Final

Amphibian and Reptile Survey Report in Support of the Proposed Fallon Range Training Complex Expansion, Nevada

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Cover Photos

Left: Long-nosed Leopard Lizard (*Gambelia wislezenii*); photo E. Rose, ManTech.
Middle: Great Basin Rattlesnake (*Crotalus oreganus lutosus*); photo E. Rose, ManTech.
Right: Western Fence Lizard (*Sceloporus occidentalis*); photo J. LeBonte, ManTech.

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Acronyms and Abbreviations

ac	acre(s)
BLM	Bureau of Land Management
°C	degrees Celsius
cm	centimeter(s)
DoN	U.S. Department of the Navy
DVTA	Dixie Valley Training Area
EIS	Environmental Impact Statement
ESA	Endangered Species Act
°F	degrees Fahrenheit
FRTC	Fallon Range Training Complex
ft	foot/feet
ha	hectare(s)
hr	hour(s)
in.	inch(es)
km	kilometer(s)
m	meter(s)
mi	mile(s)
NAC	Nevada Administrative Code
NAS	Naval Air Station
NDOW	Nevada Department of Wildlife
NNHP	Nevada Natural Heritage Program
SVL	snout-to-vent length
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
WAP	Wildlife Action Plan

1. INTRODUCTION AND OVERVIEW

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Air Station (NAS) Fallon manages the Fallon Range Training Complex (FRTC), which currently encompasses a combination of withdrawn and acquired lands totaling approximately 223,600 acres (ac) (90,490 hectares [ha]) of military training land located near Fallon, Nevada (Figure 1-1).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 areas are broken into 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 amphibian and reptile 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 AND SURVEY AREAS

For the purposes of this report, all of the proposed expansion areas define the *survey areas*, and the entire area depicted on Figure 1-1 is defined as the *study area*. Although the majority of the survey areas occur within Churchill County, portions of the proposed expansion areas occur within Pershing, Lyon, Mineral, and Nye counties.

The study area 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 (mi) (409,218 square kilometers [km]) of southern Idaho, southeastern Oregon, western Utah, eastern California, and nearly all of Nevada (MacMahon 1985). The Great Basin is a high, cold desert, with most of its elevations over 4,000 feet (ft) 1,200 meters [m]), and most of its precipitation comes in the form of snow, although rain showers can occur throughout the year (Sowell 2001).

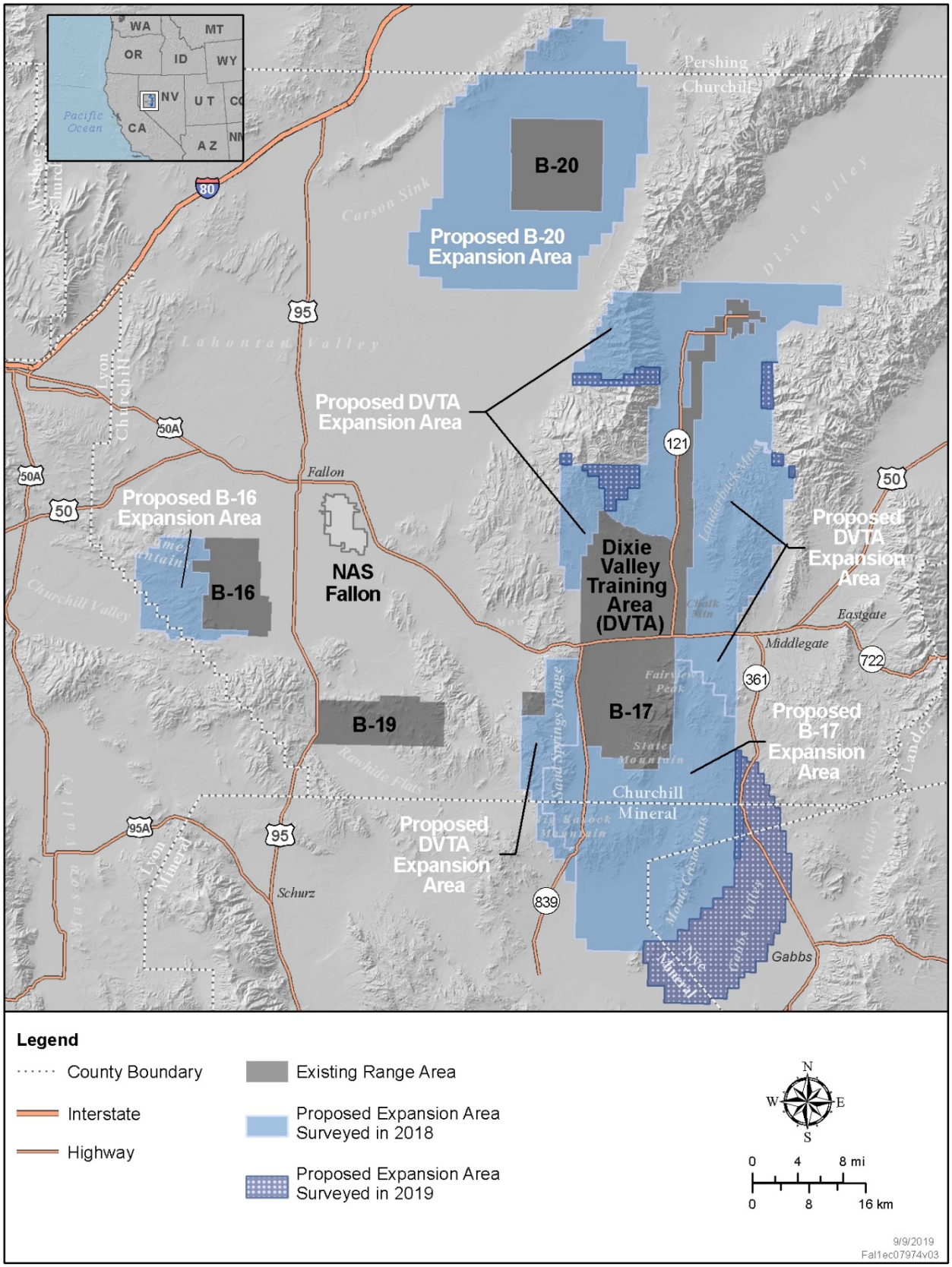

Figure 1-1. Regional Location of the Proposed FRTC Expansion Areas

1.2. REGIONAL CLIMATE

The climate of the region is classified as arid continental, characterized by abundant sunshine, low humidity, and substantial diurnal and seasonal variations in temperature throughout the year. The major influences on the regional climate are the Sierra Nevada Mountains to the west and elevation (DoN 2014).

The NAS Fallon area is hot during summer when day time temperatures average in the 90s degrees Fahrenheit (°F) (30s degrees Celsius [°C]) and cold during winter when temperatures average in the 40s °F (5-10 °C). The warmest month of the year is July with an average maximum temperature of 93 °F (34 °C), while the coldest months of the year are December and January with an average minimum temperature of 21 °F (−6 °C) (Figure 1-2a). Temperature variations between night and day tend to be relatively large due to low humidity. During summer the difference can reach 39 °F (22 °C), being more moderate during winter with an average difference of 28 °F (16 °C). In the past 30 years the average precipitation in the Lahontan Valley was 4.91 inches (in.) (12.47 centimeters [cm]). Most of the precipitation occurs during the winter/early spring months, primarily as snow (Figure 1-2b). Although Fallon gets around 7-8 in. (17.8-20.3 cm) of snow annually, it is generally very light and melts within a few days, except in the mountainous regions, where several inches can fall and remain for longer periods of time (DoN 2014; U.S Climate Data 2018).

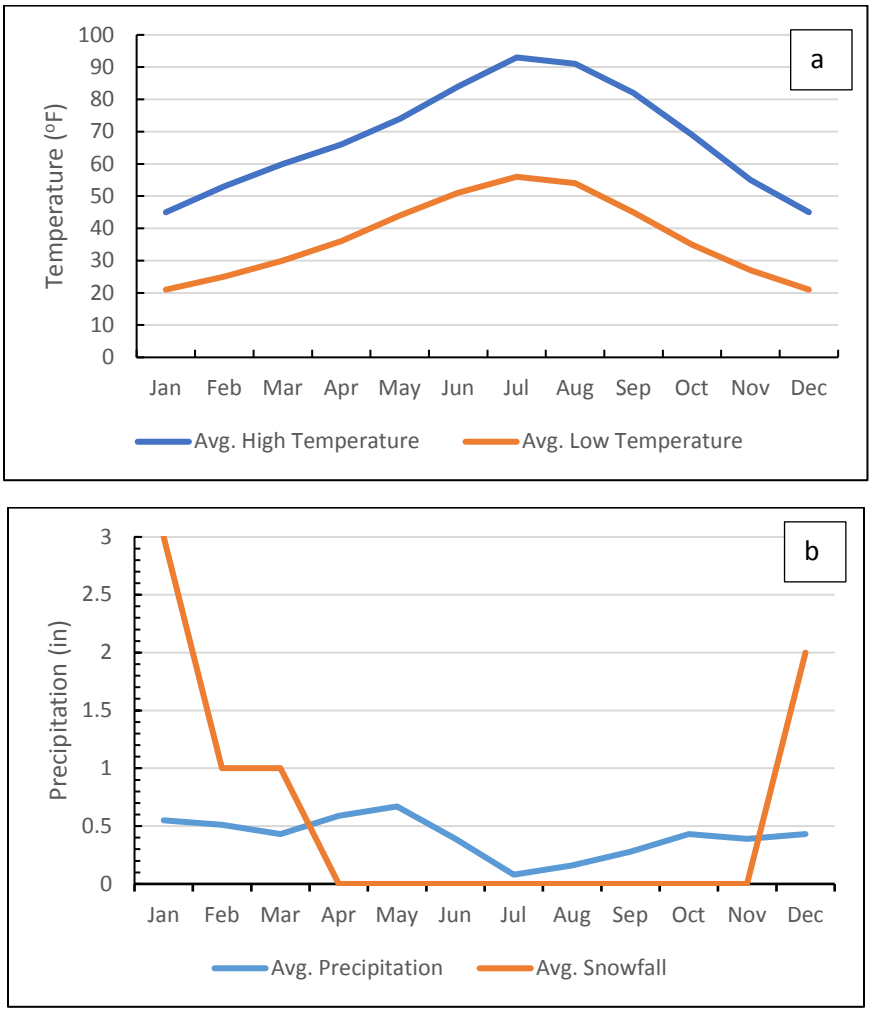

Figure 1-2. (a) Yearly Average Temperature and (b) Precipitation and Snowfall – Fallon, Nevada
Source: U.S. Climate Data 2018.

1.3. THERMAL CONDITIONS AND ECTOTHERMS

Climate plays an important role in the lives of ectotherms. Reptiles and amphibians rely on external sources of heat to maintain their body temperatures, and have very little capacity to generate and maintain body heat through internal physiological processes. This requires them to seek out thermal conditions, or microclimates, that keep their body temperature within their physiological limits (Muth 1977). This reliance on behavioral thermal mechanisms helps minimize metabolic costs during cooler temperatures, but as a consequence, an animal's potential activity is restricted when body temperatures fall outside the thermal performance breadth (Huey and Stevenson 1979). As a result, reptiles and amphibians often exhibit predictable seasonal and diurnal behavioral patterns in response to changes in temperature.

Although reptile and amphibian seasonality within the Fallon region varies across species, they are most active during the warmer months, from March to September (Rose et al. 2015). In general, amphibian activity peaks in the spring (March to June), while reptile activity peaks in the summer (May to August). Throughout most of the Fallon region, average low temperatures remain below 60 °F (15 °C), well outside the activity range of most reptile and amphibian species. Cool nighttime temperatures, even during summer months, mean that reptiles and amphibians remain hidden until they can find suitable microclimates to help elevate their body temperatures to within their thermal performance breadth.

From a monitoring perspective, it is extremely difficult to find hidden individuals that remain outside their thermal performance breadth. As a result, understanding the thermal performance breadths of the species found within the region is critical for effective monitoring. Therefore, in addition to documenting all species encountered within the proposed expansion areas, temperature data was also collected in the context of individuals encountered during survey efforts to help inform future survey efforts.

1.4. VEGETATION COMMUNITIES WITHIN THE PROPOSED EXPANSION AREAS

The following provides an overview of the vegetation communities found within the proposed FRTC expansion areas. In support of the FRTC EIS, mapping and classifying the vegetation within the proposed FRTC expansion areas was conducted as a separate survey effort. The summary below provides the context for potential amphibian and reptile habitat; details can be found in DoN (2019c).

Based on the recent vegetation community mapping effort, a total of 26 alliances within 7 formations were recorded within the 4 proposed FRTC expansion areas (Table 1-1; Figure 1-3, Figure 1-4, Figure 1-5, and Figure 1-6). The majority of the proposed expansion areas consists of shrubland alliances dominated by various species of greasewood (*Sarcobatus* spp.), sagebrush (*Artemisia* spp.), and saltbush (*Atriplex* spp.) (DoN 2019c).

Although the proposed B-16 Expansion Area is by far the smallest of the expansion areas, it is relatively diverse, with a good representation of upland alliances (Table 1-1 and Figure 1-3). The proposed B-20 Expansion Area is the least diverse, as most of it is a large, unvegetated playa (Table 1-1 and Figure 1-4). However, the margins of the proposed B-20 Expansion Area, particularly at the north end, are more diverse where soils and topography become more complex. The proposed DVTA and B-17 expansion areas have by far the most diverse assemblage of vegetation alliances, consistent with their large size and topographic complexity (Table 1-1; Figure 1-5 and Figure 1-6). The lowest elevations of Dixie Valley are highly complex due to the presence of small seeps and springs as well as development and grazing. The proposed DVTA expansion area is the only area that contains mapped riparian alliances.

Table 1-1. Acreage and Elevation Range of Vegetation Alliances Mapped within the Proposed FRTC Expansion Areas (DoN 2019c)

Formation Alliance	Elevation (ft)	Area (acres)	Percent of Total	Proposed Expansion Area			
				B-16	B-17	B-20	DVTA
Cool Semi-Desert Scrub & Grassland							
Bailey's Greasewood Shrubland	3,460–7,120	307,293	46.0	X	X	X	X
Black Sagebrush Steppe & Shrubland	3,960–7,440	45,602	6.8		X	X	X
Wyoming Big Sagebrush Dry Steppe & Shrubland	4,320–6,880	24,569	3.7	X	X		X
Basin Big Sagebrush–Foothill Big Sagebrush Dry Steppe & Shrubland	3,400–7,200	13,771	2.1		X	X	X
Big Sagebrush–Mixed Shrub Dry Steppe & Shrubland	3,600–6,920	10,815	1.6	X	X	X	X
Shadscale Saltbush Scrub	3,960–6,000	5,002	0.7	X	X	X	X
Rubber Rabbitbrush–Sand Buckwheat–Four-part Horsebrush Sparse Scrub	3,390–6,600	5,073	0.8	X	X	X	X
Cheatgrass Ruderal Grassland	3,960–6,820	1,140	0.2		X	X	
Nevada Joint-fir Scrub	4,440–7,120	882	0.13		X		
Yellow Star-thistle–Dyer's Woad–Prickly Russian Thistle Ruderal Annual Forb	3,960–4,880	1,885	0.3	X	X	X	X
Winterfat Steppe & Dwarf Shrubland	4,080–5,740	276	<0.1		X	X	
Fourwing Saltbush–Rubber Rabbitbrush Desert Wash	3,390–3,450	164	<0.1				X
Bud Sagebrush Shrubland	6,460	29	<0.1		X		
Salt Marsh							
Microphytic Playa	3,390–4,120	130,327	19.5		X	X	X
Intermountain Greasewood Wet Shrubland	3,390–6,600	61,076	9.2	X	X	X	X
Mojave Seablite–Red Swampfire Alkaline Wet Scrub	3,400–4,080	6,699	1.0			X	X
Western Wildrye Alkaline Wet Meadow	3,390–4,900	599	<0.1			X	X
Saltgrass Alkaline Wet Meadow	3,390–4,140	432	<0.1		X		X
Cool Temperate Forest & Woodland							
Great Basin Singleleaf Pinyon–Utah Juniper/Shrub Woodland	4,040–7,480	30,038	4.5				X
Utah Juniper/Shrub Woodland	5,000–8,280	2,509	0.4		X		X
Warm Desert & Semi-Desert Scrub & Grassland							
Mojave-Sonoran Burrobrush–Sweetbush Desert Wash Scrub	3,480–6,960	16,739	2.5		X	X	X
Fremont's Smokebush–Nevada Smokebush Desert Wash Scrub	4,200–5,800	1,715	0.3	X	X		
Temperate Flooded & Swamp Forest							
Ruderal Tamarisk Riparian Scrub*	3,410–6,880	183	<0.1				X
Great Basin Fremont Cottonwood Riparian Forest*	5,080–7,280	87	<0.1				X
Shrub & Herb Wetland Formation							
Western Baltic Rush–Mexico Rush Wet Meadow*	3,390–3,440	228	<0.1				X
Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland							
Arroyo Willow Wet Shrubland*	4,440–6,960	346	<0.1				X

Note: *Riparian alliance.

