2 hr before to 1 hr after sunset) as recommended by Conway and Simon (2003) and California Burrowing Owl Consortium (1993). While both survey protocols provide specific guidelines for rigorous approaches to assessing burrowing owl populations, neither approach could be fully implemented for this survey effort given the scope and nature of the contractual obligations.

The guidelines set by the California Burrowing Owl Consortium encourage extensive coverage of a comparatively small area to search for active burrows or other sign. As the proposed expansion areas encompass 680,000 ac (275,200 ha) and much of this was deemed potentially suitable burrowing owl habitat, it was decided to incorporate a pared down version of Consortium's area search methods. As such, follow-up visits to areas where burrowing owl were initially observed were performed within 24 hr of each detection in order to search for burrows or other sign. Occupancy of suitable burrowing owl habitat was verified at a site by observing molted feathers, cast pellets, prey remains, eggshell fragments, or excrement at or near a burrow entrance. Similarly, although it was not possible to conduct multiple surveys at each point during a single season, in an effort to increase the detection probability associated with a single visit to each point, surveyors used a 5-minute listening period rather than the 3 minutes recommended by Conway and Simon (2003).

In general, daily surveys consisted of two separate survey windows, one in the morning and another in the evening. Each 3-hr survey window provided enough time to complete two routes, for a total of 10 survey points. At the initiation of each survey route, an observer recorded the date, start time, and weather conditions, including wind speed (miles per hr), temperature (degrees Fahrenheit), and percent cloud cover. Surveys were not conducted during precipitation stronger than a heavy fog or periods of high wind speeds (>15 miles per hr). At each sampling point, the observer performed a burrowing owl call-broadcast survey consisting of a minimum point-visit time of 10 minutes, including a 5-minute passive listening period followed by a 5 minute call broadcast period. When a burrowing owl, or any other nocturnal avian species, was detected, the observer mapped the bird using ArcGIS Collector, and recorded the behavior that alerted the observer (call, song, wing noise), and whether the bird responded during the passive listening or active playback period. When a burrowing owl was detected, observers performed a brief search for burrows unless darkness or time constraints did not allow adequate coverage. In all cases, the observer returned within 24 hr to perform a systematic search for active burrows or sign within the vicinity of the burrowing owl detection.

2.2 AERIAL SURVEYS

In addition to ground surveys conducted in 2018 and 2019, aerial helicopter surveys were conducted in 2019 within potential and known burrowing owl habitat within the proposed FRTC expansion areas. Aerial surveys allowed access to remote portions of the proposed expansion areas, including roadless areas. Aerial surveys provided additional opportunities to identify burrowing owl activity within potential breeding habitat, and facilitated greater, more efficient geographic coverage.

2.2.1. Establishment of Aerial Survey Areas and Routes

Potential aerial burrowing owl survey locations were identified using a 3-tiered approach:

- Tier 1: High quality burrowing owl habitat within the proposed B-17 expansion area (Figure 2-5).
- Tier 2: Areas in the vicinity of previous burrowing owl detections within the entirety of the proposed FRTC expansion areas (Figure 2-5 through Figure 2-8).
- Tier 3: Vegetation alliances that were considered potential suitable burrowing owl habitat within the entirety of the proposed FRTC expansion areas (Figure 2-5 through Figure 2-8).

Tier 1 surveys focused on a portion of the proposed B-17 expansion area that was likely to support burrowing owls. The area was identified as having high densities of fossorial mammal activity during 2019 raptor and greater sage-grouse (*Centrocercus urophasianus*) aerial surveys and consisted of a large wash and adjacent uplands within Gabbs Valley. This area also contained multiple detections during the 2019 ground-based burrowing owl surveys.

Tier 2 surveys focused on areas that were spatially coincident with burrowing owl detections from previous survey efforts within proposed FRTC expansion areas (Table 2-4):

- One record of a 1998 burrowing owl detection within the existing DVTA from the Nevada Breeding Bird Survey (Pardieck et al. 2018) (Figure 2-9).
- 2017 general avian point-count surveys (including owls) conducted as part of the ecological inventory in support of the proposed FRTC expansion: 9 detections in the proposed B-17 expansion area, 3 detections within the proposed B-16 expansion area, and 1 detection within the proposed DVTA expansion area (DoN 2019a) (Figure 2-9);
- 2018 ground-based burrowing owl surveys included in this report; and
- 2019 ground-based burrowing owl surveys addressed in this report.

Table 2-4. Establishment of 2019 Tier 2 Aerial Survey Routes Based on Previous Burrowing Owl Detections within Existing FRTC Areas and Proposed FRTC Expansion Areas

Source	Year	Existing FRTC Area	Proposed Expansion Area	2019 Route #
Pardieck et al. 2018	1998	DVTA		T2_11
DoN 2019a	2017		B-17	T2_4
	2017		B-16	T2_3
Ground-based surveys addressed in this report	2018		B-16	T2_3
	2018		B-16	T2_2
	2018		B-16	T2_2
	2018		B-16	T2_2
	2018		DVTA	T2_8
	2018		B-20	T2_10
	2018		B-20	T2_9
	2018		DVTA	T2_7
Ground-based surveys addressed in this report.	2019		DVTA	T2_12, T2_13
	2019		B-17	T1, T2_1

At each previous burrowing owl locality, a 1-km^2 grid cell was centered over the detection. When grid cells of multiple detections overlapped, they were merged and surveyed together. Burrowing owl detections within the area surveyed as part of the Tier 1 effort were not revisited during the Tier 2 effort.

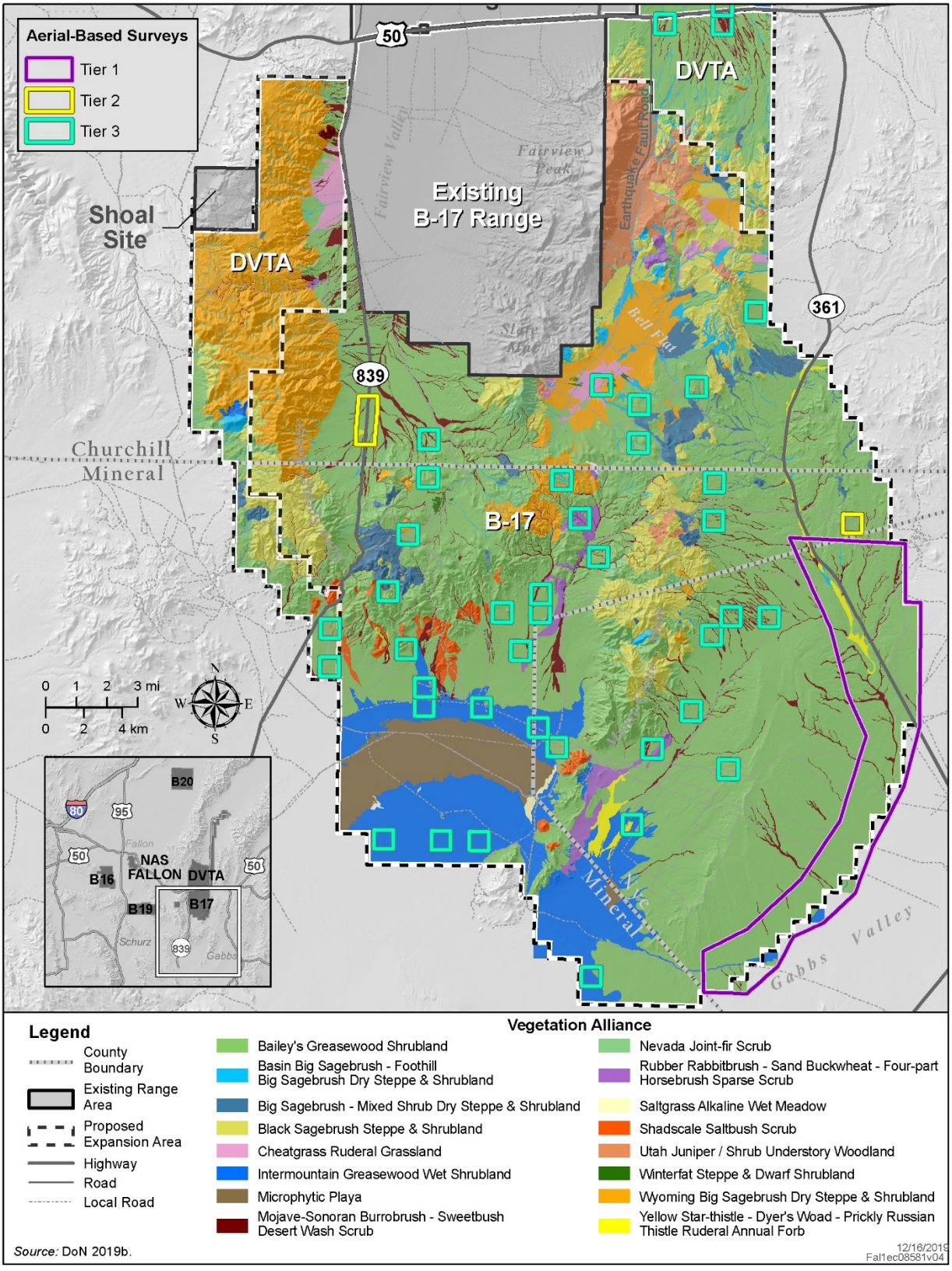

Figure 2-5. Tier 1, Tier 2, and Tier 3 Aerial Burrowing Owl Survey Areas within the Proposed B-17 and Southern DVTA Expansion Areas

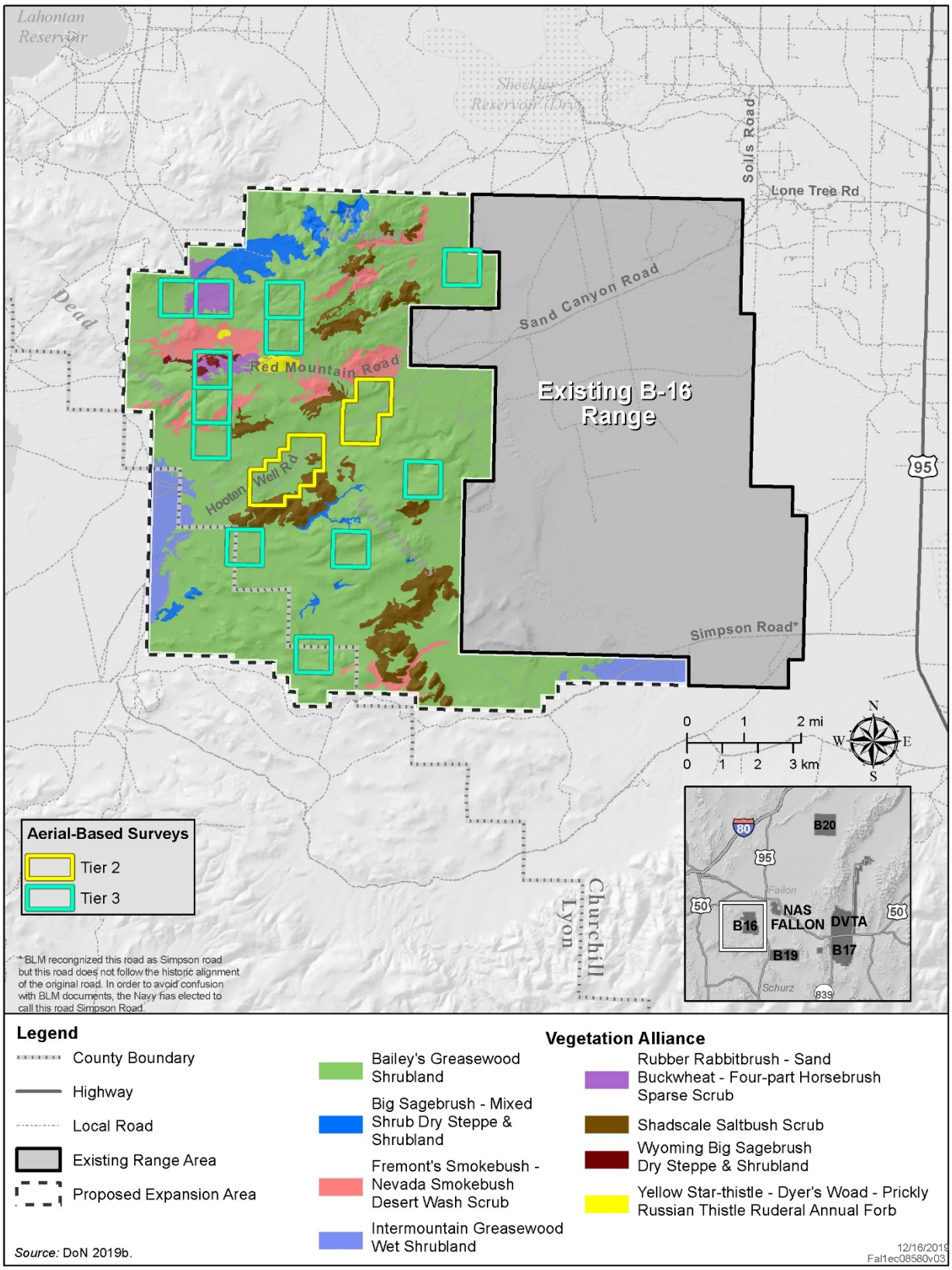

Figure 2-6. Tier 2 and Tier 3 Aerial Burrowing Owl Survey Areas within the Proposed B-16 Expansion Area

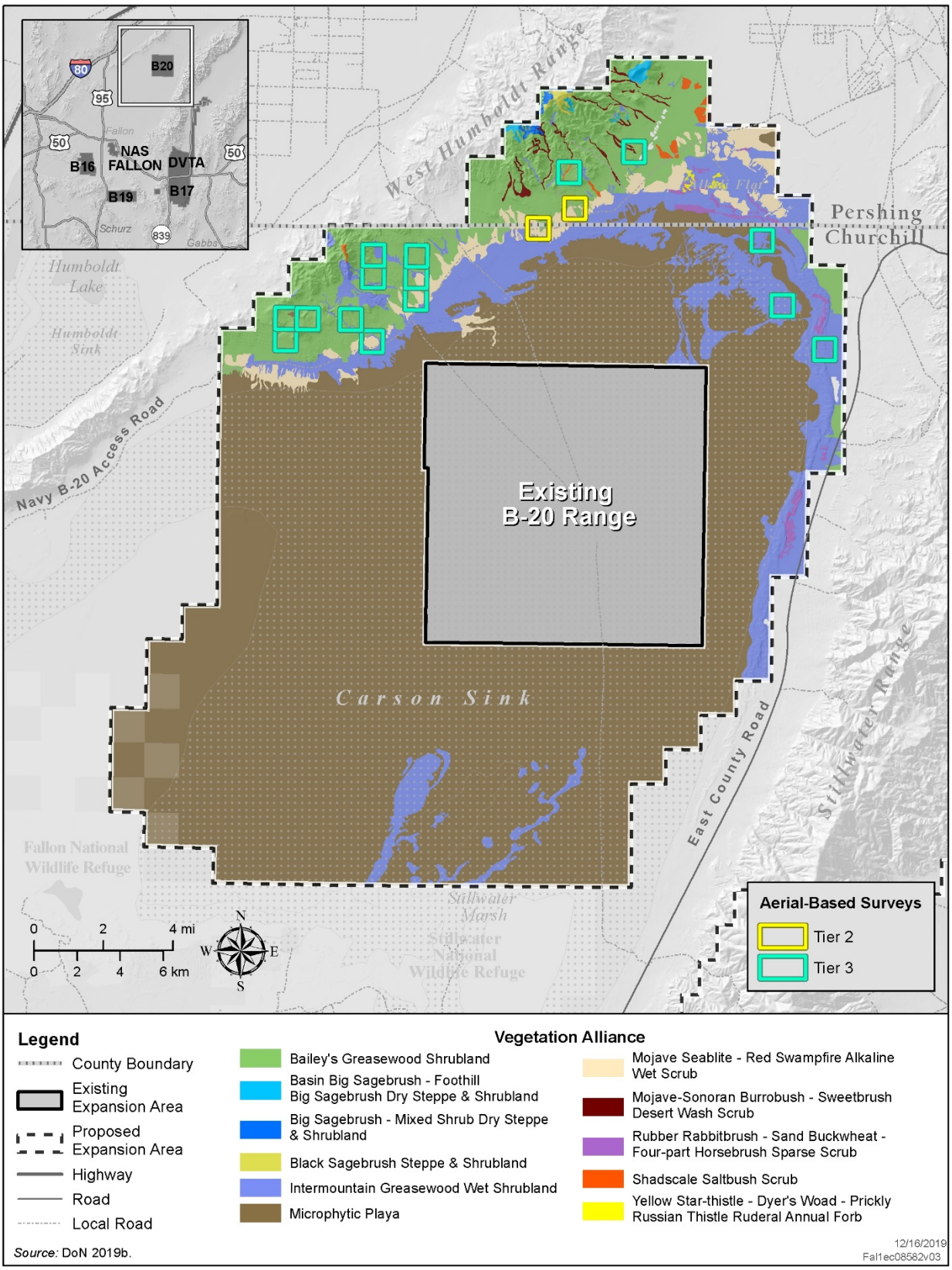

Figure 2-7. Tier 2 and Tier 3 Aerial Burrowing Owl Survey Areas within the Proposed B-20 Expansion Area

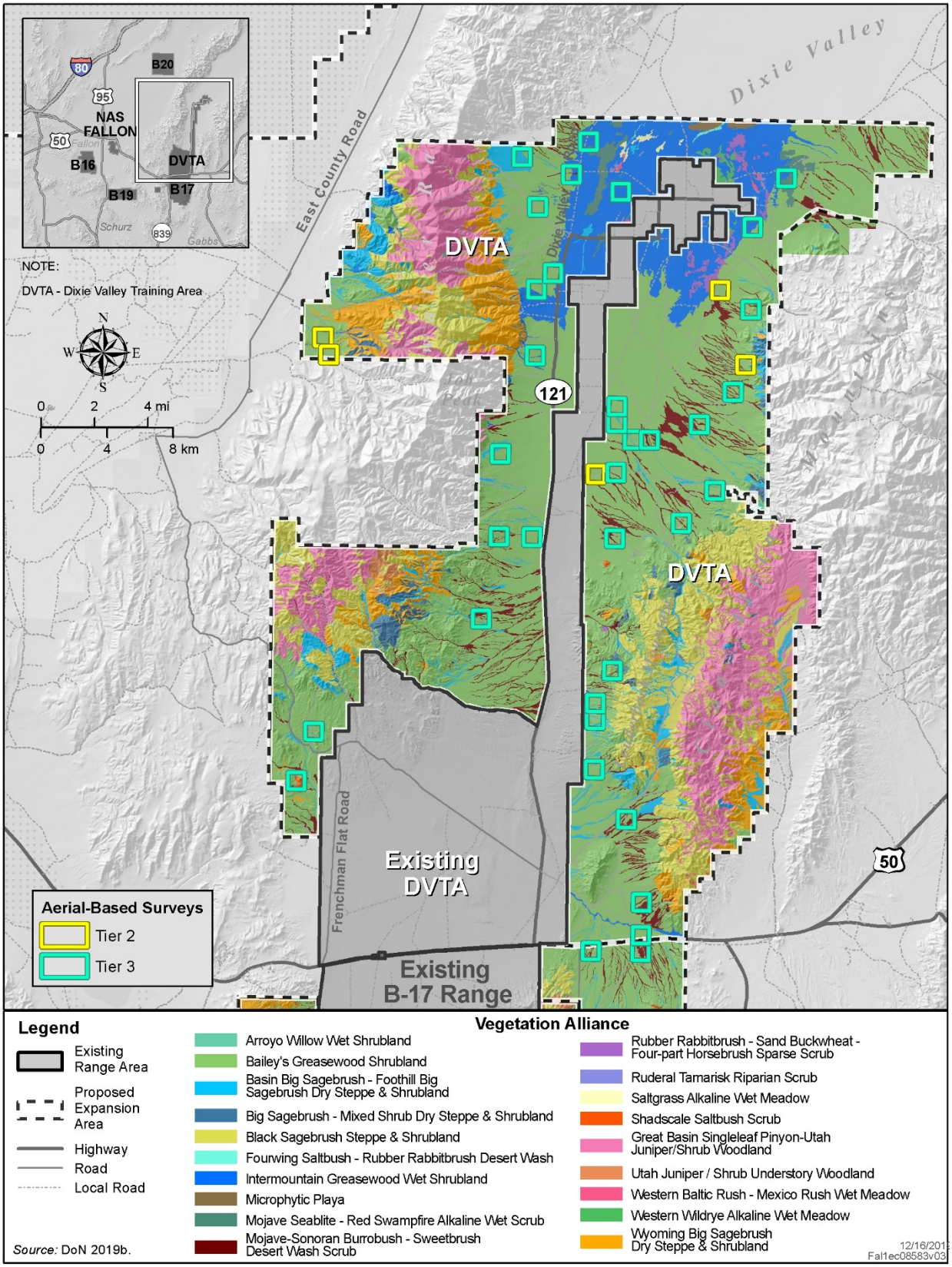

Figure 2-8. Tier 2 and Tier 3 Aerial Burrowing Owl Survey Locations within the Proposed Northern DVTA Expansion Area

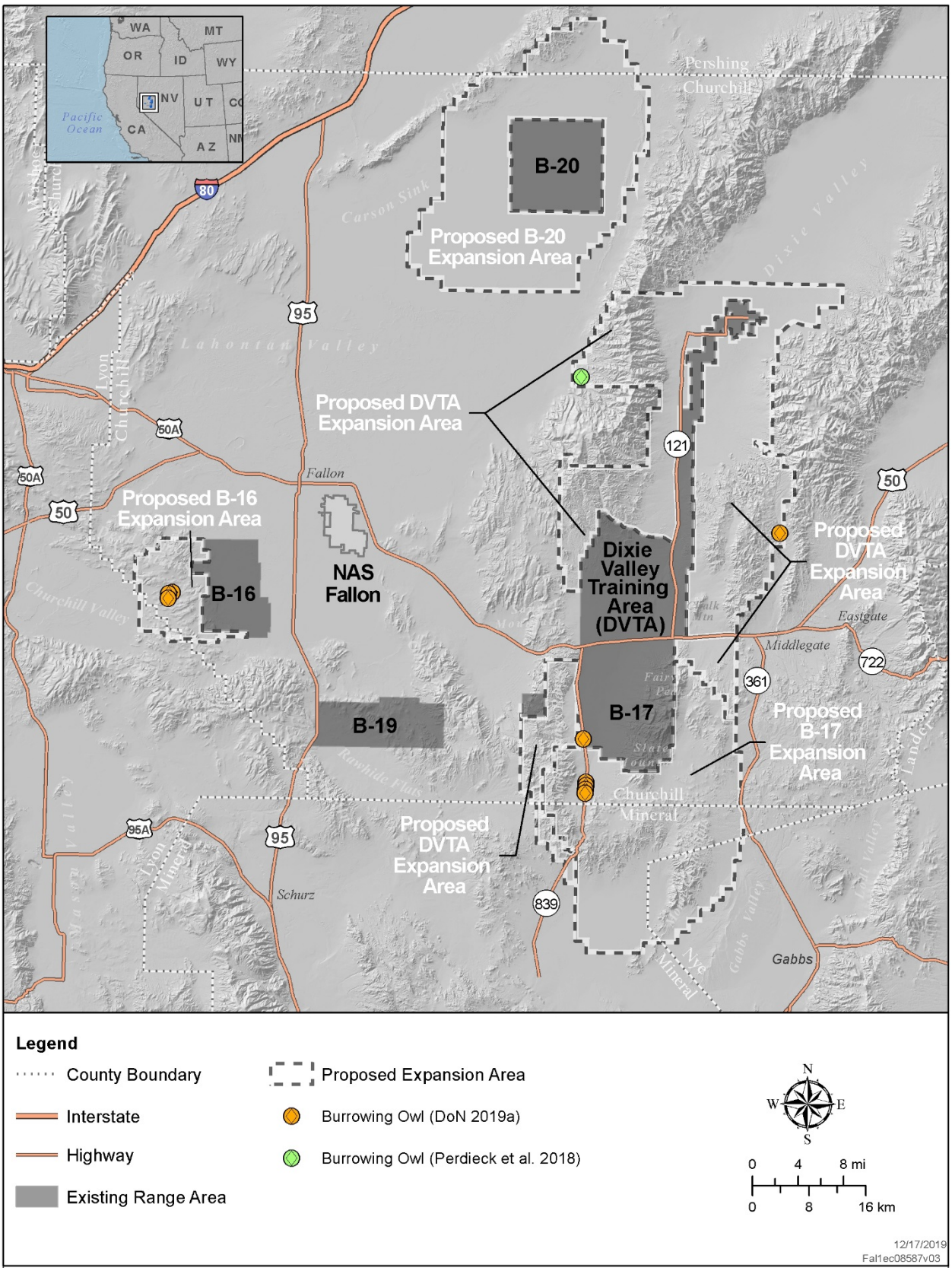

Figure 2-9. Locations of Historical Burrowing Owl Locations within the Proposed FRTC Expansion Areas

Finally, Tier 3 surveys focused on potentially suitable burrowing owl habitat within the entirety of the proposed FRTC expansion areas (i.e., B-16, B-17, B-20, and DVTA). Potentially suitable vegetation alliances were identified by overlaying past burrowing owl detections and identifying spatially coincident vegetation alliances from the 2019 vegetation feature classes (DoN 2019b). Additional vegetation alliances were also included if the primary literature indicated the presence of burrowing owl activity therein (Table 2-5).

Table 2-5. Vegetation Alliances Containing Potentially Suitable Burrowing Owl Habitat and Used for Tier 3 Aerial Burrowing Owl Surveys

Vegetation Alliance	Area Surveyed (ac)	Occurrence – Source			
		Pardieck et al. (2018)	DoN (2019a)	2018*	2019*
Bailey's Greasewood Shrubland	38,251.8	X	X	X	X
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	568.3	0	X	0	0
Intermountain Greasewood Wet Shrubland	4,398.5	0	0	X	0
Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	2,100.4	0	0	0	X
Mojave Seablite - Red Swampfire Alkaline Wet Scrub	741.3	0	0	X	0
Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	469.5	0	0	0	X
Cheatgrass Ruderal Grassland	148.3	Potentially suitable within region (Rich 1986; GBBO 2010).			
Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland	123.5	Potentially suitable within region (Rich 1986; GBBO 2010).			
Black Sagebrush Steppe & Shrubland	17.3	Potentially suitable within region (Rich 1986; GBBO 2010).			
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	593.1	Potentially suitable within region (Rich 1986).			
Shadscale Saltbush Scrub	321.2	Potentially suitable within region (GBBO 2010).			
Wyoming Big Sagebrush Dry Steppe & Shrubland	271.8	Potentially suitable within region (Rich 1986; GBBO 2010).			
Microphytic Playa	74.1	Incidental inclusions.			
Fremont's Smokebush - Nevada Smokebush Desert Wash Scrub	74.1	Incidental inclusions.			
Winterfat Steppe Dwarf Shrubland	22.2	Incidental inclusions.			
Nevada Joint-fir Scrub	7.4	Incidental inclusions.			
Total	**48,182.8**				

Sources: Rich 1986; GBBO 2010; *2018 and 2019 = ground-based surveys addressed in this report.

Within Nevada, sagebrush and salt desert habitats are considered the primary habitats where burrowing owls occur (Poulin et al. 2011). Although the presence of burrows and suitable prey are thought to be the most important drivers of burrowing owl breeding sites (Klute et al. 2003; Poulin et al. 2005; Hall et al. 2009), GBBO (2010) data show that 44% of detections occurred in sagebrush, 22% in grasslands, 21% in salt desert scrub, and 9% in agricultural areas. In addition, within sagebrush steppe habitats in Idaho, burrows often had sagebrush, cheatgrass, and rabbitbrush present (Rich 1986). Therefore, salt bush-, sagebrush-, and rabbitbrush-dominated alliances were all considered as potentially suitable burrowing owl habitat. Once suitable vegetation alliances were identified, a 1-km^2 grid system was laid over a composite map of all areas with potentially suitable vegetation. Any grid cells with less than 70% suitable

habitat or not entirely within the boundary of a proposed FRTC expansion area were removed. The final survey areas were selected randomly from the remaining grid cells.