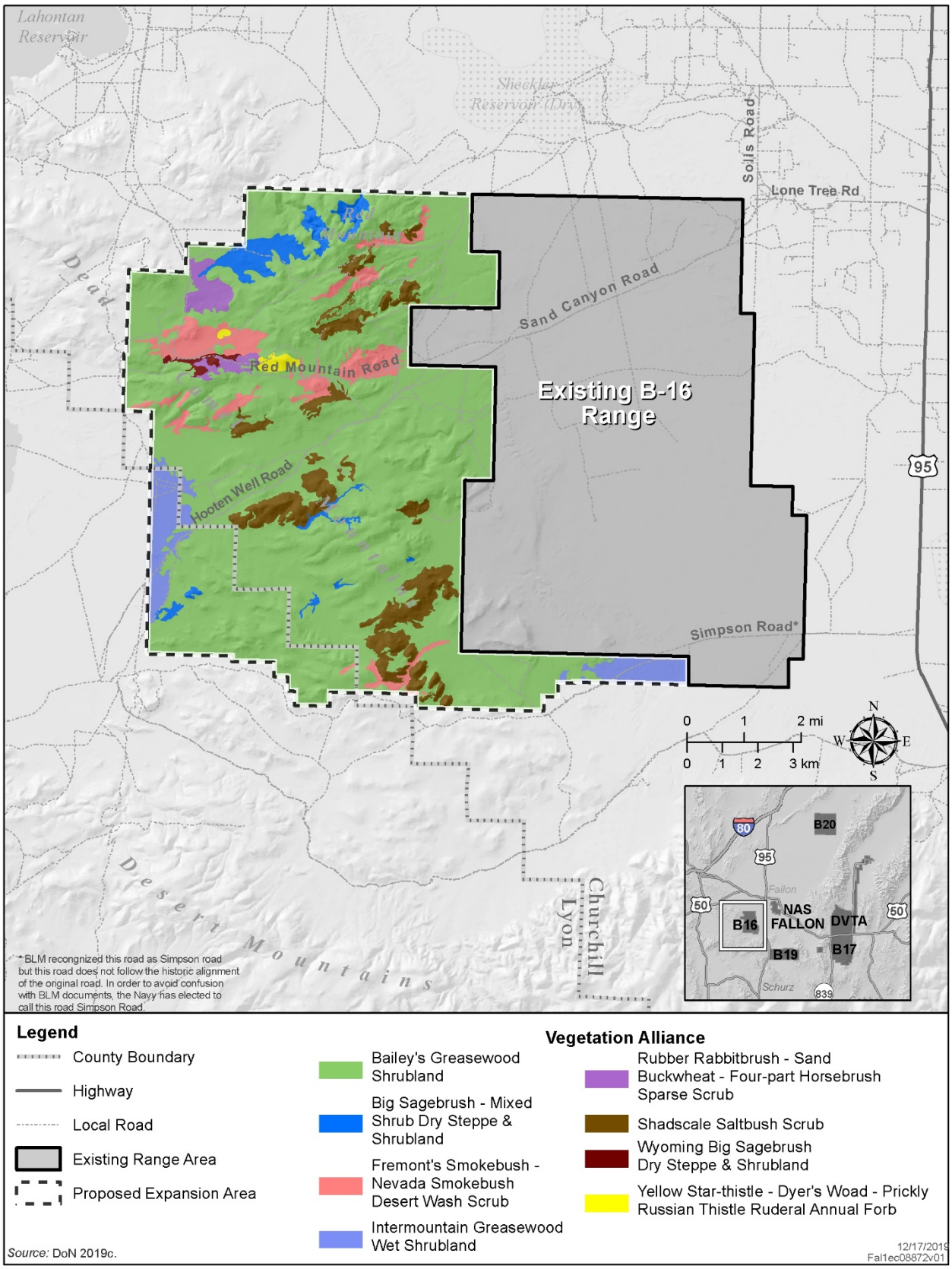

Figure 1-3. Vegetation Alliances within the Proposed B-16 Expansion Area

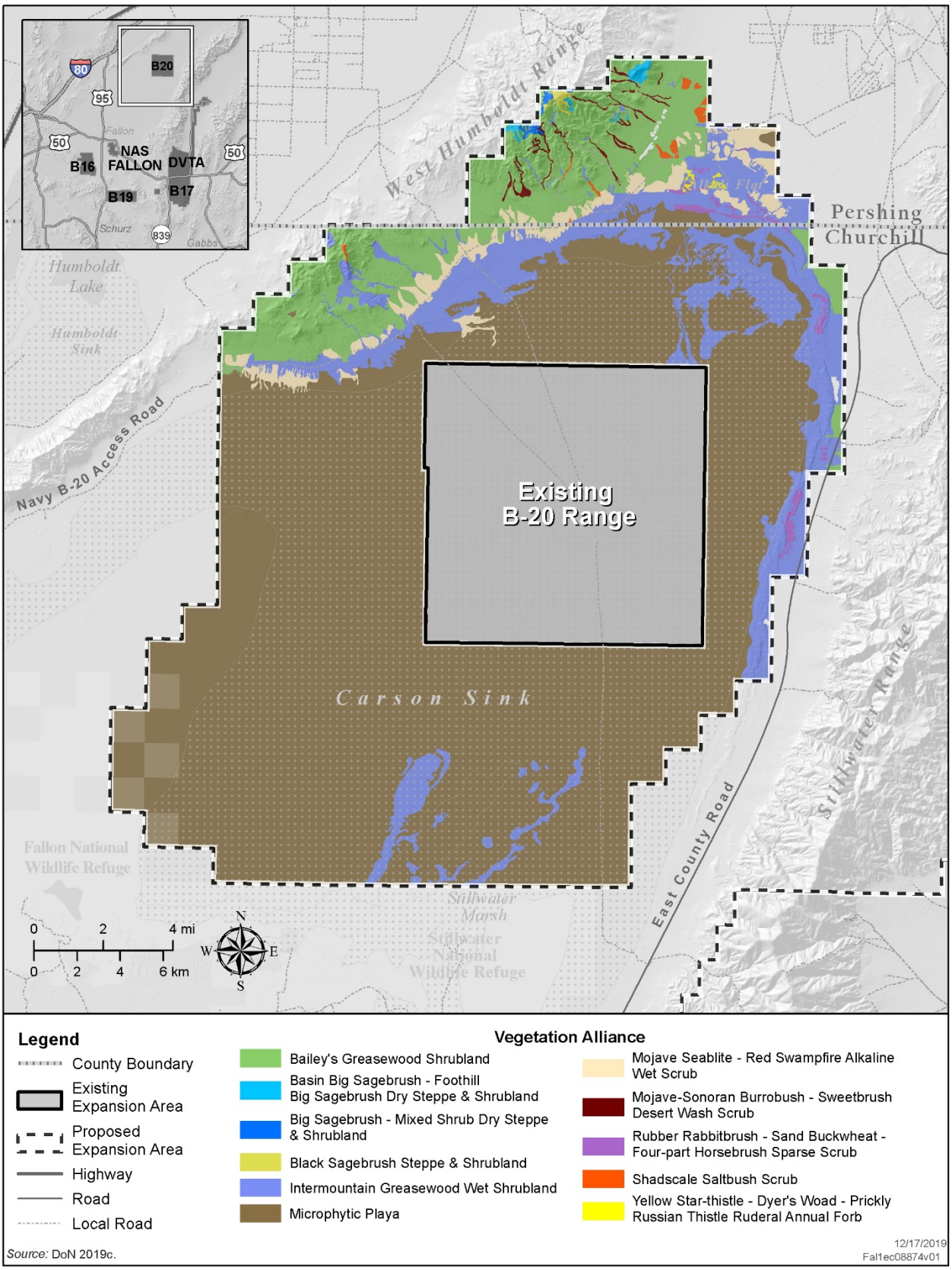

Figure 1-4. Vegetation Alliances within the Proposed B-20 Expansion Area

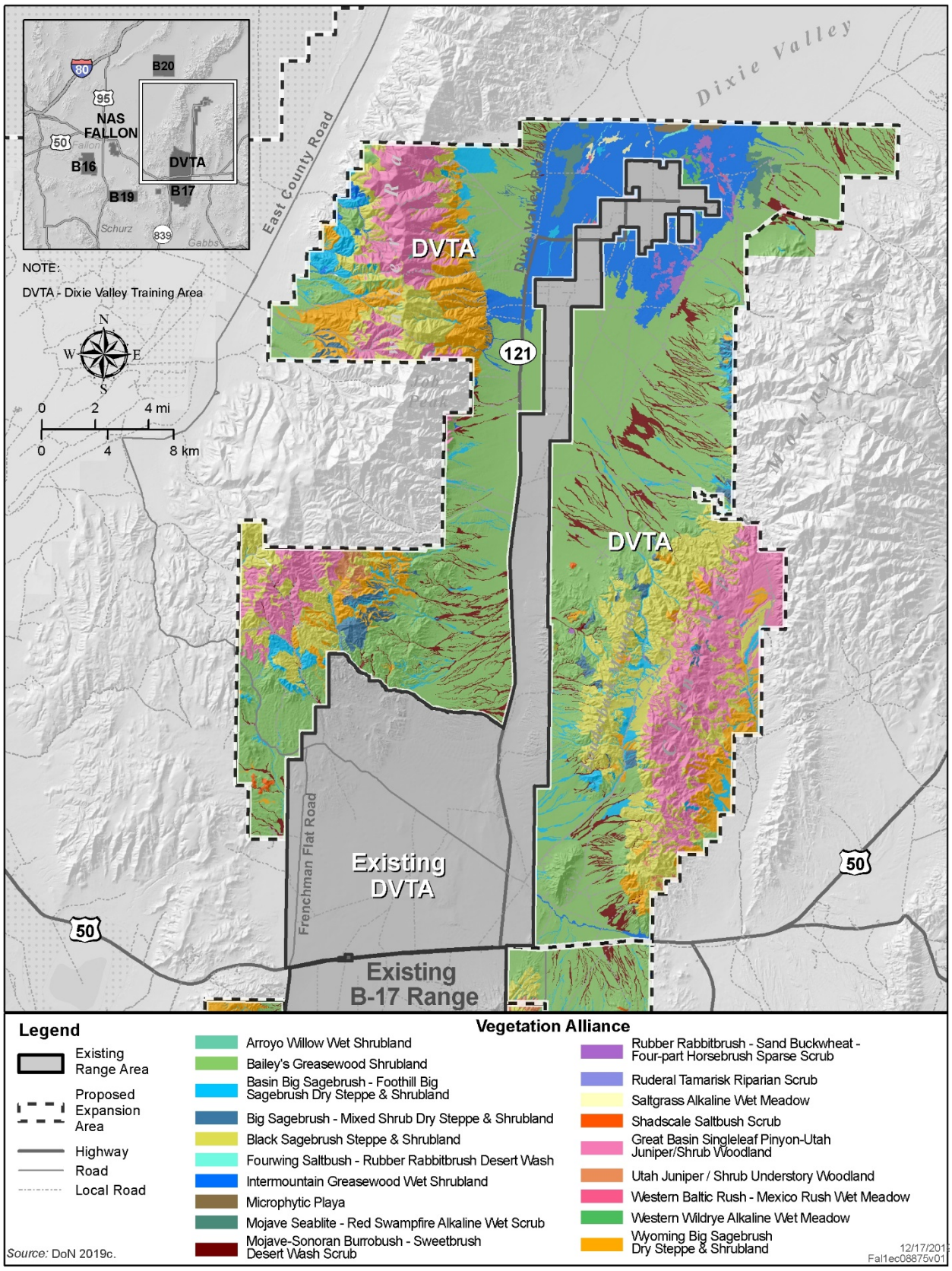

Figure 1-5. Vegetation Alliances within the Proposed Northern DVTA Expansion Area

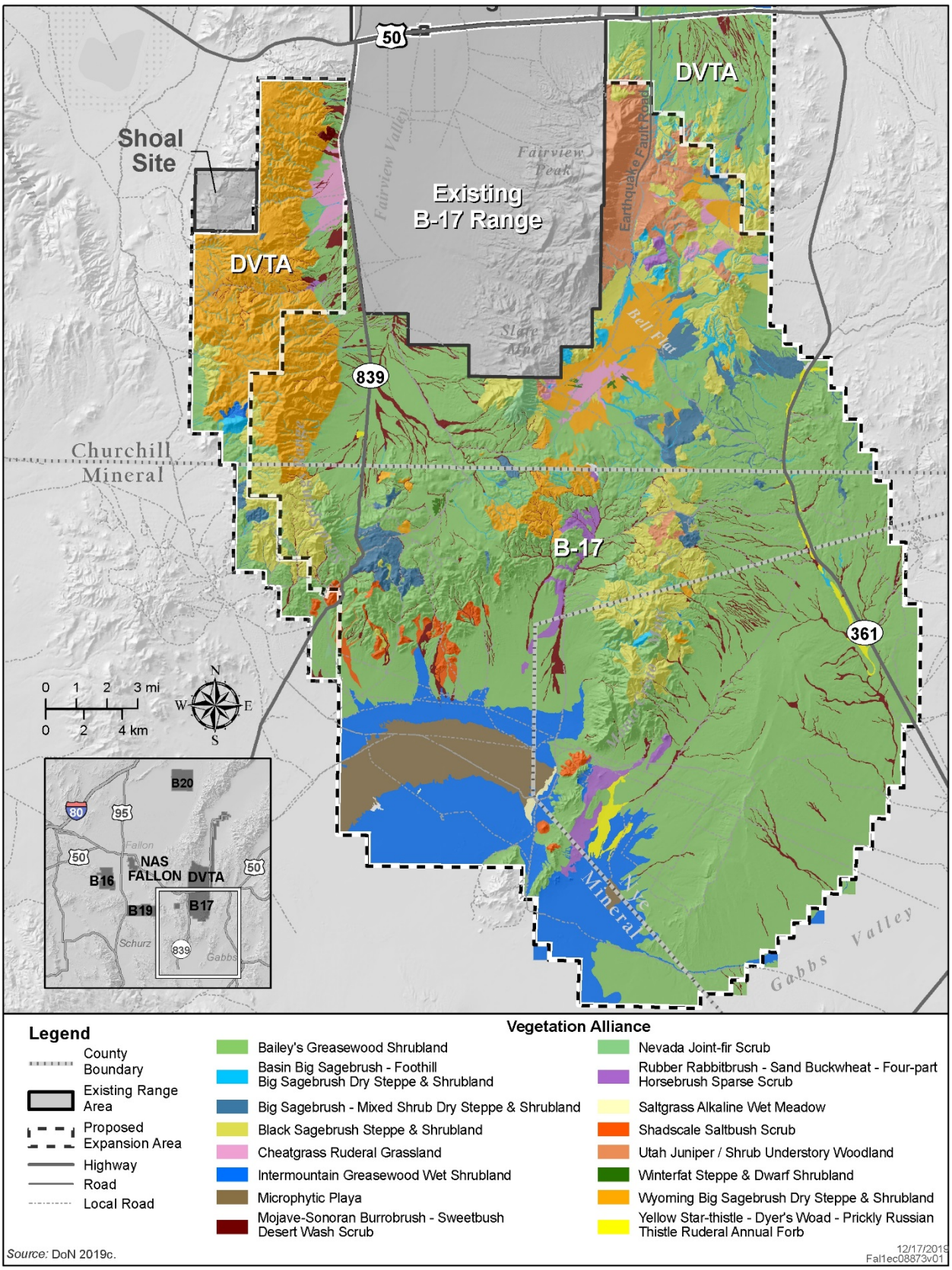

Figure 1-6. Vegetation Alliances within the Proposed B-17 and Southern DVTA Expansion Areas

1.5. AMPHIBIAN AND REPTILE SPECIES WITHIN THE STUDY AREA

The common and scientific names of amphibians and reptiles discussed in this report are based on the taxonomy and naming standards of Crother (2017).

1.5.1 Previous Amphibian and Reptile Surveys in the Study Area

Three previous survey efforts assessed the occurrence of amphibian and reptile species on NAS Fallon-managed lands:

- *Ecological Inventory of NAS Fallon and Environs Survey Report* (NAS Fallon 1997)
- *Ecological Inventory Update, Naval Air Station Fallon, Fallon, Nevada* (NAS Fallon 2008)
- *Herpetological Inventory, Naval Air Station Fallon, Fallon, Nevada* (Todd et al. 2011).

The overall purpose of these previous survey efforts was to document the presence/absence of amphibian and reptile species on NAS Fallon-managed lands.

NAS Fallon (1997)

On 2 days in April 1997, reconnaissance-level amphibian and reptile surveys were conducted on five NAS Fallon-managed parcels (B-17, B-19, DVTA, Dixie Valley Meadows, and Horse Creek) (Table 1-2; Figure 1-7). In addition, incidental observations of amphibians and reptiles were made during bird surveys (June 1996, September-October 1996, January-February 1997, March-May 1997) and mammal surveys (August and October 1996) on those five parcels as well as NAS Fallon and B-16. A total of 12 species were recorded: 2 amphibians, 7 lizards, and 3 snakes (Table 1-2 and Table 1-3). The existing DVTA had the greatest diversity of amphibian and reptile species with 16 recorded.

Table 1-2. Summary of Individual Species Observed by Survey Area during Previous Amphibian and Reptile Surveys on Existing NAS Fallon-managed Lands*

Parcel	NAS Fallon (1997)				NAS Fallon (2008)				Todd et al. (2011)			
	Amp	Liz	Sna	Total	Amp	Liz	Sna	Total	Amp	Liz	Sna	Total
NAS Fallon	1	3	2	**6**	ns	ns	ns	-	0	5	3	**8**
B-16	0	4	0	**4**	0	5	0	**5**	1	7	1	**9**
B-17	0	5	0	**5**	0	0	1	**1**	0	8	3	**11**
B-19	0	6	0	**6**	0	7	0	**7**	0	6	0	**6**
B-20	ns	ns	ns	-	0	2	0	**2**	ns	ns	ns	-
Shoal Site	ns	ns	ns	-	0	4	0	**4**	ns	ns	ns	-
DVTA	1	7	2	**10**	1	6	1	**8**	2	7	5	**14**
Dixie Valley Meadows	1	5	1	**7**	0	0	0	**0**	2	4	1	**7**
Horse Creek	0	5	1	**6**	0	2	1	**3**	1	7	2	**10**
Total	**2**	**7**	**3**	**12**	**1**	**8**	**2**	**11**	**3**	**9**	**6**	**18**

Notes: *Numbers indicate number of species observed within each group (i.e., amphibians, lizards, and snakes) not individuals observed. Amp = amphibians, Liz = lizards, Sna = snakes; ns = parcel not surveyed.
See Figure 1-7 for locations of parcels.

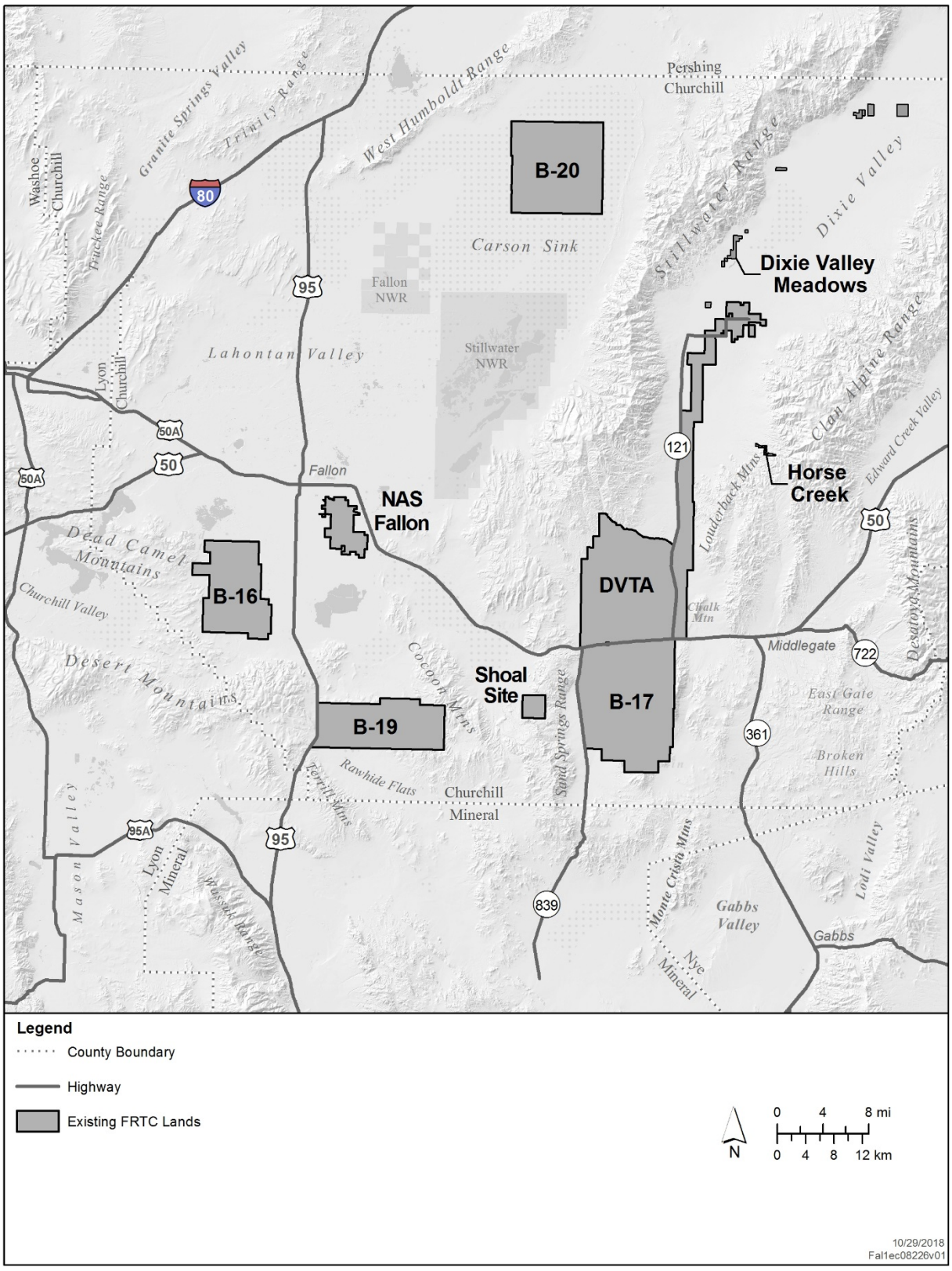

Figure 1-7. Existing NAS Fallon-managed Lands where Amphibian and Reptile Surveys were Conducted in 1996-1997, 2007, and 2011

Table 1-3. Regulatory Status and Known or Potential Occurrences of Amphibian and Reptile Species within the Study Area

Common Name (Scientific Name)	Status*			Occurrence within the Study Area[source]**						
	BLM[6]	State[4]	NNHP Rank[8]	NAS Fallon	DVTA/ EA	B-16/ EA	B-17 EA	B-19	B-20/ EA	Other
AMPHIBIANS										
American bullfrog (*Lithobates catesbeianus*)	-	-	-	x[1,3]	x[1,2,3,7]					DM[3]
Great Basin spadefoot (*Spea intermontana*)	-	WAP	S4		x[3]	x[3]				HC[3]
Northern leopard frog (*Lithobates pipiens*)	S	PA, WAP	S2S3							x[3,9]
Western toad (*Anaxyrus boreas*)	S	WAP	S4							x[9]
Dixie Valley toad (*Anaxyrus williamsi*)	S	-	S1							DM[1,3]
REPTILES – LIZARDS										
Desert horned lizard (*Phrynosoma platyrhinos*)	S	WAP	S4	x[3]	x[1,3,5]	x[1,2,3,5]	x[1,3,5]	x[1,2,3,5]	x[5]	SS[2,5]; HC, DM[3]
Great Basin collared lizard (*Crotophytus bicinctores*)	S	WAP	S4		x[2,5]	x[3,5]	x[3,5]	x[2,3,5]	x[5]	SS[2,5]; HC[3]
Great Basin fence lizard (*Sceloporus occidentalis longipes*)	-	-	S5		x[1,2]		x[1,3]	x[1]		HC[1,2,3]
Great Basin whiptail (*Aspidoscelis t. tigris*)	-	-	S5	x[1,3]	x[1,2,3]	x[1,2,3]	x[1,3]	x[1,2,3]	x[2]	HC, DM[1,3]
Long-nosed leopard lizard (*Gambelia wislizenii*)	S	WAP	S4	x[3]	x[1,2,3,5,10]	x[2,3,5]	x[3,5]	x[2,3,5]		SS[2,5]; HC[3]
Nevada side-blotched lizard (*Uta stansburiana nevadensis*)	-	-	S5	x[1,3]	x[1,2,3]	x[1,2,3]	x[1,3]	x[1,2,3]	x[3]	HC[2,3]; DM[3]
Northern sagebrush lizard (*Sceloporus g. graciosus*)	-	-	S4		x[3]					
Northern zebra-tailed lizard (*Callisaurus draconoides myurus*)	-	-	S5		x[1,2,3]	x[2,3]	x[1,3]	x[1,2,3]	x[2]	HC[1]; DM[1,3]
Yellow-backed spiny lizard (*Sceloporus uniformis*)	-	-	S5	x[1,3]	x[1,3]	x[1,3]	x[1,3]	x[1,2]		SS[2]; HC[1,3]
REPTILES – SNAKES										
California kingsnake (*Lampropeltis californiae*)	-	-	S4		x[3]					HC[2]
Desert striped whipsnake (*Coluber t. taeniatus*)	-	-	S5							HC[3]
Great Basin gophersnake (*Pituophis catenifer deserticola*)	-	-	S5	x[1,2,3]	x[1,3]	x[3]	x[2,3]			HC[1]; DM[1,3]
Great Basin rattlesnake (*Crotalus oreganus lutosus*)	-	-	S5		x[3]		x[3]			HC[3]
Red racer (*Coluber flagellum piceus*)	-	-	S5	x[1,3]	x[3]		x[3]			
Western patch-nosed snake (*Salvadora hexilepis*)	-	-	S5	x[3]	x[1,3]					
Total Number of Observed Species				**9**	**16**	**9**	**11**	**8**	**5**	DM=7; HC=13; SS=4

Notes:*BLM = Bureau of Land Management; NNHP = Nevada Natural Heritage Program; PA = protected amphibian; S = sensitive; WAP = Nevada Wildlife Action Plan Species of Conservation Priority. NNHP Rank Definitions: S1 = Critically Imperiled – at very high risk of extirpation in the state due to very restricted range, very few populations or occurrences, very steep declines, severe threats, or other factors. S2 = Imperiled – at high risk of extirpation in the state due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors. S3 = Vulnerable – at moderate risk of extirpation in the state due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors. S4 = Apparently Secure – at fairly low risk of extirpation in the state due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors. S5 = Secure – at very low or no risk of extirpation in the state due to a very extensive range, abundant populations or occurrences, with little to no concern from declines or threats.

**Occurrences do not include data from the specific surveys addressed in this report. EA = proposed expansion area; Other = all areas within the study area outside of the existing FRTC ranges and proposed expansion areas: DM = Dixie Valley Meadows, HC = Horse Creek, SS = Shoal Site (see Figure 1-7).

Sources: [1]NAS Fallon 1997; [2]NAS Fallon 2008; [3]Todd et al. 2011; [4]Nevada WAP Team 2013; [5]NDOW 2018; [6]BLM 2017; [7]DoN 2019d; [8]NNHP 2018a; [9]NNHP 2018b; [10]DoN 2019b.

NAS Fallon (2008)

Amphibian and reptile surveys were conducted on NAS Fallon-managed lands in March, April, August, and November 2007. Although species occurrences were recorded from eight parcels (Table 1-2 and Table 1-3; Figure 1-7), only two parcels (DVTA and Horse Creek) had concentrated amphibian and reptile sampling efforts; amphibian and reptile species occurrences on the other six parcels were recorded incidentally. A total of 11 species were observed (Table 1-2 and Table 1-3), with 2 new species not previously recorded on Navy lands; however, 3 species that were recorded in NAS Fallon (1997) were not observed during the 2007 surveys (Table 1-3). As with NAS Fallon (1997), the existing DVTA had the greatest diversity of amphibian and reptile species with eight recorded (Table 1-2).

Todd et al. (2011)

Amphibian and reptile surveys were conducted on seven NAS Fallon-managed parcels (Table 1-2 and Figure 1-7) from early March through mid-September 2011. Although the overall purpose of the 2011 surveys was similar to the previous 1996-1997 and 2007 surveys, to document the presence/absence of reptile and amphibian species on NAS Fallon-managed lands, the 2011 surveys were much more extensive and robust in terms of survey methodologies employed and overall survey effort. While the previous two survey efforts reported amphibian and reptile occurrences based predominantly on incidental sightings or reconnaissance-based surveys, the 2011 surveys used a combination of diurnal and nocturnal visual encounter surveys, diurnal and nocturnal frog calling surveys, automated audio recording devices (FrogLoggers), and road cruising. In addition, survey efforts focused on aquatic and wetland areas to determine the occurrence of the following sensitive amphibian species on NAS Fallon-managed parcels:

- Northern leopard frog (*Rana pipiens*)
- Dixie Valley toad (*Anaxyrus williamsi*) – an isolated population of western toad (*Anaxyrus boreas*) that may represent a potential newly described species.
- Columbia spotted frog (*Rana luteiventris*)

A total of 18 species were observed (Table 1-2 and Table 1-3), with 5 new species not previously recorded on Navy lands during the 1996-1997 and 2007 surveys (Table 1-3). Although the northern leopard frog was not observed on NAS-managed lands during the 2011 surveys, it was observed east of Fallon at Massie Slough near Hazen during preliminary surveys to test survey methods (Figure 1-1). The Dixie Valley toad was observed at Dixie Valley Meadows and the Columbia spotted frog was not observed. As with NAS Fallon (1997) and NAS Fallon (2008), the existing DVTA had the greatest diversity of amphibian and reptile species with 14 recorded (Table 1-2 and Table 1-3).