Overall, proposed Tier 1, 2, and 3 aerial burrowing owl surveys covered approximately 48,183 ac (19,500 ha) across the four proposed expansion areas (Table 2-5; Figure 2-6 through Figure 2-9). This 3-tiered site selection approach: (1) provided coverage of likely burrowing owl habitat within the southeastern portion of the proposed B-17 expansion area (Gabbs Valley) (Tier 1), (2) provided comprehensive survey coverage of areas with previous burrowing owl detections (Tier 2), and (3) provided survey coverage of potentially suitable burrowing owl habitat within the entire proposed FRTC expansion areas (Tier 3).

2.2.2. Aerial Survey Methodology

Aerial survey methods were aimed at minimizing the amount of time spent in the vicinity of burrowing owls or burrows, while providing adequate opportunity to document their presence. Aerial surveys for burrowing owls were conducted using an MD 500 helicopter following pre-determined north-south transects spaced at 200 m across each survey area (Figure 2-10). North-south transects helped to minimize the amount of time the pilot, as well as the observers, spent looking into the sun. Surveys were conducted between sunrise and 1430. Flight speeds were maintained at 30-40 knots, depending on terrain, and surveys were conducted at 49-82 ft (15-25 m) above ground level. Two observers conducted each survey, looking for burrowing owls or potential burrows. Burrows greater than 10 inches in diameter were noted and photographed for later review. One observer photographed burrows using a digital SLR camera (Canon EOS Rebel XS) and a telephoto zoom lens (Canon EF 70-300 mm F/4.0-5.6L) while the other observer recorded relevant data. After the completion of survey flights, burrows whose status was in question were visited using ground-based follow-up visits when logistically feasible.

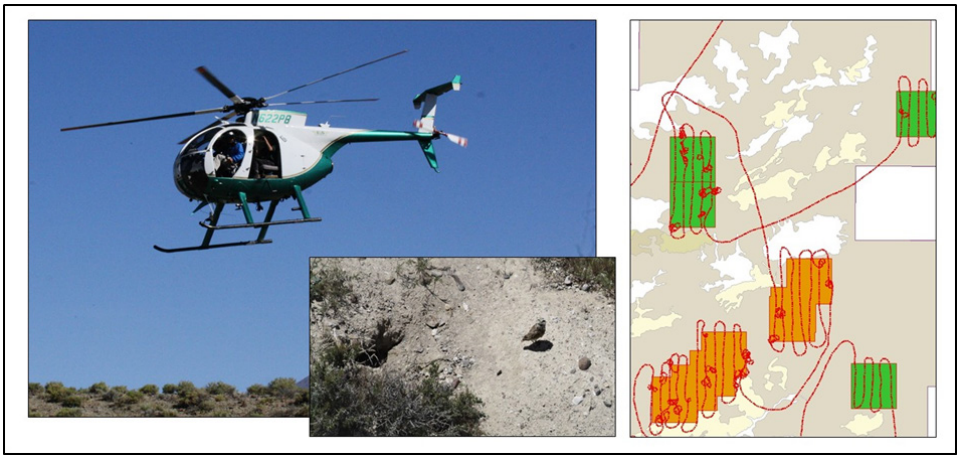

Figure 2-10. *Left*: MD 500 Helicopter; *Middle*: Photo of Burrowing Owl Taken with Telephoto Lens from Helicopter; *Right*: General North-South Aerial Transect Pattern over Survey Areas

Data was collected using the ArcGIS ESRI Collector application on an Apple iPad. The Collector application provided a geospatial framework for data collection and allowed data to be stored locally or uploaded to a remote server when cellular service became available. The data recorded included date, time, and location of each burrow detection, as well as whether a photo was taken. This information was later used to help link the photographs with the observations. Additional notes regarding the size, condition, and status of each burrow was also noted. When a bird was detected, efforts were made to locate and photograph nearby burrows to document evidence of burrowing owl activity including tracks, whitewash, or owl pellets. All flight paths were recorded to document survey coverage and downloaded at the end of each day.

3.0 RESULTS

3.1 NON-BREEDING SEASON SURVEYS

3.1.1. 2018 Surveys

In 2018, non-breeding season burrowing owl ground surveys were conducted January 29 – February 2 and March 4-7 at 140 survey points on 28 routes, totaling over 32 hr of effort (Table 3-1).

Table 3-1. Survey Effort Summary for 2018 and 2019 Ground-based Burrowing Owl Surveys within Proposed FRTC Expansion Areas

Season	Total Routes	Total Points	Total Time (min [hr])	Survey Dates
2018				
Non-breeding	28	140	1,937 (32.3)	Jan 29 – Feb 2; Mar 4-7
Breeding	30	150	2,432 (40.5)	May 21-25; May 29 – Jun 2
2019				
Breeding	37	185	2,581 (43.0)	May 18-28

Although no burrowing owls were encountered during 2018 non-breeding survey efforts, a recently active cluster of burrows was found on February 2, 2018 within the proposed B-16 expansion area (near Survey Point 02D) (Figure 3-1 and Figure 3-2). This burrow complex was on a northeast facing slope at the head of a basin containing a small, approximate 18 ac (7 ha), playa. Three largely degraded owl pellets and an extensive midden of small mammal bones were all found scattered around the burrow complex. The soil substrate was sandy, well drained, and typical of those found in alluvial fans in arid regions (Natural Resources Conservation Service 1994). The surrounding vegetation was sparse but included a mixture of shrubs common within the greasewood plant community with a sparse understory of annual grasses. The vegetation map identified the vegetation alliance as Bailey's Greasewood Shrubland (DoN 2019b).

Figure 3-1. Burrow Complex and Burrowing Owl Sign Found during 2018 Non-breeding Burrowing Owl Ground Surveys within the Proposed B-16 Expansion Area

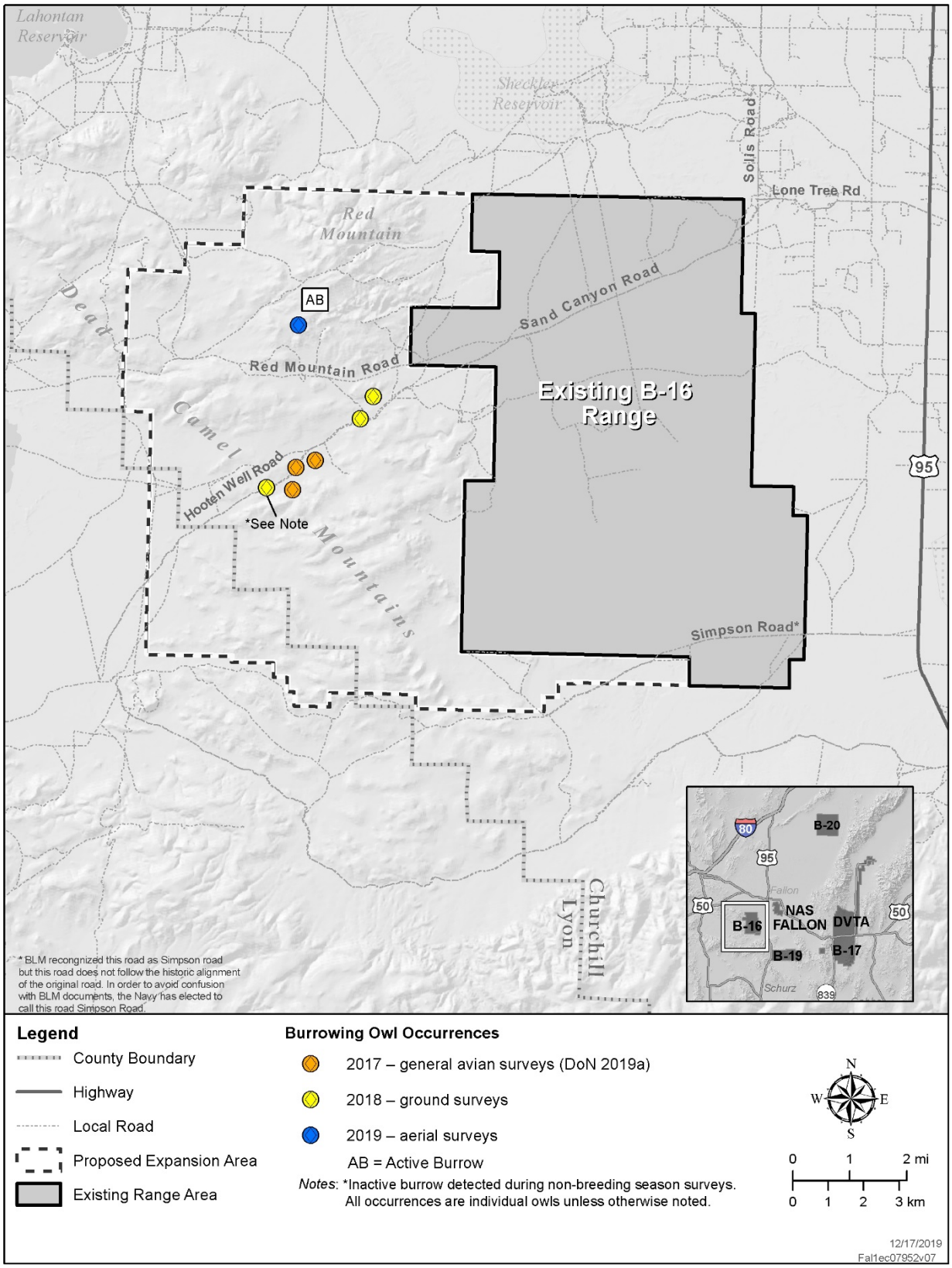

Figure 3-2. Detections of Burrowing Owls during 2017, 2018, and 2019 Ground and Aerial Surveys within the Proposed B-16 Expansion Area

3.2 BREEDING SEASON SURVEYS

3.2.1. 2018 Ground Surveys

In 2018, breeding season burrowing owl ground-based surveys were conducted May 21-25 and May 29 – June 2 at 150 survey points on 30 routes, totaling over 40 hr of effort (Table 3-1). Eight burrowing owls were detected during the 2018 breeding season survey period: six individuals during ground-based surveys and two individuals were encountered incidentally following evening surveys (Table 3-2). Although all detections were followed by systematic colony searches within the vicinity of the detected birds (visual or auditory), no active burrows were found during the survey period.

Table 3-2. Burrowing Owl Detections during 2018 Breeding Season Ground-based Surveys within Proposed FRTC Expansion Areas

Date	Observation Type	No. of Individuals	Proposed Expansion Area (Survey Pt)*	Notes
May 22, 2018	Song	1	B-16 (03C)	Songs from distant valley.
May 22, 2018	Call	1	B-16 (03E)	Responding/calling at same time as second bird to north.
May 22, 2018	Song	1	B-16 (03E)	Repeated songs from the northwest side of road; songs began before survey effort; second bird heard singing approx. 558 ft (170 m) to southwest.
May 31, 2018	Song	1	DVTA (08D)	Soft song response to playback; no burrows found; bird also responded to playback from Point 08C; behavior suggests territory is upslope and between Points 08D and 08C.
Jun 1, 2018	Visual, call	1	B-20 (25A)	Bird flew in and perched on truck, then flew east.
Jun 1, 2018	Song	1	B-20 (25E)	Sang repeatedly in response to 1st round of playback; responded from slope above gravel pit.
Incidental Detections				
May 24, 2018	Visual	1	B-17	Adult seen on dirt road; likely foraging along road.
May 29, 2018	Call	1	DVTA	Heard after survey; did not subsequently respond to playback.

Note: *Details of survey points can be found in Appendix A.

Proposed B-16 Expansion Area. Three individuals were encountered within the proposed B-16 expansion area, all within Bailey's Greasewood Shrubland (Table 3-2; Figure 3-2). Although no birds were detected in the immediate vicinity of the burrow complex found during the non-breeding season survey effort (see Section 3.1.1), all three of the detections came from further down the same valley and to the east of the small playa within the proposed B-16 expansion area. All three of these birds were detected before dawn during a morning survey. Importantly, during the May breeding season survey effort the burrow complex was deemed inactive as many of the burrows had collapsed since the non-breeding survey visit in February. Although no active colonies were observed within the proposed B-16 expansion area, regular sightings of multiple birds suggests that this area has an active burrowing owl population.

Proposed B-17 Expansion Area. Although no burrowing owls were detected during ground-based surveys within the proposed B-17 expansion area, a single burrowing owl was detected incidentally after evening surveys along the edge of a dirt road within Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub (Table 3-2; Figure 3-3).