Other Regional Data Sources

In addition to the specific surveys summarized above, additional sources of amphibian and reptile species occurrences within the study area include the Global Biodiversity Information Facility (GBIF) (https://www.gbif.org/), VertNET (http://portal.vertnet.org/search), and Linsdale (1940).

In summary, a total of 5 species of amphibians and 15 reptile species have been recorded within the study area (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011; Rose et al. 2015). These 20 species have various regulatory and conservation status as defined by the Bureau of Land Management (BLM), Nevada Department of Wildlife (NDOW), and the Nevada Natural Heritage Program (NNHP).

- BLM: three amphibian and three reptile species are listed as sensitive species (BLM 2017).

- State of Nevada
  - One species is listed under Nevada Administrative Code (NAC) 503.075.2 as a protected amphibian.
  - Three amphibian and three reptile species are listed as Species of Conservation Priority by NDOW in the 2013 Nevada Wildlife Action Plan (WAP) (Nevada WAP Team 2013).
- NNHP: conservation status ranking for the State of Nevada (NNHP 2018a).

1.5.2 Species Descriptions

The sections below provide a brief description of the amphibians and reptiles found, or potentially found, within the study area. This summary is not intended to be a thorough literature review of each species, but is background information to familiarize the reader with the species. A summary of the past occurrences of each species within the study area is provided in Section 1.5.1 of this report. Chapter 3 (Results) provides a summary of occurrences of species within the study area based upon the 2018 and 2019 surveys covered in this report.

American Bullfrog (*Photo*: P. Boice)

American Bullfrog (*Lithobates catesbeianus*). Native to the central and eastern U.S., bullfrogs were first introduced into Nevada in the 1930s and are now found throughout Nevada in suitable habitat. Typically found in lakes, ponds, cattle tanks, bogs, and sluggish portions of streams and rivers, bullfrogs significantly impact native species and aquatic ecosystems. They outcompete native amphibians and impact other vertebrate populations. They are voracious eaters and adults are known to consume birds, rodents, frogs, snakes, turtles, lizards, and bats, and will also prey on their own young. Bullfrog tadpoles can significantly alter the biomass, structure, and composition of algal communities, and thus disturb aquatic community structure (McKercher and Gregoire 2018; U.S. Fish and Wildlife Service [USFWS] 2018a). They have been recorded from ponds and other permanent waterbodies within the existing DVTA, NAS Fallon, and Dixie Valley Meadows (Table 1-3; Figure 1-7) (NAS Fallon 1997, 2008; Todd et al. 2011).

Great Basin Spadefoot (*Photo*: R. Delph)

Great Basin Spadefoot (*Spea intermontana*). The Great Basin spadefoot is a Species of Conservation Priority under the Nevada WAP and ranked as apparently secure by the NNHP (Table 1-3) (Nevada WAP Team 2013; NNHP 2018a). NDOW considers this toad a Species of Conservation Priority because of disease concerns and potential effects of climate change on amphibians in general due to their particular life history requirements. Spadefoots occur in arid regions of semi-desert shrublands, sagebrush flats, bunchgrass prairie, pinyon/juniper woodlands, and open ponderosa pine communities with loose, sandy soils that are easy to dig. The common name 'spadefoot' refers to a glossy black spade-shaped tubercle present on each hind foot that

assists them in digging burrows in the soil; rodent burrows may be used also for refuge. Spadefoots are almost completely terrestrial, entering water only to breed, and spend 7-8 months of their lives buried underground in deep burrows during winter and in shallow burrows during summer dry periods. Adults move from winter refuges to breeding sites when temperatures warm up, typically beginning in April. Rainfall can stimulate breeding, but it is not always necessary; irrigation waters can also stimulate breeding. Breeding pools must remain filled for at least 40 days in order for larvae to successfully transform, and they have the fastest metamorphosis rate of any North American frog or toad. They are primarily nocturnal, feeding on ants, beetles, and other insects (AmphibiaWeb 2018; CaliforniaHerps.com 2018). Great Basin spadefoots have been documented within the existing DVTA, Horse Creek, and B-16 (Table 1-3) (Todd et al. 2011).

Northern Leopard Frog (*Rana pipiens*). The northern leopard frog is listed as a BLM Sensitive Species, Species of Conservation Priority under the Nevada WAP, Protected Amphibian by the State of Nevada (NAC 503.075.2), and ranked as imperiled/vulnerable by the NNHP (Table 1-3) (Nevada WAP Team 2013; BLM 2017; NNHP 2018a). NDOW considers this frog a Species of Conservation Priority due to its declining population trend, known extirpations, potential climate change effects, and fragmented populations in Nevada. Northern leopard frogs require a variety of habitats, including aquatic overwintering and breeding habitats, as well as upland post-breeding habitats and the links between the two. Areas of permanent water with rooted aquatic vegetation are typically used, including springs, slow streams, marshes, bogs, ponds, canals, flood plains, reservoirs, and lakes (Nevada WAP Team 2013). Although the leopard frog historically occurred at locations near Fallon, it was not observed during the 2007 and 2011 surveys of existing FRTC lands (NAS Fallon 2008; Todd et al. 2011; Rose et al. 2015). However, one individual was recorded in 2011 at Massie Slough near Hazen, approximately 16 mi (26 km) west-northwest of Fallon (Figure 1-7), during surveys in support of the FRTC surveys (Todd et al. 2011), and there are numerous NNHP and museum records of the species west of Fallon and north of the existing B-16 from the 1930s, 1970s, and 1980s (Linsdale 1940; Todd et al. 2011; NNHP 2018b; GBIF [https://www.gbif.org]; VertNET [http://portal.vertnet.org]). There are no NDOW records of the species within or in the vicinity of the proposed FRTC expansion areas since 2008 (NDOW 2018).

Northern Leopard Frog (*Photo*: P. Block)

Western Toad (*Anaxyrus boreas*). The western toad is listed as a BLM Sensitive Species, Species of Conservation Priority under the Nevada WAP, and ranked as apparently secure by the NNHP (Table 1-3) (Nevada WAP Team 2013; BLM 2017; NNHP 2018a). Although this species is common throughout the Great Basin, there are potentially distinct and isolated endemic species within the *Anaxyrus boreas* species group (refer to discussion of the Dixie Valley toad below). The species is found in a wide variety of habitats ranging from desert springs to mountain wetlands, and it ranges into various uplands habitats around ponds, lakes, reservoirs, and slow-moving rivers and streams. It digs its

Western Toad (*Photo*: J.D. Wilson)

own burrow in loose soil or uses those of small mammals, or shelters under logs or rocks (Nevada WAP Team 2013). The western toad was not observed during the 1996-1997, 2007, and 2011 surveys of existing FRTC lands (NAS Fallon 1997, 2008; Todd et al. 2011). There is one 1927 record of the species east of Highway 95 and 16 mi (26 km) south of B-19 (NNHP 2018b). There are no NDOW records of the species within or in the vicinity of the proposed FRTC expansion areas (NDOW 2018).

Dixie Valley Toad (*Photo*: K. Urquhart)

Dixie Valley Toad (proposed species - *Anaxyrus williamsi*). The Dixie Valley toad is listed as a BLM Sensitive Species and ranked as critically imperiled by the NNHP (Table 1-3) (BLM 2017; NNHP 2018a). Based on recent genetic studies, the Dixie Valley toad has been proposed as a new species belonging to the *Anaxyrus boreas* species complex (Forrest et al. 2017; Gordon et al. 2017). The known distribution of the proposed new species is restricted to four spring-fed geothermal springs within a less than 1,500-ac (607-ha) area in Dixie Valley Meadows, approximately 3 mi (4.8 km) north of the northern boundary of the proposed DVTA expansion area (Figure 1-7). NAS Fallon (1997) and Todd et al. (2011) recorded the species within Dixie Valley Meadows. Based on the recent proposed species determination and the potential threats to the species from the construction and operation of a proposed geothermal plant in the immediate vicinity, as well as other threats to the species, the Center for Biological Diversity petitioned the USFWS to list the species under the Endangered Species Act (ESA) in September 2017 (Center for Biological Diversity 2017). In June 2018, the USFWS issued its 90-day finding on the review of the petition and found that the petitioned action may be warranted. The USFWS is conducting a status review of the species and will issue a 12-month finding, which will address whether or not the petitioned action is warranted under the ESA (USFWS 2018b). The USFWS, NDOW, BLM, and U.S. Geological Survey are currently conducting studies on the natural history and habitat requirements of the Dixie Valley toad in support of the species status assessment being prepared by the USFWS in response to the petition.

Desert Horned Lizard (*Photo*: C. Berry)

Desert Horned Lizard (*Phrynosoma platyrhinos*). The desert horned lizard is listed as a BLM Sensitive Species, Species of Conservation Priority under the Nevada WAP, and ranked as apparently secure by the NNHP (Table 1-3) (Nevada WAP Team 2013; BLM 2017; NNHP 2018a). Although relatively common in suitable habitat throughout Nevada, the desert horned lizard is considered a Species of Conservation Priority due to commercial collection pressures. The species is associated with sagebrush, saltbush, and greasewood on sandy fats, alluvial fans, along washes, and at the edges of dunes; sometimes found on hardpan or among rocks with patches of sand (Nevada WAP Team 2013). During previous surveys of existing FRTC lands, the desert horned lizard was observed within NAS Fallon and the existing DVTA, B-16, B-17, B-19, and Shoal Site areas (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011). There are no NNHP records of the species within the vicinity of the proposed FRTC expansion areas (NNHP 2018b). Records from NDOW from 1986 through

August 2015 list approximately 35,000 desert horned lizards were collected within and in the vicinity of the proposed FRTC expansion areas (NDOW 2018).

Great Basin Collared Lizard (*Photo*: C. Berry)

Great Basin Collared Lizard (*Crotophytus bicinctores*). The Great Basin collared lizard is listed as a BLM Sensitive Species, Species of Conservation Priority under the Nevada WAP, and ranked as apparently secure by the NNHP (Table 1-3) (Nevada WAP Team 2013; BLM 2017; NNHP 2018a). Although relatively common in suitable habitat throughout Nevada, the Great Basin collared lizard is considered a Species of Conservation Priority due to commercial collection pressures. The species occurs mainly in xeric, sparsely vegetated, rocky areas on alluvial fans, lava flows, hillsides, rocky plains, and in canyons (Nevada WAP Team 2013). The Great Basin collared lizard has been observed within the existing DVTA, B-16, B-17, B-19, and Shoal Site (Table 1-3) (NAS Fallon 2008; Todd et al. 2011); there are no NNHP records of the species within or in the vicinity of the proposed FRTC expansion areas (NNHP 2018b). Records from NDOW from 1986 through August 2015 list approximately 26,000 Great Basin collared lizards were collected within and in the vicinity of the proposed FRTC expansion areas (NDOW 2018).

Great Basin Fence Lizard (*Photo*: E. Rose)

Great Basin Fence Lizard (*Sceloporus occidentalis longipes*). One of six recognized subspecies of western fence lizard, the Great Basin fence lizard has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). It is found in a wide variety of open, sunny habitats, including woodlands, grasslands, sagebrush, scrub, chaparral, open woodlands and forests, along waterways, and also rural and urban disturbed areas. Probably the most familiar lizard in the west, owing to the males' vibrant blue ventral patches and push-up displays performed anywhere there are suitable basking and perching sites, including fences, brick and stone walls, woodpiles, rocky outcrops, and dead and downed trees (Jones and Lovich 2009). Fence lizards have been observed within the DVTA, B-17, B-19, and Horse Creek (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011).

Great Basin Whiptail (*Photo*: D. Suzio)

Great Basin Whiptail (*Aspidoscelis tigris tigris*). The subspecies of tiger whiptail found in Nevada, the Great Basin whiptail has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). Tiger whiptails prefer primarily hot and dry open areas with sparse foliage such as desert, grassland, chaparral, sagebrush, woodland, and riparian areas; they avoid areas with dense growth. Always moving and one of the least approachable lizards, tiger whiptails are often seen scratching and digging as they move through

the environment, searching for prey such as insects, centipedes, termites, scorpions, spiders, and even small lizards (Jones and Lovich 2009). The Great Basin whiptail has been observed on all existing NAS Fallon-managed lands within the study area (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011).

Long-nosed Leopard Lizard – adult female in breeding colors (*Photo*: C. Berry)

Long-nosed Leopard Lizard (*Gambelia wislizenii*). The long-nosed leopard lizard is listed as a BLM Sensitive Species, Species of Conservation Priority under the Nevada WAP, and ranked as apparently secure by the NNHP (Table 1-3) (Nevada WAP Team 2013; BLM 2017; NNHP 2018a). Although found throughout Nevada in suitable habitat, the long-nosed leopard lizard is considered a Species of Conservation Priority due to commercial collection pressures. This species occurs in sandy and gravelly desert and semi desert areas with scattered shrubs or other low plants (e.g., bunch grass, alkali bush, sagebrush, creosote bush), especially areas with abundant rodent burrows (Nevada WAP Team 2013). Probably the largest lizard of the Great Basin with females reaching a snout-to-vent length (SVL) of up to 5.7 in (14.4 cm), long-nosed leopard lizards are noted for their ability to eat lizards of its own size as well as snakes, small rodents, and a wide variety of invertebrate prey (Jones and Lovich 2009). The long-nosed leopard lizard has been observed within NAS Fallon, the existing DVTA, B-16, B-19, and Shoal Site areas, and the proposed B-17/DVTA expansion area (Table 1-3) (NAS Fallon 2008; Todd et al. 2011; DoN 2019b). Records from NDOW from 1986 through August 2015 list approximately 20,000 long-nose leopard lizards were collected within and in the vicinity of the proposed FRTC expansion areas (NDOW 2018).

Nevada Side-blotched Lizard (*Photo*: E. Rose)

Nevada Side-blotched Lizard (*Uta stansburiana nevadensis*). One of five recognized subspecies of side-blotched lizard, the Nevada side-blotched lizard has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). Side-blotched lizards are the most abundant and commonly-seen lizard in deserts and semi-arid areas including desert scrub, semi-desert grassland, chaparral, and woodlands. It is usually the first lizard species out in the morning due to its small size which allows it to warm up quickly. They are opportunistic insectivores, sitting and waiting for small invertebrate prey such as beetles, grasshoppers, ants, termites, spiders, and scorpions to wander within close proximity (Jones and Lovich 2009). The Nevada side-blotched lizard has been observed on all existing NAS Fallon-managed lands within the study area (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011).

Northern Sagebrush Lizard (*Sceloporus graciosus graciosus*). The subspecies of common sagebrush lizard found in Nevada, the northern sagebrush lizard has no federal or state regulatory status and is ranked by the NNHP as apparently secure (Table 1-3) (NNHP 2018a). Although commonly found throughout the western U.S. within, as the name implies, sagebrush-dominated habitats, the sagebrush lizard also inhabits chaparral, pinyon/juniper woodlands, pine/fir forests, canyon bottoms, open riparian areas, and other relatively open habitats. Primarily a ground-dwelling species found in areas of cover that can be used for refuge such as boulder fields, logs, rock crevices, rodent burrows, and debris piles. They prey primarily on ants, termites, flies, grasshoppers, beetles, other insects, and spiders (Jones and Lovich 2009). The northern sagebrush lizard has only been recorded from the existing DVTA (Table 1-3) (Todd et al. 2011).

Northern Sagebrush Lizard (*Photo*: E. Rose)

Northern Zebra-tailed Lizard (*Callisaurus draconoides myurus*). One of three subspecies found in the western U.S., the northern zebra-tailed lizard has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). This species occurs in flat, sandy, and open habitats with scant widely-spaced vegetation such as dunes, desert pavement, floodplains, arroyos, and drainages within foothills and bajadas. One of the more heat-tolerant lizard species, it often remains active during the hottest part of the day when other lizards seek shelter. It is a sit-and-wait predator, preying on a variety of insects, insect larvae, spiders, other lizards, and sometimes flowers and leaves (Jones and Lovich 2009). The zebra-tailed lizard has been recorded from all NAS Fallon-managed lands except for NAS Fallon (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011).