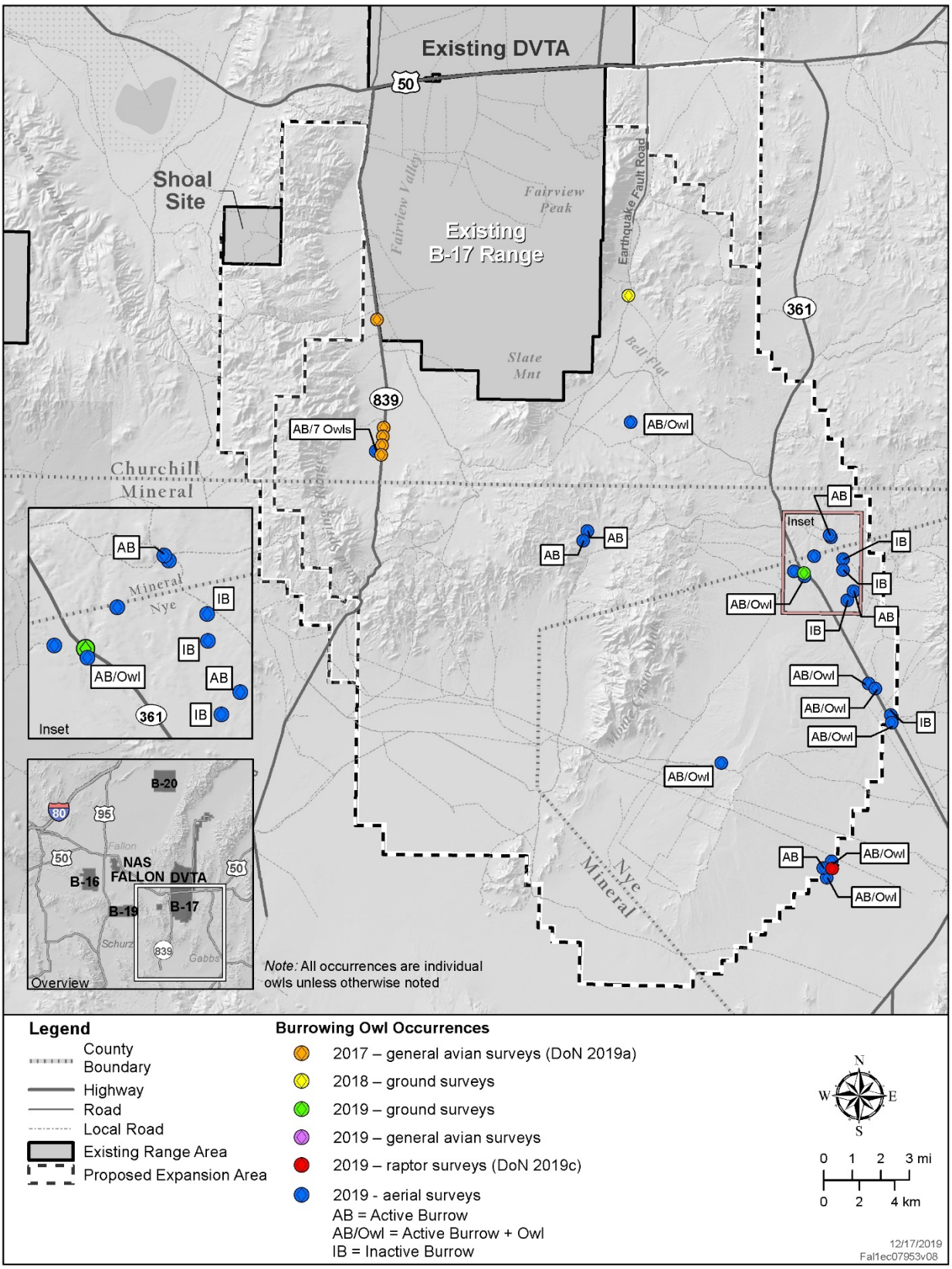

Figure 3-3. Detections of Burrowing Owls during 2017, 2018, and 2019 Ground and Aerial Surveys within the Proposed B-17 Expansion Area

Proposed B-20 Expansion Area. Two individuals were detected within the proposed B-20 expansion area during the breeding season survey period, both within Bailey's Greasewood Shrubland (Table 3-2; Figure 3-4).

Proposed Northern DVTA Expansion Area. Two individuals were detected within the proposed northern DVTA expansion area (Table 3-2; Figure 3-5). One responded to a morning playback survey, while the other was encountered incidentally following an evening survey. Both were detected along the eastern edge of the valley bottom floodplain within Bailey's Greasewood Shrubland.

3.2.2. 2019 Ground Surveys

In 2019, breeding season ground-based surveys were conducted May 18-28 within the proposed B-17 and northern DVTA expansion areas at 185 survey points on 37 routes, totaling 43 hr of effort (Table 3-1). A total of nine burrowing owls were detected during the 2019 breeding season survey period (Table 3-3). Although all detections were followed by systematic searches for burrows or colonies within the vicinity of the detected birds (visual or auditory), no active burrows were found.

Table 3-3. Burrowing Owl Detections during 2019 Breeding Season Ground-based Surveys within the Proposed FRTC Expansion Areas

Date	Observation Type	No. of Individuals	Proposed Expansion Area (Survey Pt)*	Notes
19-May-19	Song	1	B-17 (63A)	Very faint response to song playback. Some chatter a few minutes later.
19-May-19	Visual	1	B-17 (63A)	Attempted to locate individual by following song response. Flushed individual and it flew to the east. Did not locate burrow complex.
19-May-19	Song	1	B-17 (63C)	Heard song; possibly same individual from 63A.
19-May-19	Song	1	B-17 (77C)	Responded to playback with song. Searched for burrow, individual stopped responding. Went back to first response location, heard response again after playback.
21-May-19	Song	1	B-17 (76A)	Heard limited burrowing owl song response
21-May-19	Song	1	B-17 (76B)	Individual is located somewhere SE of 76A.
26-May-19	Call	1	B-17 (86A)	Individual flew in aggressively overhead and called multiple times.
27-May-19	song	1	DVTA (53D)	Heard as soon as survey began.
27-May-19	song	1	DVTA (52E)	Calling before survey began.

Note: *Details of survey points can be found in Appendix B.

Proposed B-17 Expansion Area. Seven individuals were encountered within the proposed B-17 expansion area (Table 3-3; Figure 3-3). One was within Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub alliance, two within Yellow Star-thistle-Dyer's Woad-Prickly Russian Thistle Ruderal Annual Forb alliance, and four within Bailey's Greasewood Shrubland alliance.

Proposed DVTA Expansion Area. Two individuals were detected within the proposed DVTA expansion area (Table 3-3; Figure 3-5), both within Bailey's Greasewood Shrubland.

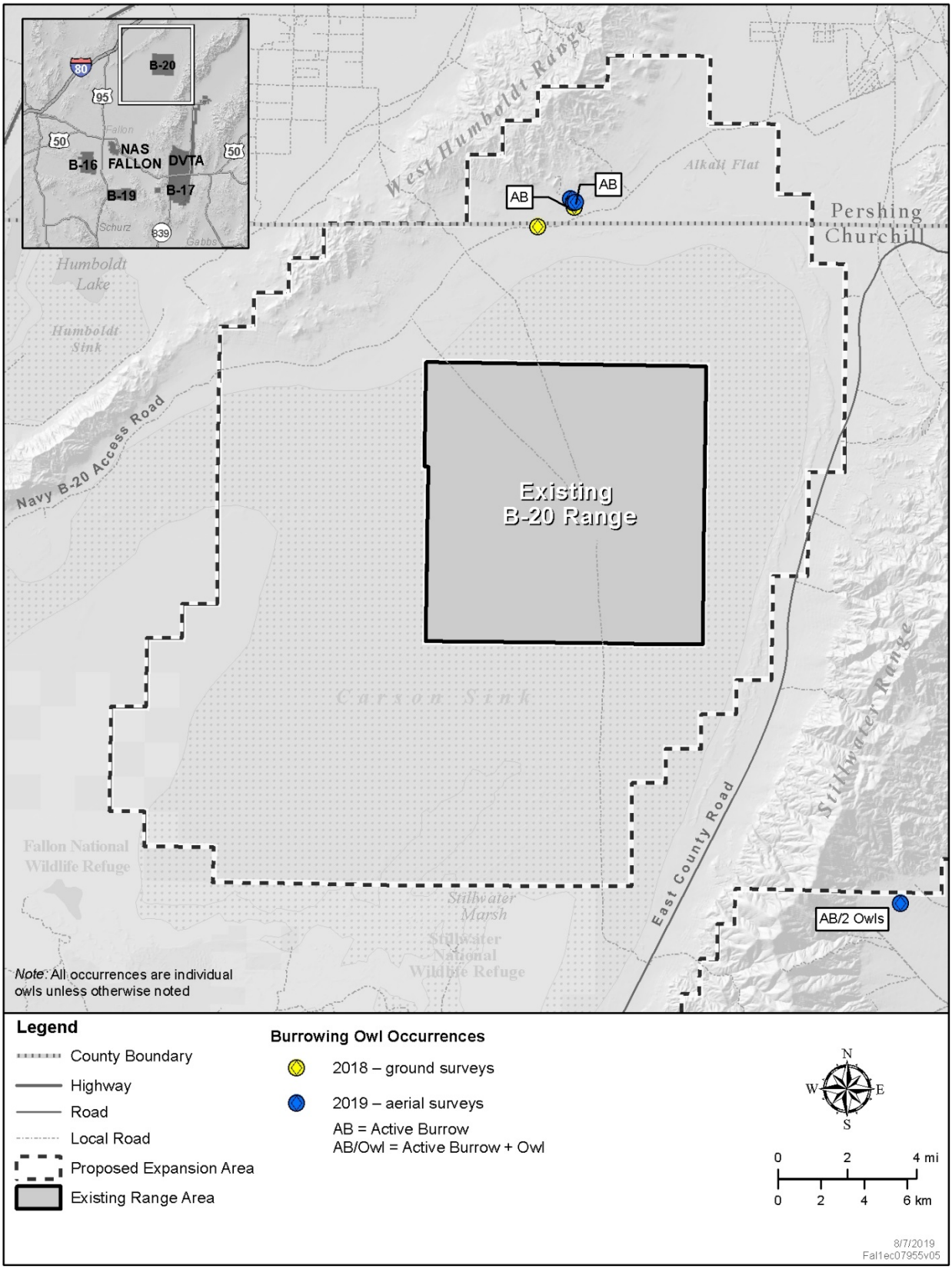

Figure 3-4. Detections of Burrowing Owls during 2018 and 2019 Ground and Aerial Surveys within the Proposed B-20 Expansion Area

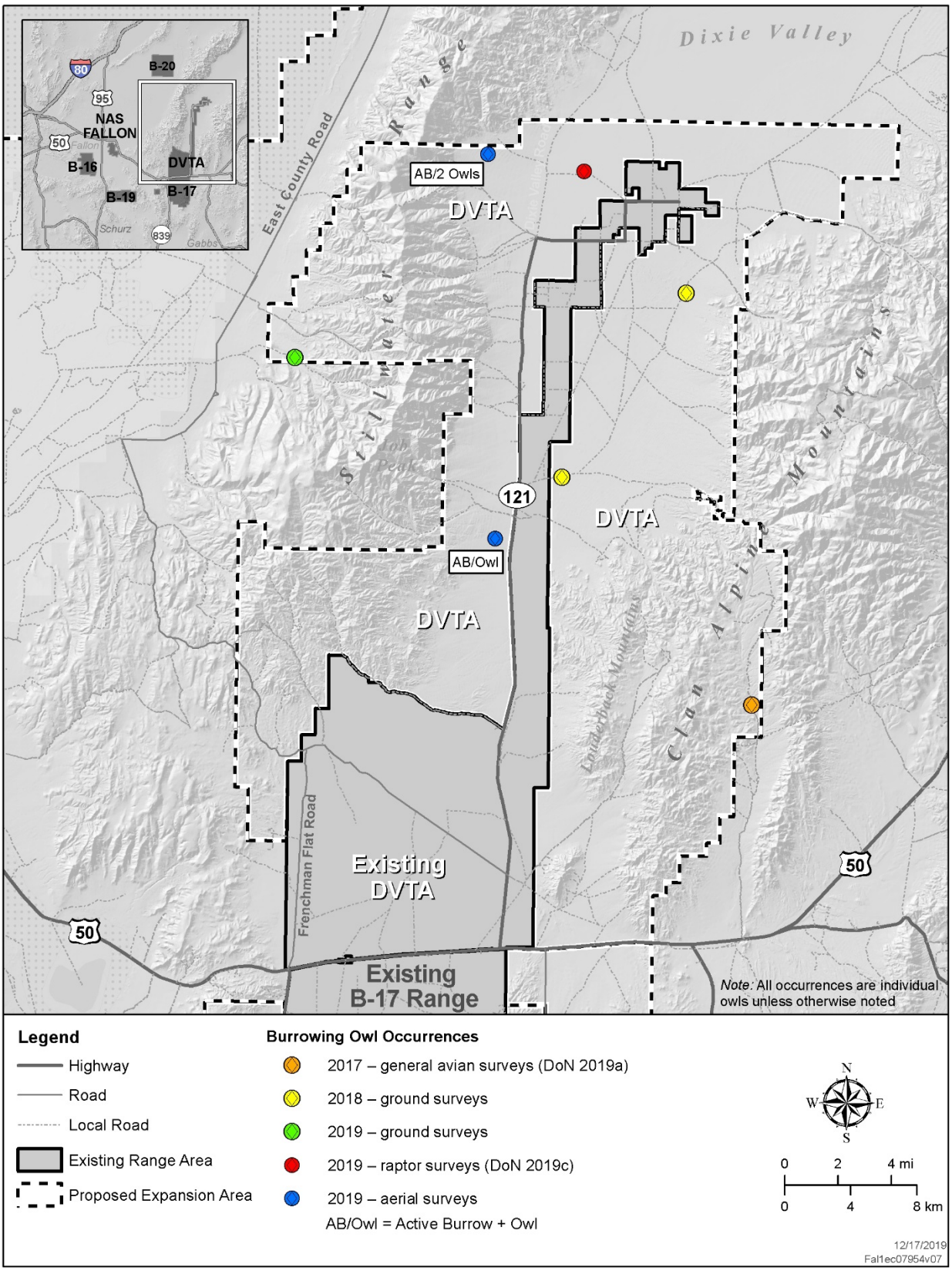

Figure 3-5. Detections of Burrowing Owls during 2017, 2018, and 2019 Ground and Aerial Surveys within the Proposed Northern DVTA Expansion Area

3.2.3. 2019 Aerial Surveys

3.2.3.1. Summary of Survey Efforts

In 2019, approximately 25.5 hr were spent conducting aerial surveys for burrowing owls within 112 areas covering 50,039 ac (20,250 ha) (Table 3-4). Tier 1 surveys were only conducted within the proposed B-17 expansion area (Figure 2-5). Of the 11 Tier 2 areas that were surveyed, 2 each were conducted within the proposed B-16, B-17, and B-20 expansion areas and 5 were surveyed in the proposed DVTA expansion area (Table 3-5; Figure 2-6 through Figure 2-8). Tier 3 surveys were conducted within 37 and 36 areas within the proposed B-17 and DVTA expansion areas, respectively (Table 3-5; Figure 2-5 and Figure 2-8), and within 12 and 15 areas within the proposed B-16 and B-20 expansion areas (Table 3-5; Figure 2-6 and Figure 2-7).