Northern Zebra-tailed Lizard (*Photo*: G. Nafis)

Yellow-backed Spiny Lizard (*Sceloporus uniformis*). The yellow-backed spiny lizard has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). One of the largest lizards of the Great Basin with males reaching a SVL of up to 5.5 in (14.0 cm), the yellow-backed spiny lizard inhabits desert flats, semiarid plains, low mountain slopes, and riparian woods. Although they occasionally eat buds, flowers, berries, and leaves, they mostly prey on insects, spiders, and smaller lizards (Jones and Lovich 2009). The yellow-backed spiny lizard has been recorded from all NAS Fallon-managed lands except for B-20 (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011).

Yellow-backed Spiny Lizard (*Photo*: G. Watson)

California Kingsnake (*Lampropeltis californiae*). The California kingsnake has no federal or state regulatory status and is ranked by the NNHP as apparently secure (Table 1-3) (NNHP 2018a). It is found in a wide variety of habitats including forests, woodlands, chaparral, grasslands, marshes, farmland, ranches, deserts, and brushy suburban areas. A powerful constrictor, kingsnakes eat a wide variety of prey including rodents and other small mammals; lizards and their eggs; snakes (including rattlesnakes) and their eggs; turtle eggs and hatchlings; frogs; birds, eggs, and chicks; and large invertebrates (CaliforniaHerps.com 2018). This species has been observed in the existing DVTA and Horse Creek (Table 1-3) (NAS Fallon 2008; Todd et al. 2011).

California Kingsnake (*Photo*: T. Burr)

Desert Striped Whipsnake (*Coluber taeniatus taeniatus*). The desert striped whipsnake has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). The whipsnake occurs in open brushy country such as desert scrub, sagebrush flats, and mixed woodlands. Also often found along the edges of rivers or ponds. Preys on lizards, snakes, small mammals, birds and bird eggs, and amphibians; juvenile whipsnakes will eat insects (CaliforniaHerps.com 2018). The desert striped whipsnake has only been reported from Horse Creek (Table 1-3) (Todd et al. 2011).

Desert Striped Whipsnake
(*Photo*: V. Mata-Silva)

Great Basin Gophersnake (*Pituophis catenifer deserticola*). One of five recognized subspecies of gophersnake in the western U.S., the Great Basin gophersnake has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). It is found in a wide variety of habitats including sagebrush, grassland, riparian areas, and forests. Eats mostly small mammals, especially pocket gophers, moles, and mice, along with birds and their eggs and nestlings; known to occasionally eat lizards and insects (CaliforniaHerps.com 2018). Gophersnakes have been reported from NAS Fallon; the existing DVTA, B-16, and B-17; Horse Creek; and Dixie Valley Meadows (Table 1-3) (NAS Fallon 1997, 2008; Todd et al. 2011).

Great Basin Gophersnake (*Photo*: G. Nafis)

Great Basin Rattlesnake (*Crotalus oreganus lutosus*). One of five subspecies of western rattlesnake in the western U.S., the Great Basin rattlesnake has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). It is the only dangerously venomous snake within the study area. They inhabit rocky hillsides, barren flats, sagebrush, grassy plains, and agricultural areas. Eats small to medium-sized mammals (e.g., ground squirrels, mice, rats, rabbits, and hares), birds, lizards, snakes, frogs, and insects (CaliforniaHerps.com 2018). The Great Basin rattlesnake has been recorded in the existing DVTA and B-17 and Horse Creek (Table 1-3) (Todd et al. 2011).

Great Basin Rattlesnake (*Photo*: E. Rose)

Red Racer (*Coluber flagellum piceus*). One of five subspecies of coachwhip found in the western U.S., the red racer has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). It inhabits open areas of desert, grassland, scrub, and sagebrush, including rocky, sandy, flat, and hilly ground; avoids dense vegetation where it cannot move quickly. Preys on mice, rats, bats, adult and nestling birds, bird eggs, lizards, snakes, and amphibians. It is frequently run over by vehicles and found dead on the road, partly due to the tendency of this snake to eat small road-killed animals (CaliforniaHerps.com 2018). The red racer has been observed on NAS Fallon and the existing DVTA and B-17 (Table 1-3) (NAS Fallon 1997; Todd et al. 2011).

Red Racer (*Photo*: G. Nafis)

Western Patch-nosed Snake (*Salvadora hexilepis*). The western patch-nosed snake has no federal or state regulatory status and is ranked by the NNHP as secure (Table 1-3) (NNHP 2018a). Patch-nosed snakes inhabit open arid and semi-arid areas including deserts, brushland, grassland, and scrub in canyons, rocky hillsides, and sandy plains. They prey primarily on lizards, especially whiptails, along with small mammals, and possibly small snakes, nestling birds, reptile eggs, and amphibians (CaliforniaHerps.com 2018). The western patch-nosed snake has been observed on NAS Fallon and the existing DVTA (Table 1-3) (NAS Fallon 1997; Todd et al. 2011).

Western Patch-nosed Snake (*Photo*: R. Lovich)

2. METHODS

Within each of the proposed expansion areas, survey efforts were generally distributed to maximize geographic coverage. However, in some instances efforts were focused on more productive habitats rather than expending extensive effort in unproductive areas. For example, much of the proposed B-20

expansion area consists of an extensive salt playa (Microphytic Playa vegetation alliance), which provides poor habitat for target species. As a result, survey efforts generally focused around the playa perimeter and within the upland habitats found in the northern portion of the proposed B-20 expansion area.

To help identify productive areas for amphibian and reptile survey efforts, survey personnel identified locations with good cover and surface water during helicopter-based raptor and vegetation surveys conducted in early 2018 and 2019 (DoN 2019a, c). In addition, vegetation maps (DoN 2019c) were reviewed to identify potential wetland areas to target survey efforts, since they are often associated with greater densities of reptiles and amphibians.

While much of the study area is accessible by vehicle, a helicopter was also used to support access to the more remote areas. Despite employing different strategies, safety constraints still limited survey coverage of higher elevations during the warmer months, since operating the helicopter at high elevations during hot air temperatures became too dangerous. As a result, additional efforts were made to survey those areas by foot.

Although pitfall traps and funnel traps are frequently used during reptile surveys, due to the size and remoteness of the survey areas, the time and labor intensive sampling methodology of conducting pitfall or funnel trap surveys was considered prohibitive with regard to the overall purpose and objectives of the surveys (i.e., determine presence/absence). Therefore, it was determined that visual encounter surveys would be appropriate and achieve the survey objectives.

To increase the chances of encountering all species present within the proposed expansion areas, survey personnel used two different survey methods: flipping/picking of rocks, debris, etc. and road cruising. All flipping/picking surveys were conducted during the day (sunrise to sunset), while road cruising surveys were conducted both during the day, as well as at night to detect nocturnal species. The amount of effort expended and total area surveyed were dependent on the ease of mobility of the surveyors, which was influenced by the topography and ruggedness of terrain and density of physical and vegetative cover.

2.1. Diurnal Walking Surveys: Flipping/Picking

Flipping/picking was done on foot and involved searching an area extensively by seeking out individuals in suitable microhabitats. These surveys included flipping over rocks and boards and any other materials that could provide shelter for target species. Boards, rocks, and other forms of cover can help moderate temperatures, trap moisture, and provide refuge during periods of extreme heat and cold. Searching these types of cover can be particularly productive early and late in the season on cool mornings and afternoons.

In addition to areas with substantial cover, all known ponds, guzzlers, and riparian drainages that contained water during part or all of the survey period were surveyed. Observers used dip nets to help capture animals and noted any egg masses or other evidence of amphibian presence.

Flipping/picking surveys were conducted in remote areas accessed by helicopter during two of the five survey periods. Generally, the helicopter served as transportation for multiple teams of two to three observers, “leapfrogging” teams between remote areas. Utilizing multiple teams allowed the helicopter to transport one team while the other teams continued to survey.

2.2. Diurnal and Nocturnal Road Cruising

In addition to diurnal walking surveys, road cruising surveys were conducted to increase sampling coverage and to target species that commonly exploit the thermal properties of roads. Many reptile species take advantage of the radiant heat coming off of warm roads during cool periods. Black asphalt

absorbs solar radiation quickly and retains the heat longer than the surrounding soil, making paved roads one of the first places to warm up in the morning and one of the last places to cool down in the evenings. While these properties can extend the periods of activity for both snakes and lizards, it can also be deadly. This propensity to exploit the thermal properties of roads make them vulnerable to being hit by passing vehicles (Andrews et al. 2008). Whether observed alive or dead on the road, many species of reptile are readily found by driving slowly along roads during mornings and evenings. Road cruising can be particularly productive on cool sunny mornings and evenings when roadways can be within the thermal tolerance of ectothermic reptiles while the surrounding soils are too cold.

Two types of road cruising surveys were conducted: day cruising and night cruising. Both day cruising and night cruising were done using the same overall approach but night cruising was done after sunset and before sunrise. Road cruising survey methods entailed driving at slow speeds (<30 mi per hour [hr] [<48 km per hr], depending on visibility and terrain) while multiple observers watched for reptiles. Roads were primarily selected by identifying routes that helped fill in under-sampled areas and habitats. In addition, road cruising surveys were performed opportunistically when driving between walking survey locations, and at the beginning and end of survey days if conditions were suitable. When reptiles were encountered, the vehicle safely pulled to the side of the road and the reptile in question was approached. Road-killed snakes are often encountered when using this survey method.

Night cruising surveys were conducted after local sunset and before local sunrise when road temperatures were warm, generally greater than 75 ^{o}F (24 ^{o}C). In addition to the vehicle headlights to spotlight animals seen within or adjacent to the roadway, each observer also had a handheld spotlight (UK C8 E-LED, 10-watt dive light) that could be used to follow animals beyond the range of the headlights. Although this approach is a reliable way to find nocturnal snakes in warmer regions (e.g., southern Nevada and much of Arizona), road temperatures within the study area often cooled quickly following sunset. As a result, comparatively fewer night cruising surveys were conducted.

2.3. Incidental Observations

In addition to flipping/picking and road cruising, survey personnel also recorded incidental observations of amphibians and reptiles encountered outside of focused survey efforts to help inform species' distributions within the study area.

2.4. Data Collection and Management

Data was not collected using line distance or other survey methods capable of yielding population density estimates and other demographics. The intent of the surveys was to provide presence/absence information only.

During focused survey efforts, observers carried hand-held ground temperature readers (Commercial Electric Infrared Thermometer MS6520H) to help identify optimal conditions for encountering reptiles and amphibians, as well as gloves for handling species, a noose pole for capturing lizards, a snake hook and snake bag for capturing snakes, and a dip net to aid capture and handling of amphibians. Geo-referenced digital cameras were used to document notable findings and a ruler or cloth tape was used to measure SVL of captured individuals to the nearest millimeter. Each observer also recorded a track file of their survey effort using a handheld Garmin GPSmap 64. When animals were encountered, efforts were made to capture the individual to help ascertain age and gender. In addition to documenting live animals, observers recorded dead animals (i.e., road kill) and animal sign or evidence of recent activity (e.g., snake sheds/skins, desert horned lizard castings near ant colonies, etc.).

All data were collected and entered while in the field using the ArcGIS ESRI Collector phone application. The Collector application allows for data to be stored both locally and on a remote storage platform. This workflow allowed multiple observers to record data simultaneously whether cellular service was available or not. When service was available, observers could upload data in real time, as well as upload data collected when service was not available. After each of the five survey periods, all observations were reviewed for quality assurance. In addition, global positioning system (GPS) track files were used to record survey effort for each surveyor. These data were reviewed and post-processed to remove non-survey portions of each track using survey start and stop times. Following the last survey visit, track files were summarized to document the amount of distance traveled during each type of survey.

2.5. Scientific Permit

In accordance with NDOW requirements, all field work was conducted under a Scientific Collection/Possession/Education Permit. The permit (Permit #39386) was issued on April 9, 2018 and expires on December 30, 2019. See Appendix A for the permit application and permit.

3. RESULTS

3.1. Overview

Amphibian and reptile surveys were conducted during 174 person days across 9 survey periods (Table 3-1) that spanned the peak seasons of activity for the local species (Rose et al. 2015). The 2018 survey efforts were stratified across the four proposed expansion areas, such that each area was visited during each of the five survey periods. The 2019 survey efforts were conducted only within the proposed northern DVTA expansion area and southeastern portion of the proposed B-17 expansion area (see Figure 1-1).

Table 3-1. 2018 Amphibian and Reptile Survey Periods, Dates, and Personnel Effort

Survey Period	Survey Dates	Person Days
2018		
1	May 11-16	21
2*	June 27 – July 1	31
3	July 21-25	15
4	August 14-17, 19, 21, & 23	18
5*	September 12-16, 18, 19, 22, & 23	35
2019		
1	April 15-17, 22-25	13
2	May 2-6	10
3	May 24-25, 27-28	4
4	June 18-28	27

Note: *Included helicopter support to allow observers to access remote areas efficiently.

Overall, walking and driving surveys were conducted on 733 transects covering approximately 1,331 mi (2,142 km) during approximately 698 survey hr (Table 3-2, Table 3-3, Table 3-4, and Table 3-5; Figure 3-1 through Figure 3-10). The majority of transects were comprised of flipping/picking surveys (594 of 733 transects or 81%), which are the most effective method to detect reptiles (Table 3-2 and Table 3-4). Night driving was only conducted during Survey Periods 3 and 4 in 2018 (Table 3-2 and Table 3-3; Figure 3-3B and Figure 3-4B). In general, it was found that ground and road conditions were generally too cold for reptile activity during night surveys. Therefore, night surveys were not conducted during Period 5 in 2018 and all survey periods in 2019.

Table 3-2. Summary of Survey Type, Transects, and Survey Time by Survey Period for 2018 Amphibian and Reptile Surveys within the Proposed FRTC Expansion Areas

Survey Period	Flipping/Picking			Day Driving			Night Driving			Total		
	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)
1	97	110.6	70.1	25	166.8	12.2	0	0	0	**122**	**277.4**	**82.4**
2	96	102.2	138.1	10	31.2	10.3	0	0	0	**106**	**133.4**	**148.4**
3	40	49.5	61.5	14	84.2	14.6	2	25.0	1.6	**56**	**158.7**	**77.7**
4	102	140.4	66.5	35	167.3	18.5	3	39.2	2.9	**140**	**346.9**	**87.9**
5	107	89.2	122.5	13	68.7	9.1	0	0	0	**120**	**157.9**	**131.6**
Total	**442**	**491.9**	**458.7**	**97**	**518.2**	**64.7**	**5**	**64.2**	**4.5**	**544**	**1,074.3**	**527.9**

Table 3-3. Summary of Survey Type, Transects, and Survey Time by Proposed Expansion Area for 2018 Amphibian and Reptile Surveys within the Proposed FRTC Expansion Areas

Proposed Expansion Area	Survey Periods	Flipping/Picking			Day Driving			Night Driving			Total		
		No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)
B-16	1 – 4	80	65.0	65.2	20	65.0	8.5	1	3.1	0.4	**101**	**133.1**	**74.1**
B-17	1 – 5	121	192.6	116.1	26	139.2	12.7	0	0	0	**147**	**331.8**	**128.8**
B-20	1 – 4	35	16.0	16.1	8	67.4	9.5	0	0	0	**43**	**83.4**	**25.6**
DVTA	1 – 5	205	217.6	260.8	34	164.2	28.3	3	39.2	2.9	**242**	**421.0**	**292.0**
B-17/DVTA*	1 – 5	1	0.7	0.5	9	82.4	5.7	1	21.9	1.2	**11**	**105.0**	**7.4**
Total		**442**	**491.9**	**458.7**	**97**	**518.2**	**64.7**	**5**	**64.2**	**4.5**	**544**	**1,074.3**	**527.9**

Note: *11 transects crossed both the proposed B-17 expansion area and the southern portion of the proposed DVTA expansion area (see Figure 3-6).

Table 3-4. Summary of Survey Type, Transects, and Survey Time by Survey Period for 2019 Amphibian and Reptile Surveys within the Proposed FRTC Expansion Areas

Survey Period	Flipping/Picking			Day Driving			Total		
	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)
1	31	27.6	26.3	3	19.3	7.6	34	46.9	33.9
2	52	47.6	39.0	30	79.1	15.9	82	126.7	54.9
3	14	9.6	7.6	2	6.1	1.0	16	15.7	8.6
4	54	61.2	69.8	2	4.8	1.5	56	66.0	71.3
Total	**151**	**146.0**	**142.7**	**37**	**109.3**	**26**	**188**	**255.3**	**168.7**

Table 3-5. Summary of Survey Type, Transects, and Survey Time by Proposed Expansion Area for 2019 Amphibian and Reptile Surveys within the Proposed FRTC Expansion Areas

Proposed Expansion Area	Survey Periods	Flipping/Picking			Day Driving			Total		
		No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)	No. Transects	Distance (mi)	Time (hr)
B-17	1 – 4	56	62.8	58.1	18	61.5	11.7	**74**	**124.3**	**69.8**
DVTA	1 – 4	95	83.2	84.6	19	47.8	14.3	**114**	**131.0**	**98.9**
	Total	**151**	**146.0**	**142.7**	**37**	**109.3**	**26**	**188**	**255.3**	**168.7**

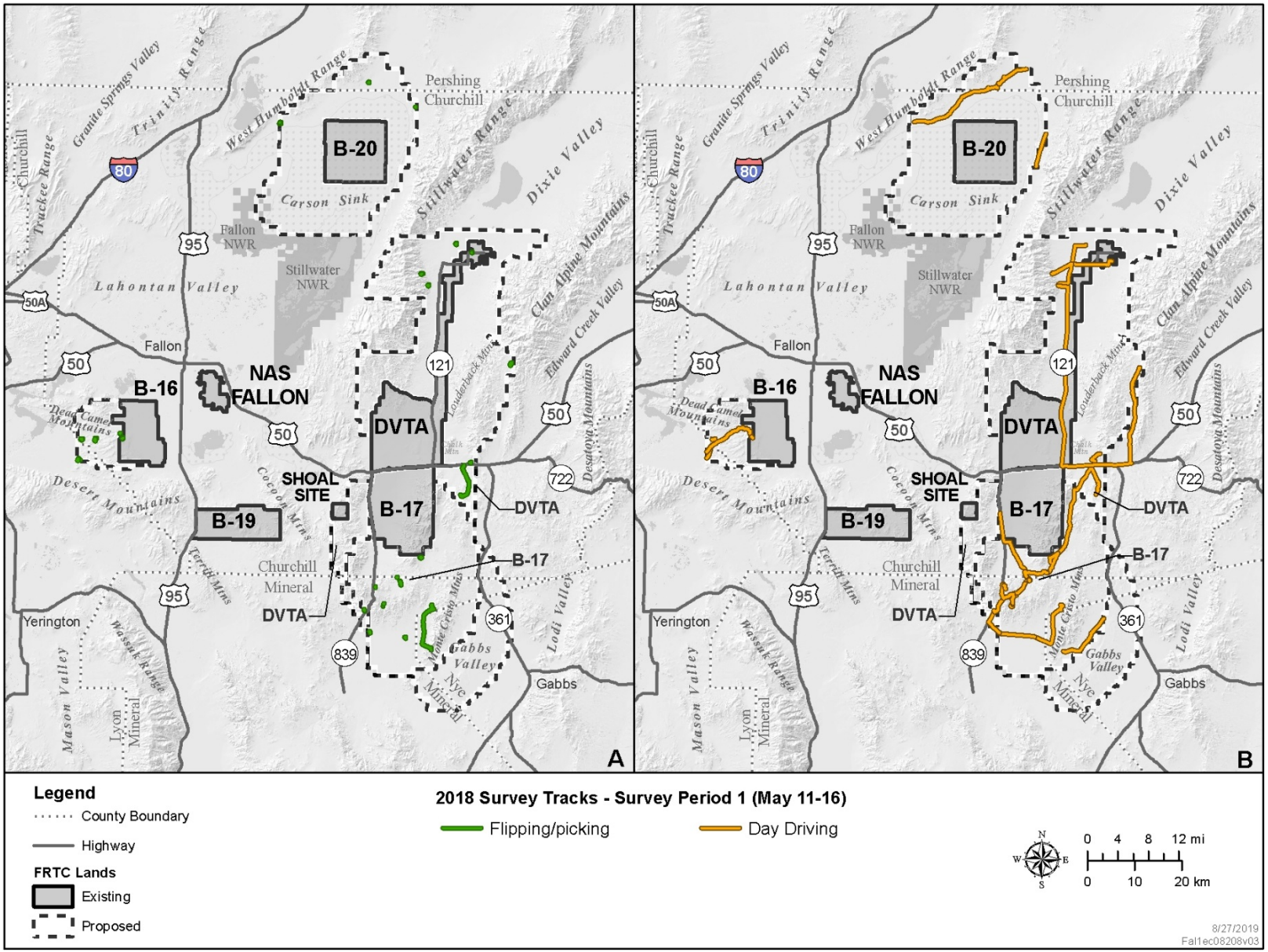

Figure 3-1. Amphibian and Reptile Survey Tracks during 2018 Survey Period 1 within Proposed FRTC Expansion Areas

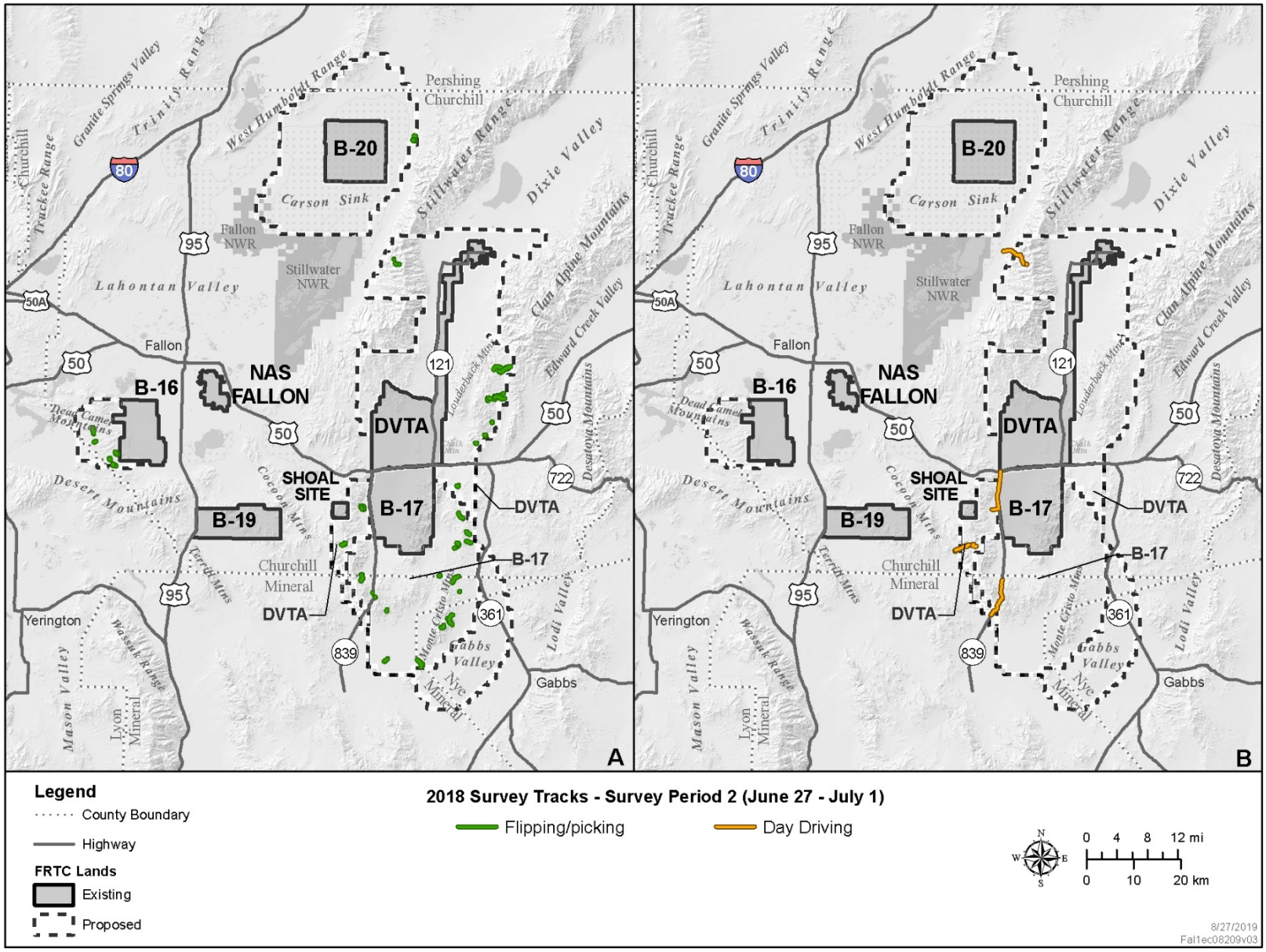

Figure 3-2. Amphibian and Reptile Survey Tracks during 2018 Survey Period 2 within Proposed FRTC Expansion Areas

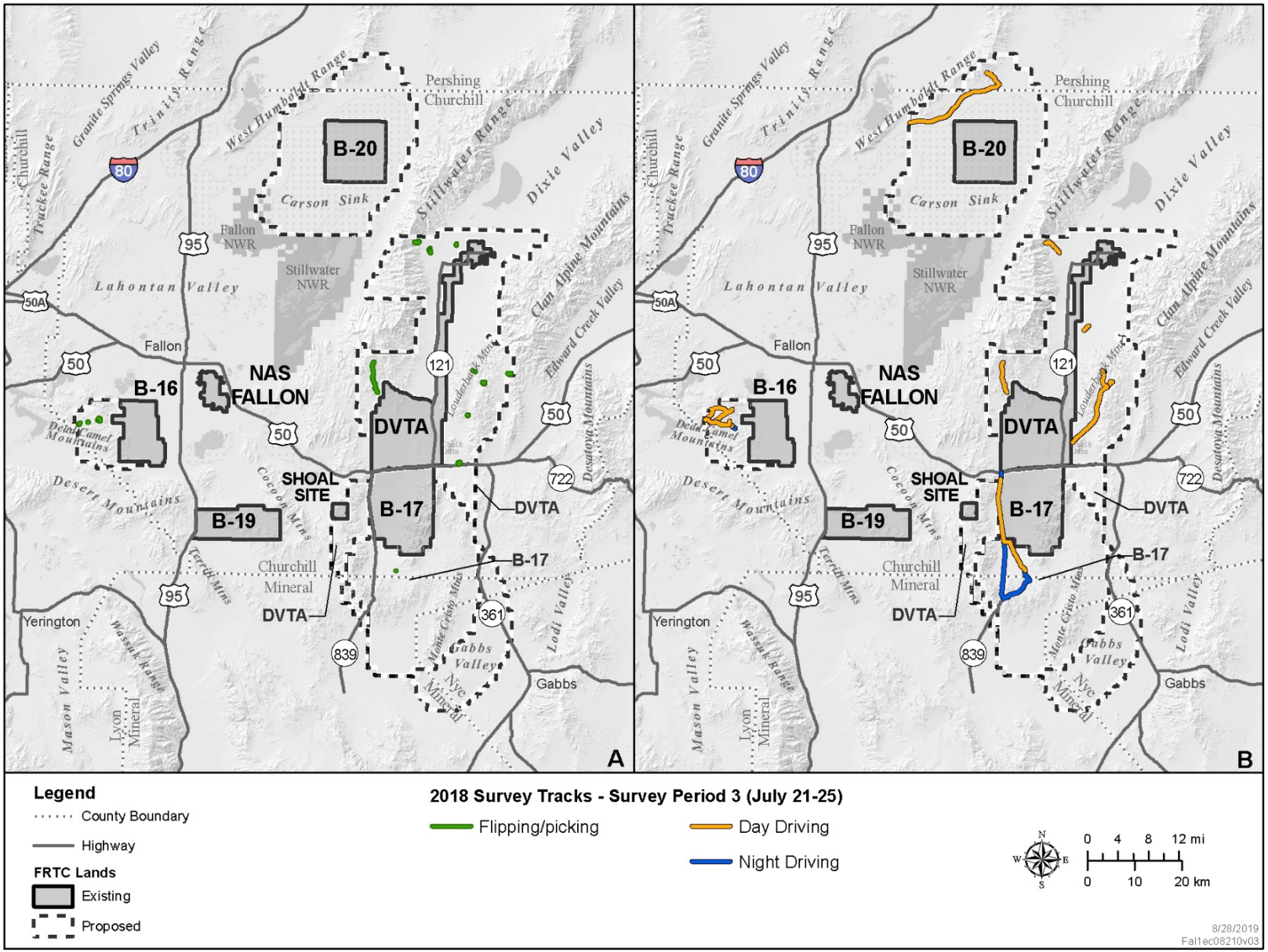

Figure 3-3. Amphibian and Reptile Survey Tracks during 2018 Survey Period 3 within Proposed FRTC Expansion Areas

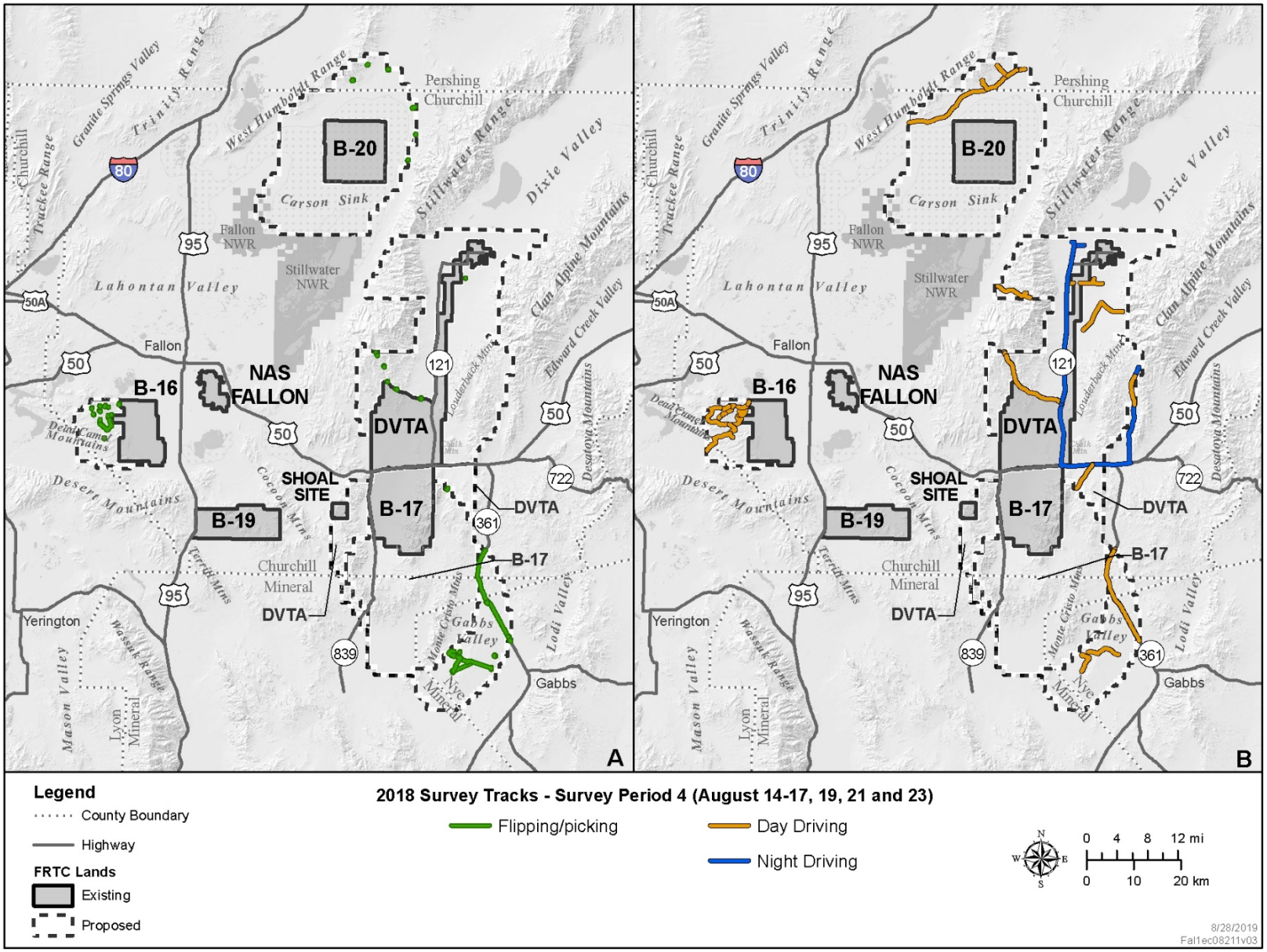

Figure 3-4. Amphibian and Reptile Survey Tracks during 2018 Survey Period 4 within Proposed FRTC Expansion Areas