Table 3-4. Summary of 2019 Tiered Aerial Surveys by Tier, Area, Effort, and Date

Survey Tier	No. Survey Areas	Total Area (ha)	Total Time (min)	2019 Survey Dates
Tier 1	1	8,720*	487	June 23, 26
Tier 2	11	1,530	161	June 22, 24-26, 28
Tier 3	100	10,000	883	June21-22, 24-28
Total	**112**	**20,250**	**1,531**	

Note: *Approximately 7,600 ha included in the total area were adjacent to, but immediately outside the proposed FRTC expansion area.

Table 3-5. Summary of 2019 Aerial Surveys by Proposed Expansion Area, Tier, Area, and Effort

	B-16	B-17	B-20	DVTA	Total
Survey Tier					
Tier 1 Areas	0	1	0	0	**1**
Tier 2 Areas	2	2	2	5	**11**
Tier 3 Areas	12	37	15	36	**100**
Total # of Areas Surveyed	14	40	17	41	**112**
Total Area (ha)*	1,670	12,580	1,700	4,300	**20,250**
Total Time (min)	180	827	153	371	**1,531**

Note: *Approximately 7,600 ha included in the total area were adjacent to, but immediately outside the proposed B-17 expansion area.

3.2.3.2. Detection of Burrowing Owls and Burrows

In combination with follow-up ground visits, aerial surveys documented 34 burrowing owl detections: 4 burrowing owls not associated with a burrow, 18 burrowing owls associated with a burrow, 8 active and 4 inactive burrows with no burrowing owls. This included 18 adult burrowing owls, 5 juvenile burrowing owls, and 24 burrows with evidence of current or past burrowing owl activity (Table 3-6 and Table 3-7; Figure 3-2 through Figure 3-5). Of the 23 observed birds, 19 were associated with active burrows: 7 birds (2 adults and 5 juveniles) were associated with a single cluster of active burrows, 2 birds were associated with another single burrow, and 10 additional birds were each associated with active burrows (Table 3-7).

Table 3-6. Summary of Burrowing Owls and Burrows with Burrowing Owl Sign Detected within the Proposed FRTC Expansion Areas during 2019 Aerial Surveys

	Proposed Expansion Area and Survey Tier*												
	B-16			B-17			B-20			DVTA			
	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	Total
Burrowing Owls													
Adult	na	0	0	8†	3	2	na	1	0	na	0	3	**18**
Post-aerial Survey Detections		0			1			0			0		**1**
Juvenile**	na	0	0	0	5	0	na	0	0	na	0	0	**5**
Total		**0**			**19**			**1**			**3**		**23**
Burrowing Owl Burrows													
Active	na	0	1	8†	2	4	na	2	0	na	0	2	**19**
Post-aerial Survey Detections		0			1			0			0		**1**
Inactive	na	0	0	4	0	0	na	0	0	na	0	0	**4**
Total		**1**			**19**			**2**			**2**		**24**

Notes: *T1= Tier 1, T2 = Tier 2, T3 = Tier 3 – refer to Section 2.2.1 for a description of each survey tier.
na = not applicable: Tier 1 surveys were only conducted within the proposed B-17 expansion area.
†One adult and one active burrow were encountered adjacent to, but outside the proposed expansion area footprint and are not included.
**All juveniles were identified during ground-based follow-up surveys after the aerial surveys.

Table 3-7. Summary of Burrowing Owls and Active and Inactive Burrows Detected within the Proposed FRTC Expansion Areas during 2019 Aerial Surveys

	B-16	B-17	B-20	DVTA	Total
Individual Burrowing Owls	0	3	1	0	**4**
Active Burrow Only	1	5	2	0	**8**
Inactive Burrow	0	4	0	0	**4**
Individual Burrowing Owls at a Burrow	0	15[(a)]	0	3[(b)]	**18**
Total	**1**	**27**	**3**	**3**	**34**

Notes: [(a)]8 Burrows with 1 owl each + 1 burrow with 7 owls = 15.
[(b)]1 burrow with 1 owl + 1 burrow with 2 owls = 3.

Of the 23 burrows found during aerial survey efforts, 19 were active and 4 were inactive. Twelve of the active burrows were associated with one or more of the 23 observed burrowing owls, and the 7 other active burrows were identified based on the presence of fresh tracks, whitewash, owl pellets, or some combination thereof. The majority (14) of the 20 active burrows were found within the proposed B-17 expansion area, with two each found in DVTA and B-20, while a single active burrow was found in B-16 (Table 3-7). One additional active burrow was found adjacent to, but outside the proposed B-17 expansion area. The four inactive burrows were all found within the proposed B-17 expansion area, and were identified by the presence of old owl pellets and did not have fresh tracks or whitewash in the vicinity.

The majority (27) of the 34 burrowing owl detections (owls and burrows) were found within the proposed B-17 expansion area (Table 3-7; Figure 3-3). The proposed B-20 and DVTA expansion areas had three detections each (Figure 3-4 and Figure 3-5) and the proposed B-16 expansion area had one detection (active burrow) (Figure 3-2). One additional burrowing owl was found adjacent to, but outside the proposed B-17 expansion area (Figure 3-3).

Following survey flights, 12 burrows whose status was in question were visited using ground-based follow-up visits when logistically feasible. This approach confirmed five instances of suspected burrowing owl

activity, and contributed one additional active burrow with the presence of one adult within the proposed B-17 expansion area.

3.2.4. Association of Burrowing Owls with Vegetation Communities

Statewide records suggest that burrowing owls are most common within sagebrush habitats (44% of observations) (GBBO 2010). The 2017, 2018, and 2019 surveys resulted in 70 burrowing owl detections (owls and active and inactive burrows) within nine vegetation alliances (Table 3-8). Of the 70 total detections, 47 (11 of 13 detections in 2017, 6 of 8 detections in 2018, and 30 of 49 detections in 2019) occurred within the Bailey's Greasewood Shrubland alliance. To avoid double counting detections in the 2019 aerial surveys, only the number of birds are included when the detection included a bird(s) at a burrow. In addition, the burrow complex found during the non-breeding survey was also within that plant community. Importantly however, the majority of the area (44%) within the surveyed area of the proposed FRTC expansion areas is classified as Bailey's Greasewood Shrubland. Similarly, the majority of the burrowing owl survey points (59%) were placed within this vegetation community. Although the results suggest that there may be an association between burrowing owls and Bailey's Greasewood Shrubland within the proposed FRTC expansion areas, too few individuals were detected to provide a meaningful statistical analysis. Lastly, other factors influence the occurrence of burrowing owls, particularly the presence of suitable soils for burrows and presence of burrows provided by other species (e.g., ground squirrels, American badger).

Table 3-8. 2017, 2018, and 2019 Burrowing Owl Breeding Season Detections Summarized by Vegetation Community

Vegetation Alliance	% Total Area	Detections (2019)[1]	Detections (2018)	Detections (2017)[2]	Total Detections
Bailey's Greasewood Shrubland	62.2	32	6	11	**49**
Intermountain Greasewood Wet Shrubland	14.5	0	1	0	**1**
Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub	4.1	3	0	0	**3**
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	3.9	2	0	1	**3**
Shadscale Saltbush Scrub	1.4	0	0	1	**1**
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	1.2	1	0	0	**1**
Mojave Seablite - Red Swampfire Alkaline Wet Scrub	1.1	0	1	0	**1**
Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	0.3	10	0	0	**10**
Bud Sagebrush Shrubland	<0.1	1	0	0	**1**
Total		**49**	**8**	**13**	**70**

Notes: [1]Includes both ground and aerial survey detections and both detections of individual burrowing owls and active burrows. However, a burrowing owl at an active burrow was counted as only 1 detection. Total does not include a burrow and owl detected immediately adjacent to and outside of the proposed B-17 expansion area
[2]DoN 2019a.

The Tier 3 aerial surveys in 2019 covered potentially suitable burrowing owl habitat throughout the proposed FRTC expansion areas and identified both individual burrowing owls and active burrows. This allowed for a more detailed assessment of the occurrence of burrowing owls and burrows within various vegetation alliances. The 2019 aerial surveys documented burrowing owl activity within five vegetation

alliances (Table 3-9). These included Bailey's Greasewood Shrubland (11 birds, 15 active burrows), Basin Big Sagebrush – Foothill Big Sagebrush Dry Steppe & Shrubland (2 birds, 1 active burrow), Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub (1 bird), Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub (1 active burrow), and Yellow Star-thistle - Dyer's Wood - Prickly Russian-thistle Ruderal Annual Forb (8 birds, 2 active burrows). In addition, one bird and one active burrow were detected adjacent to the proposed B-17 expansion area within the Tier 1 survey area in Gabbs Valley. These two observations came from outside the area covered by the vegetation mapping.

Table 3-9. Burrowing Owl and Active Burrow Density by Vegetation Alliance within the Proposed FRTC Expansion Areas from 2019 Aerial Surveys*

Vegetation Alliance	Individual Owls	Active Burrows	Owl Density (#/ha)	Burrow Density (#/ha)	Area Surveyed (ha)
Bailey's Greasewood Shrubland	11	15	<0.01	<0.01	15,484.1
Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	1	0	<0.01	0	486.1
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	0	1	0	<0.01	111.3
Yellow Star-thistle - Dyer's Wood - Prickly Russian-thistle Ruderal Annual Forb	8	2	0.04	0.01	189.6
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	2	1	0.01	<0.01	173.4
Total	**22**	**19**	**<0.01**	**<0.01**	**16,444.5**

Note: *Does not include one adult and one active burrow that were detected immediately adjacent to the proposed B-17 expansion area.

Although most burrowing owl activity was found within the Bailey's Greasewood Shrubland alliance (11 birds and 15 active burrows), burrowing owl density (0.04 birds/ha) was greatest within the Yellow Star-thistle - Dyer's Wood - Prickly Russian-thistle Ruderal Annual Forb alliance (8 birds and 2 active burrows). This vegetation community also had the greatest density of active burrows (0.01 burrow/ha). This was due to the smaller area of Yellow Star-thistle – Dyer's Wood – Prickly Russian-thistle Ruderal Annual Forb that was surveyed 469 ac (190 ha) compared to surveyed area of Bailey's Greasewood Shrubland 38,262 ac (15,484 ha).

3.2.5. Identification of Other Burrows

During 2019 aerial surveys, an additional 285 burrows were documented that were not attributed to burrowing owls. Although the occupants of these burrows were not identified in most cases, the aerial surveys documented active burrows for the following taxa: desert kangaroo rat (*Dipodomys deserti*), white-tailed antelope ground squirrel (*Ammospermophilus leucurus*), Piute ground squirrel (*Spermophilus mollis*), rabbits (either black-tailed jackrabbit [*Lepus californicus*] or desert cottontail [*Sylvilagus audubonii*]), kit fox (*Vulpes macrotis*), coyote, or American badger. Although the resident of a burrow can be difficult to discern, many of these had convincing evidence in the form of tracks, distinctive burrow characteristics, or animal sightings in the immediate vicinity of the burrow. Most photographed burrows were not attributed to a specific taxon (164/285) as many appeared inactive or they did not have enough evidence to attribute them to a species.

3.3 INCIDENTAL OBSERVATIONS OF OTHER NOCTURNAL AVIAN SPECIES

During burrowing owl surveys, five nocturnal avian species were also incidentally observed: great-horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), short-eared owl (*Asio flammeus*), common nighthawk (*Chordeiles minor*), and common poorwill (*Phalaenoptilus nuttallii*) (Figure 3-6).

Great-horned Owl

A common resident of northern Nevada, and probably the most frequently observed owl species, great-horned owls can be found in a wide diversity of desert and montane habitats as well as urban areas. However, they are generally rare in portions of desert habitat where trees are absent and there is a lack of nesting structures. They prey primarily on small mammals such as ground squirrels, mice, gophers, and rabbits, as well as birds (Ryser 1985; Alcorn 1988; Floyd et al. 2007). A great-horned owl was observed in the southern portion of the proposed B-17 expansion area in Intermountain Greasewood Wet Shrubland.

Long-eared Owl

Although not as common or widely distributed across northern Nevada as is the great-horned owl, the long-eared owl is still widespread, fairly common, and easily approached. They nest primarily in the northern part of Nevada. They require a combination of dense, woody vegetation, especially riparian areas, for roosting and open country for foraging. The breeding range of long-eared owls is similar to that of the great-horned owl (which often co-occurs with the long-eared owl), except that long-eared owls are generally absent from salt desert scrub communities. Prey species are similar to great-horned owls (i.e., rodents, rabbits, hares, and birds) (Ryser 1985; Alcorn 1988; Floyd et al. 2007). A long-eared owl was observed in the eastern portion of the proposed DVTA expansion area in Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland.

Short-eared Owl

A year-round resident in northern Nevada, the short-eared owl is a BLM Sensitive Species, Conservation Priority Species under the Nevada WAP, and ranked by the NNHP as apparently secure. Considered a bird of dense grasslands, the short-eared owl is relatively uncommon in Nevada, but it can also be found in diverse types of open country where small mammal populations, particularly voles (*Microtus* spp.), are sufficiently dense (e.g., wet meadows, grasslands, or crop fields). As voles are active during the day, short-eared owls can often be seen hunting during daylight hours. Short-eared owl populations also tend to follow annual fluctuations in vole abundance (Floyd et al. 2007; GBBO 2010; NDOW 2013; BLM 2017; NNHP 2018a). Two individuals were observed within the proposed DVTA expansion area within Bailey's Greasewood Shrubland and Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub.