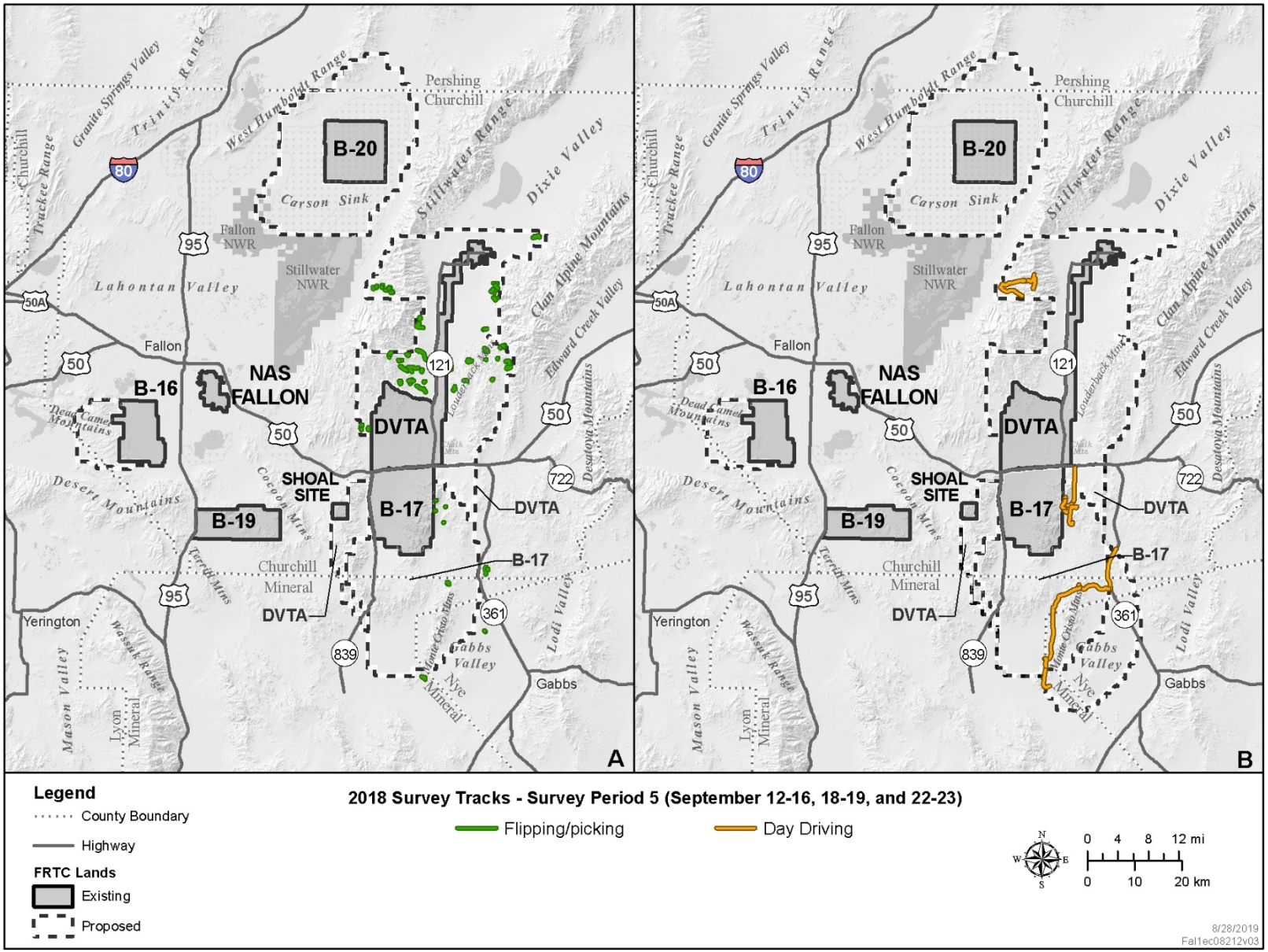

Figure 3-5. Amphibian and Reptile Survey Tracks during 2018 Survey Period 5 within Proposed FRTC Expansion Areas

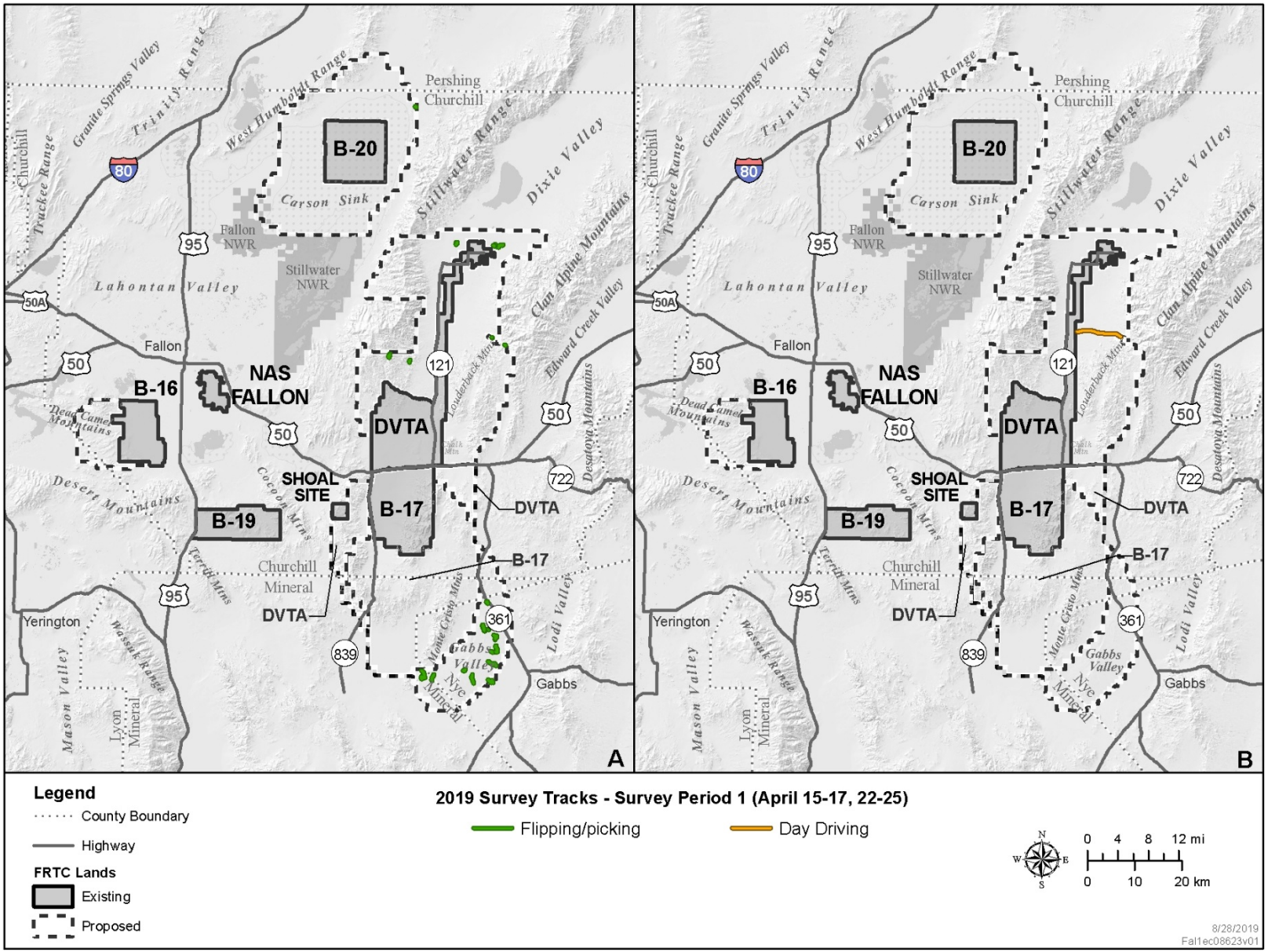

Figure 3-6. Amphibian and Reptile Survey Tracks during 2019 Survey Period 1 within Proposed DVTA and B-17 Expansion Areas

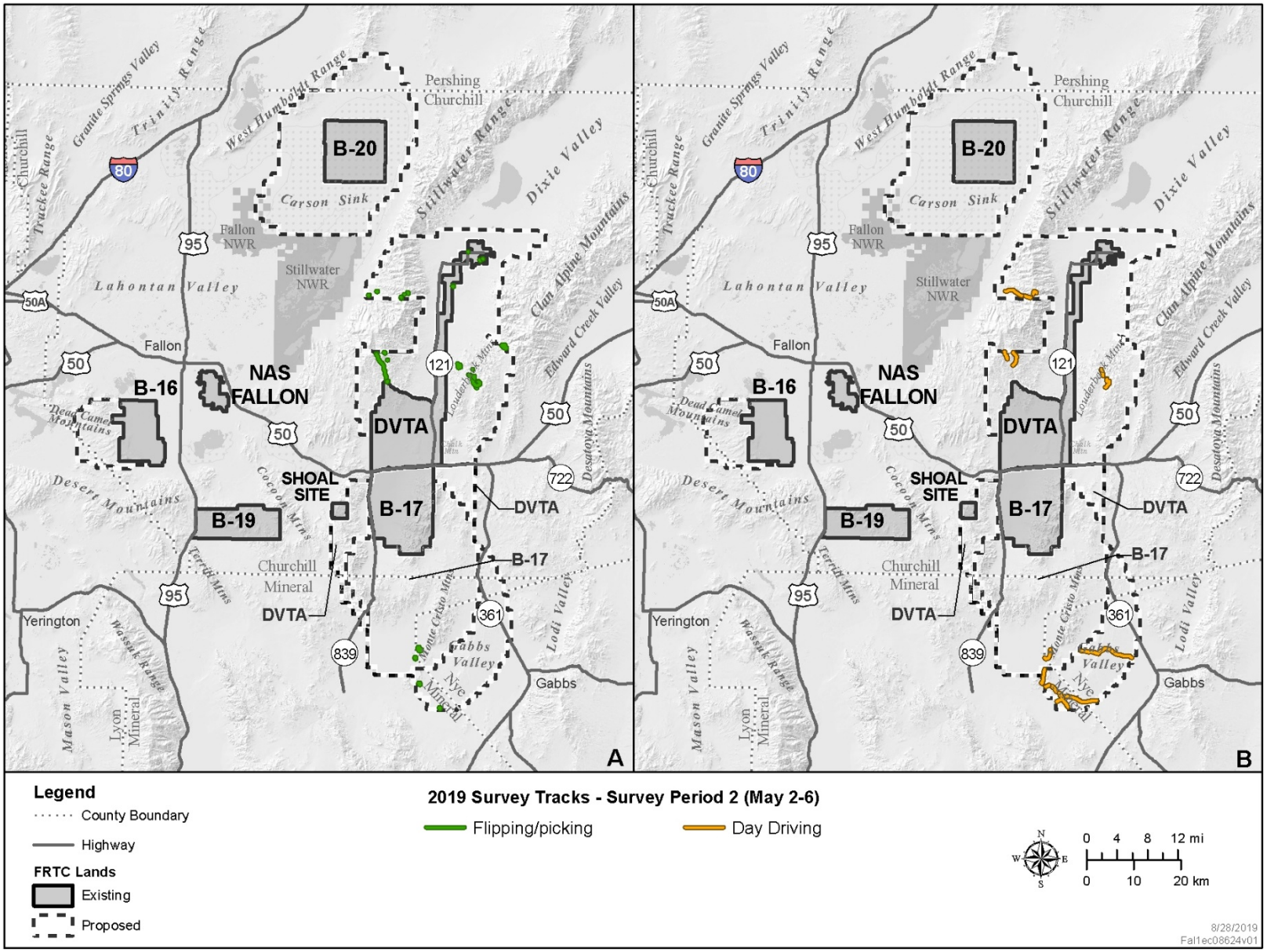

Figure 3-7. Amphibian and Reptile Survey Tracks during 2019 Survey Period 2 within Proposed DVTA and B-17 Expansion Areas

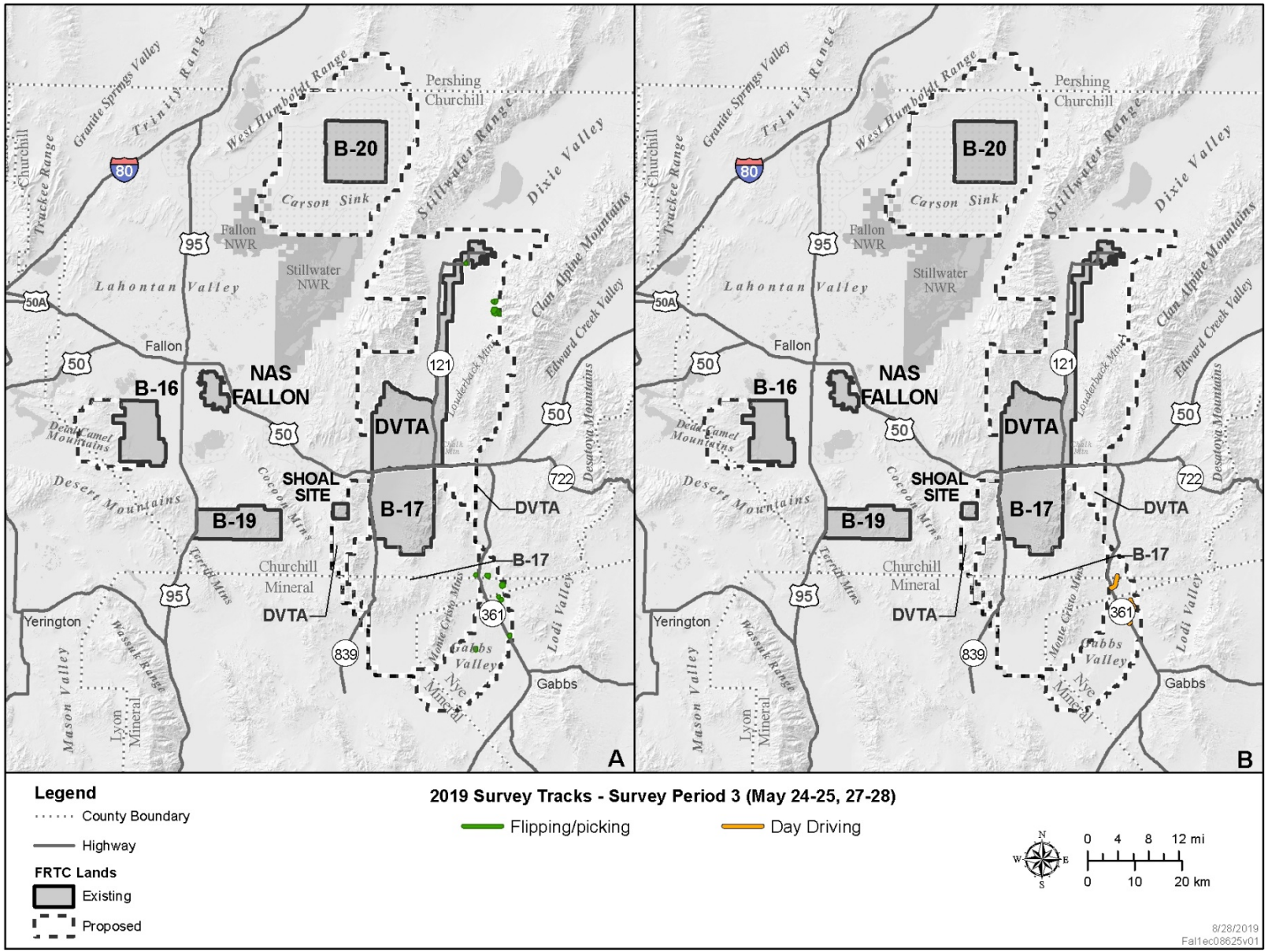

Figure 3-8. Amphibian and Reptile Survey Tracks during 2019 Survey Period 3 within Proposed DVTA and B-17 Expansion Areas