Common Nighthawk

The common nighthawk is a Conservation Priority Species under the Nevada WAP and ranked by the NNHP as secure. Found in northern Nevada during the summer breeding season and during fall and spring migration, nighthawks are found in a wide diversity of open and semi-open habitats including open coniferous forests, savanna, grasslands, fields within and around cites, and agricultural areas where it feeds on flying insects (GBBO 2010; NDOW 2013; NNHP 2018a). The common nighthawk was the most frequently observed incidental species and was observed within the proposed B16, B-17, B-20, and DVTA expansion areas within Bailey's Greasewood Shrubland and Intermountain Greasewood Wet Shrubland.

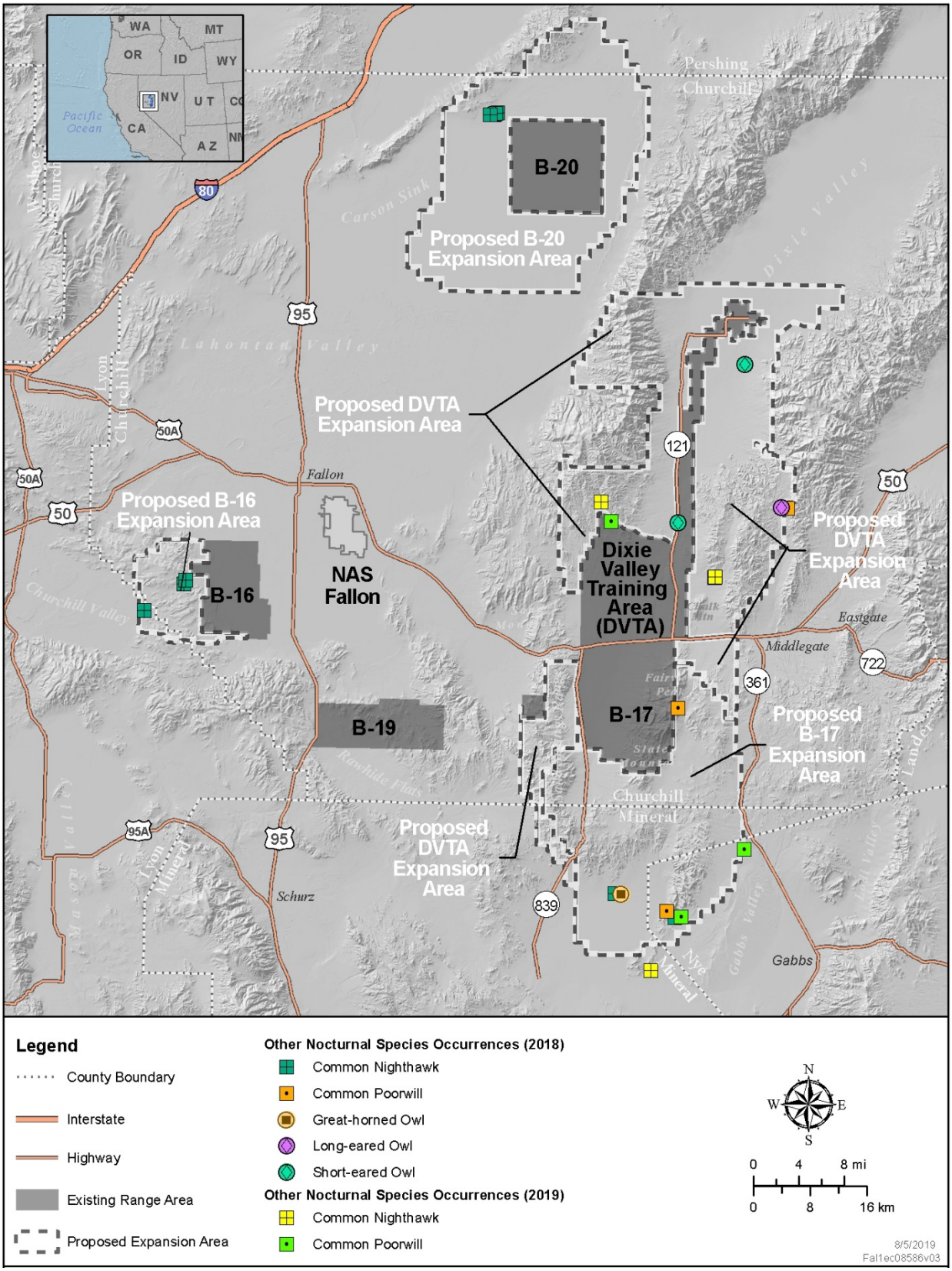

Figure 3-6. Incidental Detections of Other Nocturnal Avian Species within the Proposed FRTC Expansion Areas

Common Poorwill

The habitat and prey requirements and seasonal distribution of the common poorwill are similar to the common nighthawk, although poorwills tend to nest in areas of denser ground cover. Poorwills are unique in that they are one of the few species of birds that can enter into a prolonged state of torpor and spend an entire winter in hibernation (Ryser 1985; Floyd et al. 2007). Individuals were observed within the proposed DVTA and B-17 expansion areas within Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland and Bailey's Greasewood Shrubland, respectively.

4.0 DISCUSSION

4.1 EVIDENCE OF BREEDING AND SEASONALITY

In light of historical burrowing owl distribution records (GBBO 2010; DoN 2019a; Fink et al. 2018; NDOW 2018), it is not surprising that burrowing owls were not encountered within the proposed FRTC expansion areas outside of the breeding season. Although there are 17 records consisting of at least 22 individual burrowing owls within northern Nevada during the non-breeding season (Table 1-2), it is noteworthy that the majority of these records (14 of 17) occurred shortly after the breeding season (September/October – 6 records) or just prior to the breeding season (March/April – 8 records) and likely represent birds dispersing from or early arrivals to the breeding areas.

The fact that burrowing owls were documented within all of the proposed expansion areas during the 2018 and 2019 breeding season surveys, as well as the 2017 general nocturnal owl surveys (DoN 2019a) suggests that the species is widely distributed across the proposed expansion areas and likely breeds within, or in the vicinity, of each expansion area.

4.2 AERIAL SURVEY CONSIDERATIONS

Following aerial surveys, photographs were reviewed for the presence of burrowing owl sign (Figure 4-1). Photographs were used to corroborate data collected during aerial surveys, and proved invaluable for identifying burrow inhabitants, determining burrow status, and allowing ground-based follow-up surveys to determine exact status of a burrow.

Notably, aerial surveys were largely motivated by incidental observations of birds and burrows during aerial raptor surveys. As survey personnel did not find any guidance in the literature for aerial burrowing owl survey methods, aerial survey methods were based on past experience conducting aerial surveys for other taxa. Important survey details included flight speed, height above ground, and the extent to which photography was incorporated into the methods. Each of these involved practical and logistical trade-offs. Slow speeds, low above ground heights, and additional time spent taking photos would likely improve a team's ability to detect birds and active burrows. However, they would also limit the amount of area that a team could cover. The current aerial survey methodology minimized the time at each site when burrowing owls or active burrows were detected. Although birds were photographed, the photos were intended only to document their presence and not aimed at capturing high quality images. As such, not every bird was photographed and most detections were documented with a single or only a couple passes using the helicopter. This approach restricted the potential for disturbance to less than a minute in most cases. The aerial surveys and associated photographs also allowed ground-based observers to return to the area, if logistically feasible, and collect more detailed data. For example, juvenile burrowing owls were only identified during these post-aerial survey visits to active burrowing owl colonies identified during the aerial surveys.

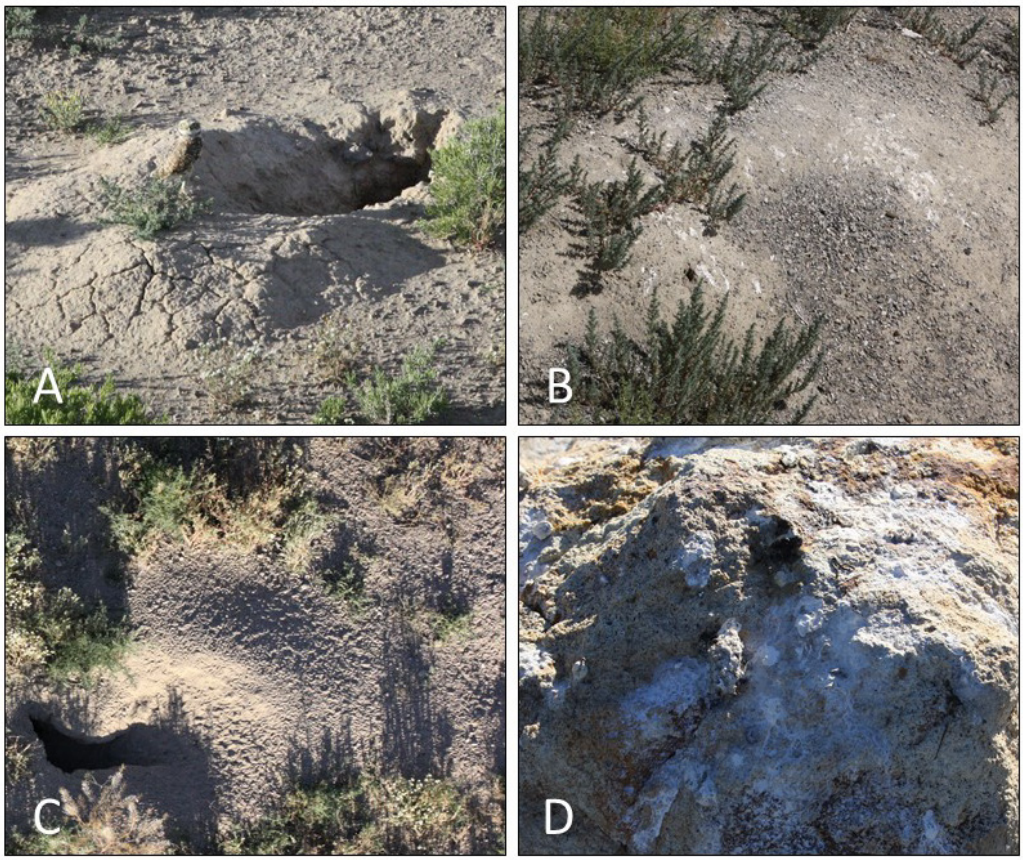

Figure 4-1. Aerial Surveys Provided Evidence of Burrowing Owls and Burrowing Owl Activity: (A) Individual Bird, (B) Whitewash, (C) Tracks, and (D) Pellets

Despite the lack of information from the published literature regarding the use of aerial survey methods to survey burrowing owls, the aerial survey effort proved to be a powerful tool for documenting burrowing owl activity, notably active burrows. Prior to the aerial survey effort, no active burrowing owl colonies were detected during the 2018 and 2019 ground-based survey efforts. The ground-based efforts resulted in 15 burrowing owl detections from a total of 335 breeding season survey points. During 2018 and 2019 ground-based breeding season surveys, observers documented eight and nine individuals, respectively, but no active burrows. During 2019 aerial surveys, 19 active burrows were detected, including 1 burrow immediately adjacent to the proposed B-17 expansion area, and 4 inactive burrows.

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APPENDIX A: Locations of Burrowing Owl Ground Survey Points (2018)

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Table A-1. Locations of Burrowing Owl Ground Survey Points (2018)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_01A	B-16	39.3113	-119.0253	Bailey's Greasewood Shrubland
BUOW_01B	B-16	39.3068	-119.0259	Bailey's Greasewood Shrubland
BUOW_01C	B-16	39.3025	-119.0275	Bailey's Greasewood Shrubland
BUOW_01D	B-16	39.2981	-119.0287	Intermountain Greasewood Wet Shrubland
BUOW_01E	B-16	39.2940	-119.0311	Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland
BUOW_02A	B-16	39.3352	-118.9840	Bailey's Greasewood Shrubland
BUOW_02B	B-16	39.3313	-118.9870	Bailey's Greasewood Shrubland
BUOW_02C	B-16	39.3285	-118.9915	Bailey's Greasewood Shrubland
BUOW_02D†	***B-16***	***39.3261***	***-118.9964***	***Bailey's Greasewood Shrubland***
BUOW_02E	B-16	39.3243	-119.0017	Bailey's Greasewood Shrubland
BUOW_03A	B-16	39.3577	-118.9549	Bailey's Greasewood Shrubland
BUOW_03B	B-16	39.3532	-118.9550	Bailey's Greasewood Shrubland
BUOW_03C	***B-16***	***39.3489***	***-118.9570***	***Bailey's Greasewood Shrubland***
BUOW_03D	B-16	39.3456	-118.9609	Bailey's Greasewood Shrubland
BUOW_03E	***B-16***	***39.3435***	***-118.9660***	***Bailey's Greasewood Shrubland***
BUOW_04A	B-16	39.3312	-118.9246	Bailey's Greasewood Shrubland
BUOW_04B	B-16	39.3350	-118.9277	Bailey's Greasewood Shrubland
BUOW_04C	B-16	39.3391	-118.9302	Bailey's Greasewood Shrubland
BUOW_04D	B-16	39.3436	-118.9299	Bailey's Greasewood Shrubland
BUOW_04E	B-16	39.3467	-118.9340	Bailey's Greasewood Shrubland
BUOW_05A	B-20	39.9480	-118.4727	Intermountain Greasewood Wet Shrubland
BUOW_05B	B-20	39.9484	-118.4669	Bailey's Greasewood Shrubland
BUOW_05C	B-20	39.9507	-118.4619	Intermountain Greasewood Wet Shrubland
BUOW_05D	B-20	39.9598	-118.4493	Intermountain Greasewood Wet Shrubland
BUOW_05E	B-20	39.9635	-118.4459	Intermountain Greasewood Wet Shrubland
BUOW_06A	B-20	39.9846	-118.4239	Bailey's Greasewood Shrubland
BUOW_06B	B-20	39.9809	-118.4273	Bailey's Greasewood Shrubland
BUOW_06C	B-20	39.9773	-118.4308	Bailey's Greasewood Shrubland
BUOW_06D	B-20	39.9732	-118.4333	Intermountain Greasewood Wet Shrubland
BUOW_06E	B-20	39.9907	-118.4157	Bailey's Greasewood Shrubland
BUOW_07A	DVTA	39.6997	-118.0007	Bailey's Greasewood Shrubland
BUOW_07B	DVTA	39.6955	-118.0026	Bailey's Greasewood Shrubland
BUOW_07C	DVTA	39.6910	-118.0022	Bailey's Greasewood Shrubland
BUOW_07D	DVTA	39.6865	-118.0013	Bailey's Greasewood Shrubland
BUOW_07E	DVTA	39.6821	-118.0021	Bailey's Greasewood Shrubland
BUOW_08A	DVTA	39.6364	-118.0481	Bailey's Greasewood Shrubland
BUOW_08B	DVTA	39.6384	-118.0429	Bailey's Greasewood Shrubland
BUOW_08C	DVTA	39.6425	-118.0405	Bailey's Greasewood Shrubland
BUOW_08D	***DVTA***	***39.6466***	***-118.0382***	***Bailey's Greasewood Shrubland***
BUOW_08E	DVTA	39.6507	-118.0357	Bailey's Greasewood Shrubland
BUOW_09A	DVTA	39.4385	-117.9919	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_09B	DVTA	39.4429	-117.9907	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_09C	DVTA	39.4474	-117.9906	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_09D	DVTA	39.4516	-117.9884	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_09E	DVTA	39.4554	-117.9853	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_10A	DVTA	39.4125	-117.9838	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_10B	DVTA	39.4166	-117.9864	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_10C	DVTA	39.4210	-117.9875	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland

Table A-1. Locations of Burrowing Owl Ground Survey Points (2018)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_10D	DVTA	39.4253	-117.9889	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_10E	DVTA	39.4296	-117.9907	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_11A	DVTA	39.2984	-118.0903	Bailey's Greasewood Shrubland
BUOW_11B	DVTA	39.3008	-118.0952	Bailey's Greasewood Shrubland
BUOW_11C	DVTA	39.3024	-118.1007	Bailey's Greasewood Shrubland
BUOW_11D	DVTA	39.3039	-118.1061	Bailey's Greasewood Shrubland
BUOW_11E	DVTA	39.3054	-118.1116	Bailey's Greasewood Shrubland
BUOW_12A	DVTA	39.2719	-118.0813	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_12B	DVTA	39.2559	-118.0709	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_12C	DVTA	39.2677	-118.0793	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_12D	DVTA	39.2637	-118.0766	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_12E	DVTA	39.2596	-118.0742	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_13A	B-17	39.1607	-118.3057	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_13B	B-17	39.1562	-118.3048	Bailey's Greasewood Shrubland
BUOW_13C	B-17	39.1518	-118.3040	Bailey's Greasewood Shrubland
BUOW_13D	B-17	39.1473	-118.3031	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_13E	B-17	39.1429	-118.3023	Bailey's Greasewood Shrubland
BUOW_14A	B-17	39.1060	-118.2991	Bailey's Greasewood Shrubland
BUOW_14B	B-17	39.1015	-118.2995	Bailey's Greasewood Shrubland
BUOW_14C	B-17	39.0970	-118.2999	Bailey's Greasewood Shrubland
BUOW_14D	B-17	39.0925	-118.3003	Bailey's Greasewood Shrubland
BUOW_14E	B-17	39.0876	-118.3007	Bailey's Greasewood Shrubland
BUOW_15A	B-17	39.1311	-118.1546	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_15B	B-17	39.1277	-118.1585	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_15C	B-17	39.1244	-118.1624	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_15D	B-17	39.1216	-118.1670	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_15E	B-17	39.1178	-118.1701	Cheatgrass Ruderal Grassland
BUOW_16A	B-17	39.1313	-118.1266	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_16B	B-17	39.1273	-118.1239	Bailey's Greasewood Shrubland
BUOW_16C	B-17	39.1232	-118.1216	Bailey's Greasewood Shrubland
BUOW_16D	B-17	39.1193	-118.1187	Bailey's Greasewood Shrubland
BUOW_16E	B-17	39.1156	-118.1155	Bailey's Greasewood Shrubland
BUOW_17A	B-17	38.9550	-118.0967	Bailey's Greasewood Shrubland
BUOW_17B	B-17	38.9564	-118.1021	Bailey's Greasewood Shrubland
BUOW_17C	B-17	38.9571	-118.0916	Bailey's Greasewood Shrubland
BUOW_17D	B-17	38.9605	-118.0878	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_17E	B-17	38.9646	-118.0853	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_18A	B-17	38.9415	-118.1703	Bailey's Greasewood Shrubland
BUOW_18B	B-17	38.9403	-118.1647	Bailey's Greasewood Shrubland
BUOW_18C	B-17	38.9373	-118.1605	Bailey's Greasewood Shrubland
BUOW_18D	B-17	38.9338	-118.1567	Bailey's Greasewood Shrubland
BUOW_18E	B-17	38.9334	-118.1510	Bailey's Greasewood Shrubland
BUOW_19A	DVTA	39.5452	-118.1175	Bailey's Greasewood Shrubland
BUOW_19B	DVTA	39.5460	-118.1118	Bailey's Greasewood Shrubland
BUOW_19C	DVTA	39.5493	-118.1077	Bailey's Greasewood Shrubland
BUOW_19D	DVTA	39.5524	-118.1036	Bailey's Greasewood Shrubland
BUOW_19E	DVTA	39.5556	-118.0994	Bailey's Greasewood Shrubland
BUOW_20A	DVTA	39.5769	-118.0843	Bailey's Greasewood Shrubland
BUOW_20B	DVTA	39.5808	-118.0814	Bailey's Greasewood Shrubland
BUOW_20C	DVTA	39.5727	-118.0863	Bailey's Greasewood Shrubland

Table A-1. Locations of Burrowing Owl Ground Survey Points (2018)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_20D	DVTA	39.5847	-118.0785	Bailey's Greasewood Shrubland
BUOW_20E	DVTA	39.5886	-118.0756	Bailey's Greasewood Shrubland
BUOW_21A	B-17	38.9655	-118.3073	Bailey's Greasewood Shrubland
BUOW_21B	B-17	38.9652	-118.3016	Bailey's Greasewood Shrubland
BUOW_21C	B-17	38.9649	-118.2958	Bailey's Greasewood Shrubland
BUOW_21D	B-17	38.9646	-118.2900	Bailey's Greasewood Shrubland
BUOW_21E	B-17	38.9643	-118.2843	Bailey's Greasewood Shrubland
BUOW_22A	B-17	38.9631	-118.2609	Intermountain Greasewood Wet Shrubland
BUOW_22B	B-17	38.9628	-118.2551	Intermountain Greasewood Wet Shrubland
BUOW_22C	B-17	38.9625	-118.2493	Intermountain Greasewood Wet Shrubland
BUOW_22D	B-17	38.9622	-118.2436	Intermountain Greasewood Wet Shrubland
BUOW_22E	B-17	38.9619	-118.2378	Intermountain Greasewood Wet Shrubland
BUOW_23A	DVTA	39.4212	-118.1573	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_23B	DVTA	39.4256	-118.1559	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_23C	DVTA	39.4300	-118.1545	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_23D	DVTA	39.4345	-118.1545	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_23E	DVTA	39.4390	-118.1549	Bailey's Greasewood Shrubland
BUOW_24A	DVTA	39.3324	-118.1361	Bailey's Greasewood Shrubland
BUOW_24B	DVTA	39.3360	-118.1327	Bailey's Greasewood Shrubland
BUOW_24C	DVTA	39.3395	-118.1290	Bailey's Greasewood Shrubland
BUOW_24D	DVTA	39.3426	-118.1248	Bailey's Greasewood Shrubland
BUOW_24E	DVTA	39.3453	-118.1202	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_25A	***B-20***	***39.9995***	***-118.3798***	***Bailey's Greasewood Shrubland***
BUOW_25B	B-20	39.9995	-118.3739	Bailey's Greasewood Shrubland
BUOW_25C	B-20	40.0002	-118.3681	Bailey's Greasewood Shrubland
BUOW_25D	B-20	40.0025	-118.3618	Mojave Seablite - Red Swampfire Alkaline Wet Scrub
BUOW_25E	***B-20***	***40.0068***	***-118.3600***	***Bailey's Greasewood Shrubland***
BUOW_26A	B-20	40.0056	-118.3532	Mojave Seablite - Red Swampfire Alkaline Wet Scrub
BUOW_26B	B-20	40.0067	-118.3475	Intermountain Greasewood Wet Shrubland
BUOW_26C	B-20	40.0167	-118.3331	Bailey's Greasewood Shrubland
BUOW_26D	B-20	40.0163	-118.3272	Shadscale Saltbush Scrub
BUOW_26E	B-20	40.0199	-118.3373	Mojave-Sonoran Burrobrush - Sweetbush Desert Wash Scrub
BUOW_27A	DVTA	39.7105	-117.9921	Intermountain Greasewood Wet Shrubland
BUOW_27B	DVTA	39.7131	-117.9874	Mojave Seablite - Red Swampfire Alkaline Wet Scrub
BUOW_27C	DVTA	39.7157	-117.9826	Mojave Seablite - Red Swampfire Alkaline Wet Scrub
BUOW_27D	DVTA	39.7182	-117.9777	Mojave Seablite - Red Swampfire Alkaline Wet Scrub
BUOW_27E	DVTA	39.7206	-117.9728	Bailey's Greasewood Shrubland
BUOW_28A	DVTA	39.6574	-118.0273	Bailey's Greasewood Shrubland
BUOW_28B	DVTA	39.6600	-118.0225	Bailey's Greasewood Shrubland
BUOW_28C	DVTA	39.6625	-118.0177	Bailey's Greasewood Shrubland
BUOW_28D	DVTA	39.6662	-118.0144	Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub
BUOW_28E	DVTA	39.6702	-118.0117	Intermountain Greasewood Wet Shrubland
BUOW_29A	DVTA	39.5951	-118.0709	Bailey's Greasewood Shrubland
BUOW_29B	DVTA	39.5990	-118.0681	Bailey's Greasewood Shrubland
BUOW_29C	DVTA	39.6030	-118.0654	Bailey's Greasewood Shrubland
BUOW_29D	DVTA	39.6070	-118.0626	Bailey's Greasewood Shrubland
BUOW_29E	DVTA	39.6097	-118.0580	Bailey's Greasewood Shrubland

Table A-1. Locations of Burrowing Owl Ground Survey Points (2018)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_30A	DVTA	39.5450	-118.0883	Bailey's Greasewood Shrubland
BUOW_30B	DVTA	39.5433	-118.0829	Bailey's Greasewood Shrubland
BUOW_30C	DVTA	39.5419	-118.0774	Bailey's Greasewood Shrubland
BUOW_30D	DVTA	39.5420	-118.0716	Bailey's Greasewood Shrubland
BUOW_30E	DVTA	39.5415	-118.0658	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland

Note: *Table rows in ***bold italics*** indicate the detection of a burrow and/or burrowing owl during 2018 surveys.

†A burrow was observed in February during a non-breeding survey at Survey Point 2D.

APPENDIX B: Locations of Burrowing Owl Ground Survey Points (2019)

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Table B-1. Locations of Burrowing Owl Ground Survey Points (2019)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_50A	DVTA	39.4564	-118.0625	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_50B	DVTA	39.4632	-118.0620	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_50C	DVTA	39.4714	-118.0662	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_50D	DVTA	39.4775	-118.0948	Black Sagebrush Steppe & Shrubland
BUOW_50E	DVTA	39.6300	-118.1178	Bailey's Greasewood Shrubland
BUOW_51A	DVTA	39.5144	-117.9842	Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland
BUOW_51B	DVTA	39.5186	-117.9864	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_51C	DVTA	39.5194	-117.9919	Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland
BUOW_51D	DVTA	39.5212	-117.9975	Arroyo Willow Wet Shrubland
BUOW_51E	DVTA	39.7097	-118.1108	Western Baltic Rush - Mexican Rush Wet Meadow
BUOW_52A	DVTA	39.5792	-118.0027	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_52B	DVTA	39.5798	-118.0085	Bailey's Greasewood Shrubland
BUOW_52C	DVTA	39.5818	-118.0137	Bailey's Greasewood Shrubland
BUOW_52D	DVTA	39.5832	-118.0192	Bailey's Greasewood Shrubland
BUOW_52E	***DVTA***	***39.6028***	***-118.0197***	***Bailey's Greasewood Shrubland***
BUOW_53A	DVTA	39.6119	-118.3306	Bailey's Greasewood Shrubland
BUOW_53B	DVTA	39.6104	-118.3251	Bailey's Greasewood Shrubland
BUOW_53C	DVTA	39.6088	-118.3197	Bailey's Greasewood Shrubland
BUOW_53D	***DVTA***	***39.6066***	***-118.3146***	***Bailey's Greasewood Shrubland***
BUOW_53E	DVTA	39.6050	-118.3092	Bailey's Greasewood Shrubland
BUOW_54A	DVTA	39.6080	-118.2478	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_54B	DVTA	39.6092	-118.2534	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_54C	DVTA	39.6108	-118.2588	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_54D	DVTA	39.6103	-118.2646	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_54E	DVTA	39.6185	-118.3039	Intermountain Greasewood Wet Shrubland
BUOW_55A	DVTA	39.4453	-118.2755	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland
BUOW_55B	DVTA	39.4891	-118.2982	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_55C	DVTA	39.4932	-118.3003	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_55D	DVTA	39.4973	-118.3029	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_55E	DVTA	39.5016	-118.3044	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland
BUOW_56A	DVTA	39.4945	-118.2758	Utah Juniper / Shrub Understory Woodland
BUOW_56B	DVTA	39.4900	-118.2750	Utah Juniper / Shrub Understory Woodland
BUOW_56C	DVTA	39.4856	-118.2762	Utah Juniper / Shrub Understory Woodland
BUOW_56D	DVTA	39.4815	-118.2786	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_56E	DVTA	39.4783	-118.2826	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_57A	DVTA	39.4499	-118.0520	Black Sagebrush Steppe & Shrubland
BUOW_57B	DVTA	39.4477	-118.0461	Black Sagebrush Steppe & Shrubland
BUOW_57C	DVTA	39.4434	-118.0474	Black Sagebrush Steppe & Shrubland
BUOW_57D	DVTA	39.4402	-118.0515	Black Sagebrush Steppe & Shrubland
BUOW_57E	DVTA	39.4373	-118.0560	Black Sagebrush Steppe & Shrubland
BUOW_58A	DVTA	39.4796	-117.9829	Wyoming Big Sagebrush Dry Steppe & Shrubland
BUOW_58B	DVTA	39.4796	-117.9754	Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland
BUOW_58C	DVTA	39.4752	-117.9741	Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland
BUOW_58D	DVTA	39.4711	-117.9764	Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland
BUOW_58E	DVTA	39.4670	-117.9788	Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland

Table B-1. Locations of Burrowing Owl Ground Survey Points (2019)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_59A	B-17	39.1234	-118.0313	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_59B	B-17	39.1195	-118.0343	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_59C	B-17	39.1154	-118.0366	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_59D	B-17	39.1113	-118.0389	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_59E	B-17	39.1071	-118.0411	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_60A	B-17	39.1030	-118.0434	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_60B	B-17	39.0986	-118.0445	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_60C	B-17	39.0941	-118.0452	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_60D	B-17	39.0896	-118.0458	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_60E	B-17	39.0851	-118.0465	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_61A	B-17	39.0806	-118.0471	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_61B	B-17	39.0761	-118.0470	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_61C	B-17	39.0719	-118.0451	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_61D	B-17	39.0679	-118.0424	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_61E	B-17	39.0636	-118.0406	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_62A	B-17	39.0568	-118.0389	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_62B	B-17	39.0524	-118.0377	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_62C	B-17	39.0483	-118.0351	Bailey's Greasewood Shrubland
BUOW_62D	B-17	39.0442	-118.0328	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_62E	B-17	39.0400	-118.0307	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_63A	***B-17***	***39.0306***	***-118.0240***	***Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb***
BUOW_63B	B-17	39.0358	-118.0286	Bailey's Greasewood Shrubland
BUOW_63C	***B-17***	***39.0314***	***-118.0297***	***Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub***
BUOW_63D	B-17	39.0305	-118.0354	Bailey's Greasewood Shrubland
BUOW_63E	B-17	39.0272	-118.0393	Bailey's Greasewood Shrubland
BUOW_64A	B-17	39.0060	-118.0476	Bailey's Greasewood Shrubland
BUOW_64B	B-17	39.0226	-118.0390	Bailey's Greasewood Shrubland
BUOW_64C	B-17	39.0184	-118.0408	Bailey's Greasewood Shrubland
BUOW_64D	B-17	39.0142	-118.0428	Bailey's Greasewood Shrubland
BUOW_64E	B-17	39.0099	-118.0448	Bailey's Greasewood Shrubland

Table B-1. Locations of Burrowing Owl Ground Survey Points (2019)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_65A	B-17	39.0138	-117.9820	Bailey's Greasewood Shrubland
BUOW_65B	B-17	39.0180	-117.9797	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_65C	B-17	39.0222	-117.9779	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_65D	B-17	39.0264	-117.9757	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_65E	B-17	39.0306	-117.9738	Bailey's Greasewood Shrubland
BUOW_66A	B-17	38.9932	-117.9922	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb
BUOW_66B	B-17	38.9973	-117.9899	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_66C	B-17	39.0016	-117.9884	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_66D	B-17	39.0052	-117.9850	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_66E	B-17	39.0097	-117.9843	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_67A	B-17	38.9322	-118.0602	Bailey's Greasewood Shrubland
BUOW_67B	B-17	38.9349	-118.0555	Bailey's Greasewood Shrubland
BUOW_67C	B-17	38.9375	-118.0509	Bailey's Greasewood Shrubland
BUOW_67D	B-17	38.9390	-118.0455	Bailey's Greasewood Shrubland
BUOW_67E	B-17	38.9376	-118.0400	Bailey's Greasewood Shrubland
BUOW_68A	B-17	38.9317	-118.0866	Bailey's Greasewood Shrubland
BUOW_68B	B-17	38.9318	-118.0809	Bailey's Greasewood Shrubland
BUOW_68C	B-17	38.9311	-118.0752	Bailey's Greasewood Shrubland
BUOW_68D	B-17	38.9298	-118.0696	Bailey's Greasewood Shrubland
BUOW_68E	B-17	38.9289	-118.0641	Bailey's Greasewood Shrubland
BUOW_69A	B-17	38.9258	-118.1075	Bailey's Greasewood Shrubland
BUOW_69B	B-17	38.9244	-118.1020	Bailey's Greasewood Shrubland
BUOW_69C	B-17	38.9230	-118.0965	Bailey's Greasewood Shrubland
BUOW_69D	B-17	38.9216	-118.0910	Bailey's Greasewood Shrubland
BUOW_69E	B-17	38.9199	-118.0857	Bailey's Greasewood Shrubland
BUOW_70A	B-17	38.9125	-118.0543	Bailey's Greasewood Shrubland
BUOW_70B	B-17	38.9139	-118.0598	Bailey's Greasewood Shrubland
BUOW_70C	B-17	38.9169	-118.0815	Bailey's Greasewood Shrubland
BUOW_70D	B-17	38.9153	-118.0761	Bailey's Greasewood Shrubland
BUOW_70E	B-17	38.9129	-118.0712	Bailey's Greasewood Shrubland
BUOW_71A	B-17	38.9056	-118.0269	Bailey's Greasewood Shrubland
BUOW_71B	B-17	38.9070	-118.0324	Bailey's Greasewood Shrubland
BUOW_71C	B-17	38.9083	-118.0379	Bailey's Greasewood Shrubland
BUOW_71D	B-17	38.9097	-118.0433	Bailey's Greasewood Shrubland
BUOW_71E	B-17	38.9111	-118.0488	Bailey's Greasewood Shrubland
BUOW_72A	B-17	38.8987	-117.9995	Bailey's Greasewood Shrubland
BUOW_72B	B-17	38.9001	-118.0050	Bailey's Greasewood Shrubland
BUOW_72C	B-17	38.9015	-118.0104	Bailey's Greasewood Shrubland
BUOW_72D	B-17	38.9029	-118.0159	Bailey's Greasewood Shrubland
BUOW_72E	B-17	38.9042	-118.0214	Bailey's Greasewood Shrubland
BUOW_73A	B-17	38.8932	-118.1968	Intermountain Greasewood Wet Shrubland
BUOW_73B	B-17	38.8976	-118.1957	Intermountain Greasewood Wet Shrubland
BUOW_73C	B-17	38.9188	-118.1962	Intermountain Greasewood Wet Shrubland
BUOW_73D	B-17	38.9350	-118.1836	Intermountain Greasewood Wet Shrubland
BUOW_73E	B-17	38.9421	-118.1921	Intermountain Greasewood Wet Shrubland
BUOW_74A	B-17	38.8652	-118.1889	Intermountain Greasewood Wet Shrubland
BUOW_74B	B-17	38.8708	-118.1997	Intermountain Greasewood Wet Shrubland
BUOW_74C	B-17	38.8753	-118.1994	Intermountain Greasewood Wet Shrubland
BUOW_74D	B-17	38.8798	-118.1990	Intermountain Greasewood Wet Shrubland

Table B-1. Locations of Burrowing Owl Ground Survey Points (2019)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_74E	B-17	38.8842	-118.1981	Intermountain Greasewood Wet Shrubland
BUOW_75A	B-17	38.8390	-118.0667	Bailey's Greasewood Shrubland
BUOW_75B	B-17	38.8389	-118.0725	Bailey's Greasewood Shrubland
BUOW_75C	B-17	38.8386	-118.0782	Bailey's Greasewood Shrubland
BUOW_75D	B-17	38.8376	-118.0839	Bailey's Greasewood Shrubland
BUOW_75E	B-17	38.8369	-118.0895	Intermountain Greasewood Wet Shrubland
BUOW_76A	***B-17***	***38.9647***	***-117.9695***	***Bailey's Greasewood Shrubland***
BUOW_76B	***B-17***	***38.9683***	***-117.9731***	***Bailey's Greasewood Shrubland***
BUOW_76C	B-17	38.9723	-117.9756	Bailey's Greasewood Shrubland
BUOW_76D	B-17	38.9768	-117.9767	Bailey's Greasewood Shrubland
BUOW_76E	B-17	38.9812	-117.9775	Bailey's Greasewood Shrubland
BUOW_77A	B-17	39.0532	-118.0152	Bailey's Greasewood Shrubland
BUOW_77B	B-17	39.0519	-118.0097	Bailey's Greasewood Shrubland
BUOW_77C	***B-17***	***39.0490***	***-118.0053***	***Bailey's Greasewood Shrubland***
BUOW_77D	B-17	39.0445	-118.0045	Bailey's Greasewood Shrubland
BUOW_77E	B-17	39.0408	-118.0013	Bailey's Greasewood Shrubland
BUOW_78A	B-17	39.0536	-118.0544	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_78B	B-17	39.0544	-118.0487	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_78C	B-17	39.0562	-118.0320	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_78D	B-17	39.0545	-118.0267	Bailey's Greasewood Shrubland
BUOW_78E	B-17	39.0537	-118.0209	Bailey's Greasewood Shrubland
BUOW_80A	B-17	38.9207	-117.9825	Bailey's Greasewood Shrubland
BUOW_80B	B-17	38.9238	-117.9868	Bailey's Greasewood Shrubland
BUOW_80C	B-17	38.9249	-117.9923	Bailey's Greasewood Shrubland
BUOW_80D	B-17	38.9251	-117.9981	Bailey's Greasewood Shrubland
BUOW_80E	B-17	38.9252	-118.0039	Bailey's Greasewood Shrubland
BUOW_81A	B-17	38.9262	-118.0096	Bailey's Greasewood Shrubland
BUOW_81B	B-17	38.9266	-118.0152	Bailey's Greasewood Shrubland
BUOW_81C	B-17	38.9278	-118.0208	Bailey's Greasewood Shrubland
BUOW_81D	B-17	38.9300	-118.0259	Bailey's Greasewood Shrubland
BUOW_81E	B-17	38.9328	-118.0304	Bailey's Greasewood Shrubland
BUOW_82A	B-17	38.8363	-118.0953	Bailey's Greasewood Shrubland
BUOW_82B	B-17	38.8365	-118.1010	Bailey's Greasewood Shrubland
BUOW_82C	B-17	38.8370	-118.1068	Bailey's Greasewood Shrubland
BUOW_82D	B-17	38.8394	-118.1117	Bailey's Greasewood Shrubland
BUOW_82E	B-17	38.8416	-118.1168	Bailey's Greasewood Shrubland
BUOW_83A	B-17	39.0226	-117.9848	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_83B	B-17	39.0266	-117.9876	Bailey's Greasewood Shrubland
BUOW_83C	B-17	39.0308	-117.9897	Bailey's Greasewood Shrubland
BUOW_83D	B-17	39.0347	-117.9927	Bailey's Greasewood Shrubland
BUOW_83E	B-17	39.0380	-117.9966	Bailey's Greasewood Shrubland
BUOW_84A	B-17	39.0596	-117.9852	Bailey's Greasewood Shrubland
BUOW_84B	B-17	39.0552	-117.9845	Bailey's Greasewood Shrubland
BUOW_84C	B-17	39.0508	-117.9831	Bailey's Greasewood Shrubland
BUOW_84D	B-17	39.0516	-117.9887	Bailey's Greasewood Shrubland
BUOW_84E	B-17	39.0502	-117.9943	Bailey's Greasewood Shrubland
BUOW_85A	B-17	38.8212	-118.1350	Bailey's Greasewood Shrubland
BUOW_85B	B-17	38.8252	-118.1375	Bailey's Greasewood Shrubland
BUOW_85C	B-17	38.8291	-118.1405	Bailey's Greasewood Shrubland
BUOW_85D	B-17	38.8327	-118.1439	Bailey's Greasewood Shrubland

Table B-1. Locations of Burrowing Owl Ground Survey Points (2019)*

Survey Point	Proposed Expansion Area	Latitude	Longitude	Vegetation Alliance (DoN 2019b)
BUOW_85E	B-17	38.8362	-118.1475	Bailey's Greasewood Shrubland
BUOW_86A	***B-17***	***38.9873***	***-117.9930***	***Bailey's Greasewood Shrubland***
BUOW_86B	B-17	38.9992	-117.9973	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_86C	B-17	39.0031	-118.0001	Bailey's Greasewood Shrubland
BUOW_86D	B-17	39.0072	-118.0030	Bailey's Greasewood Shrubland
BUOW_86E	B-17	39.0111	-118.0059	Bailey's Greasewood Shrubland
BUOW_87A	B-17	39.0599	-118.0280	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_87B	B-17	39.0643	-118.0266	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_87C	B-17	39.0688	-118.0261	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_87D	B-17	39.0729	-118.0241	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub
BUOW_87E	B-17	39.0774	-118.0233	Bailey's Greasewood Shrubland

Note: *Table rows in ***bold italics*** indicate the detection of a burrow and/or burrowing owl within the vicinity during 2019 surveys.

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APPENDIX C: Photographs of Representative Burrowing Owl Survey Points on Ground-based Routes

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Route ID: BUOW_01

Route ID: BUOW_02

Route ID: BUOW_03

Route ID: BUOW_04

Route ID: BUOW_05

Route ID: BUOW_06

Route ID: BUOW_07

Route ID: BUOW_08

Route ID: BUOW_09

Route ID: BUOW_10

Route ID: BUOW_11

Route ID: BUOW_12

Route ID: BUOW_13

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Route ID: BUOW_71

Route ID: BUOW_72

Route ID: BUOW_73

Route ID: BUOW_74

Route ID: BUOW_75

Route ID: BUOW_76

Route ID: BUOW_77

Route ID: BUOW_78

Route ID: BUOW_80

Route ID: BUOW_81

Route ID: BUOW_82

Route ID: BUOW_83

Route ID: BUOW_84

Route ID: BUOW_85

Route ID: BUOW_86

Route ID: BUOW_87