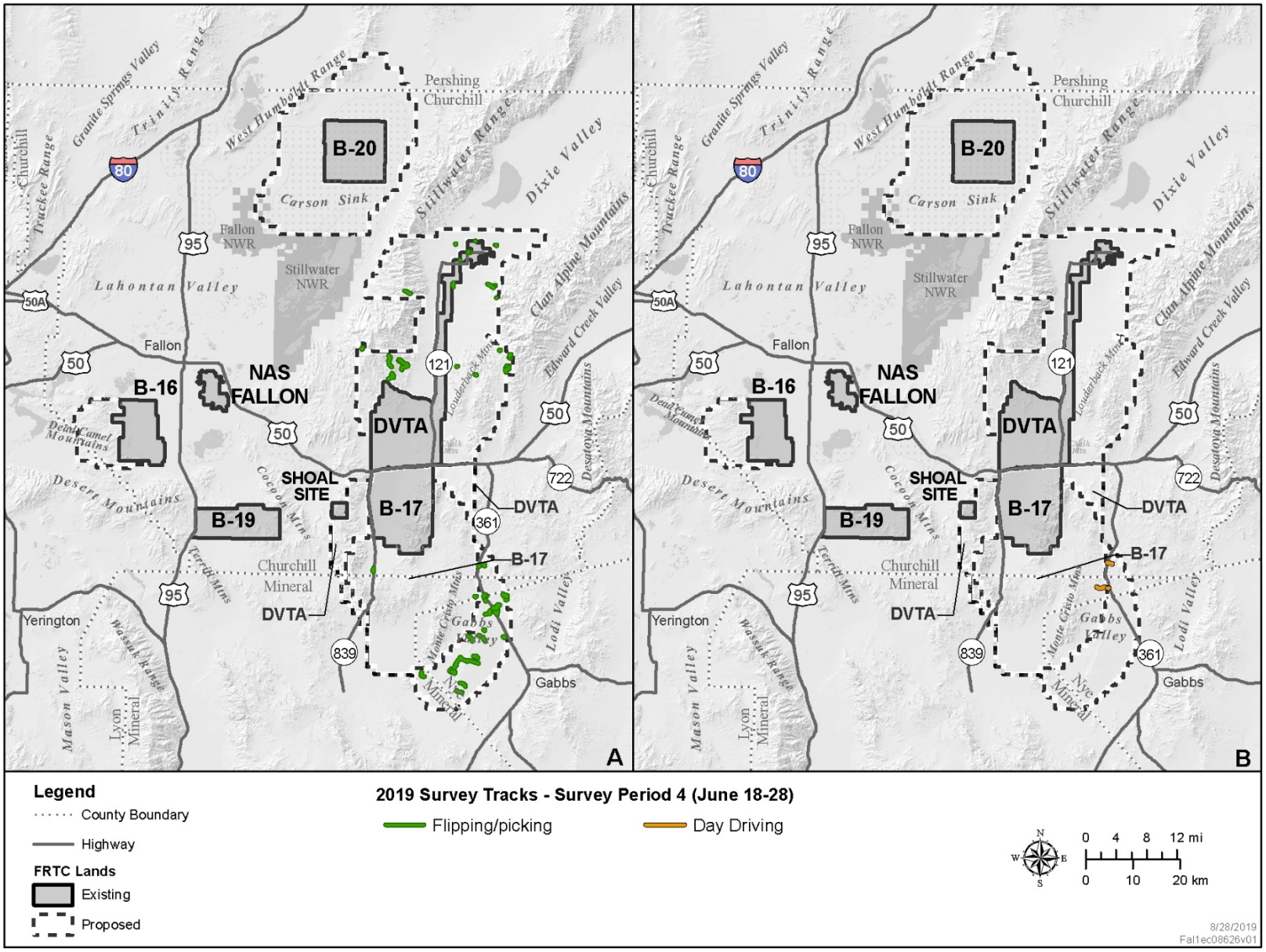

Figure 3-9. Amphibian and Reptile Survey Tracks during 2019 Survey Period 4 within Proposed DVTA and B-17 Expansion Areas

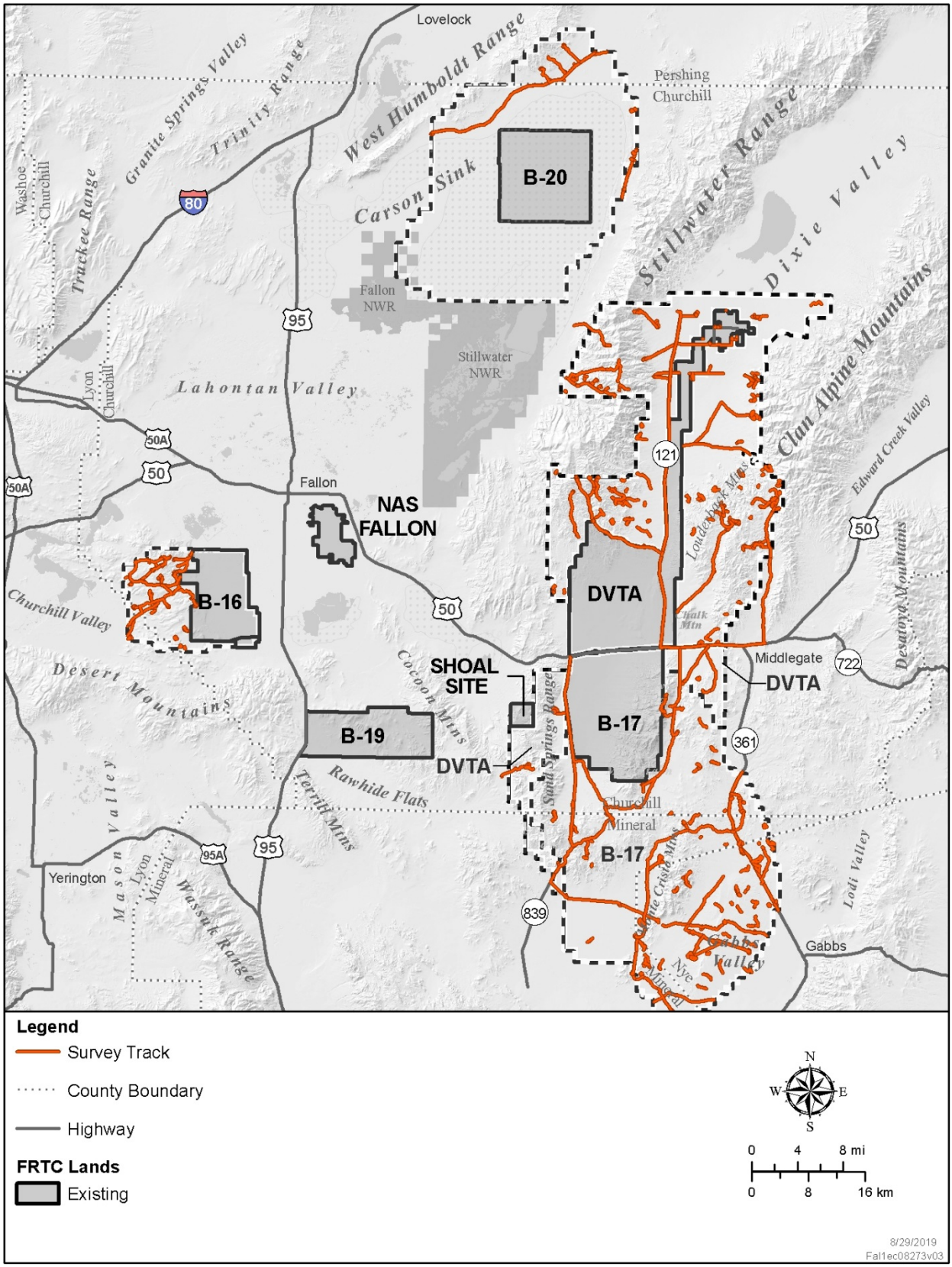

Figure 3-10. Overview of All Amphibian and Reptile Survey Tracks during 2018 and 2019 Surveys within Proposed FRTC Expansion Areas

The 2018 survey efforts resulted in 2,166 detections of individual reptiles and amphibians (Table 3-6). This total includes detections of both live animals and animal sign encountered during focused survey efforts (2,001), as well as those encountered incidentally (165). The 2,166 detections represent 17 species: 1 amphibian, 7 snakes, and 9 lizards. Overall, this report documents 30 individual amphibians (all American bullfrogs), 57 individual snakes, and 2,079 individual lizards. Appendix B provides a summary of individual species detections by survey period within each proposed expansion area.

Table 3-6. Summary of Individual Amphibian and Reptile Species Detections by 2018 Survey Period within the Proposed FRTC Expansion Areas

Species	Survey Period*					Total Survey Detections*	Incidental Detections*	Total Detections
	1	2	3	4	5			
AMPHIBIANS								
American bullfrog	27	0	0	0	0	27	3	**30**
REPTILES – SNAKES								
California kingsnake	0	0	0	0	1(ss)	1(ss)	0	**1**
Desert striped whipsnake	1	0	2(ss)	0	1(ss)	4(2 ss)	1	**5**
Great Basin gophersnake	2	2	0	1	1	6	4	**10**
Great Basin rattlesnake	4(2 ss)	2	1	1(ss)	5(2 ss)	13(5 ss)	7	**20**
Red racer	0	1(ss)	0	1(ss)	1(ss)	3(3 ss)	1	**4**
Western groundsnake	2(ss)	1	0	0	0	3(2 ss)	3	**6**
Western patch-nosed snake	0	2	0	0	0	2	2	**4**
Snake skin – unidentified	1	0	2	0	3	6	1	**7**
Snakes Subtotal	**10**	**8**	**5**	**3**	**12**	**38**	**19**	**57**
REPTILES – LIZARDS								
Desert horned lizard†	15	7(3 c)	6	3	10	41	11	**52**
Great Basin collared lizard†	10	82	64	53	43	252	1	**253**
Great Basin fence lizard	14	114	99	45	133	405	16	**421**
Great Basin whiptail	11	51	16	10	13	101	9	**110**
Long-nosed leopard lizard†	5	21	20	27	23	96	14	**110**
Nevada side-blotched lizard	115	65	119	123	160	582	35	**617**
Northern sagebrush lizard	49	5	2	0	1	57	3	**60**
Northern zebra-tailed lizard	16	17	63	88	72	256	28	**284**
Sceloporus sp.	2	2	0	0	0	4	1	**5**
Yellow-backed spiny lizard	31	17	30	40	24	142	25	**167**
Lizards Subtotal	**268**	**381**	**419**	**389**	**479**	**1,936**	**143**	**2,079**
Total	**305**	**389**	**424**	**392**	**491**	**2,001**	**165**	**2,166**

Note: *Total Survey Detections includes all individuals and evidence of individuals (animal sign) encountered during surveys. Incidental Detections are those animals or sign that were detected outside of focused survey efforts.
Animal sign: c = casting near ant colony; ss = snake skin/shed.
†Species of Conservation Priority under the Nevada WAP (Nevada WAP Team 2013).

The 2019 survey efforts resulted in 844 detections of individual reptiles and amphibians within portions of the proposed DVTA expansion area and the southeastern portion of the proposed B-17 expansion area (Table 3-7). This total includes detections of both live animals and animal sign encountered during focused survey efforts (757), as well as those encountered incidentally (87). The 844 detections represent 16 species: 2 amphibians, 5 snakes, and 9 lizards.

Table 3-7. Summary of Individual Amphibian and Reptile Species Detections by 2019 Survey Period within the Proposed DVTA and Southeastern B-17 Expansion Areas

Species	Survey Period*				Total Survey Detections*	Incidental Detections*	Total Detections
	1	2	3	4			
AMPHIBIANS							
American bullfrog	2	4	9	3	18	0	**18**
Great Basin spadefoot	1	0	0	0	1(t)	3(1 t)	**4**
Amphibians Subtotal	**3**	**4**	**9**	**3**	**19**	**3**	**22**
REPTILES – SNAKES							
Great Basin gophersnake	0	0	0	2(2 ss)	2(2 ss)	3	**5**
Great Basin rattlesnake	0	0	0	0	0	2	**2**
Red racer	0	2	0	0	2	0	**2**
Western groundsnake	1(1 ss)	0	0	1	2(1 ss)	2(1 ss)	**4**
Western patch-nosed snake	0	0	0	1	1	0	**1**
Snake skin – unidentified	0	0	0	1	1	0	**1**
Snakes Subtotal	**1**	**2**	**0**	**5**	**8**	**7**	**15**
REPTILES – LIZARDS							
Desert horned lizard†	15	5	1	13	34	21	**55**
Great Basin collared lizard†	2	34	4	34	74	8	**82**
Great Basin fence lizard	10	99	1	79	189	5	**194**
Great Basin whiptail	10	11	5	96	122	10	**132**
Long-nosed leopard lizard†	15	20	1	22	58	21	**79**
Nevada side-blotched lizard	22	13	16	64	115	8	**123**
Northern sagebrush lizard	0	13	1	6	20	0	**20**
Northern zebra-tailed lizard	43	15	1	54	113	4	**117**
Yellow-backed spiny lizard	1	2	0	2	5	0	**5**
Lizards Subtotal	**118**	**212**	**30**	**370**	**730**	**77**	**807**
Total	**122**	**218**	**39**	**378**	**757**	**87**	**844**

Note: *Total Survey Detections includes all individuals and evidence of individuals (animal sign) encountered during surveys.
Incidental Detections are those animals or sign that were detected outside of focused survey efforts.
Animal sign: c = casting near ant colony; ss = snake skin/shed.
t = detection of tadpoles.
†Species of Conservation Priority under the Nevada WAP (Nevada WAP Team 2013).

Overall, the surveys documented 52 individual amphibians, 72 individual snakes, and 2,886 individual lizards (Table 3-8). Appendix B provides a summary of individual species detections by survey period within each proposed expansion area.

Although incidental detections did not result in any additional species, these opportunistic records added detections of 258 individuals within the proposed expansion areas and helped to inform occurrence of infrequently encountered species.

Table 3-8. Summary of Individual Amphibian and Reptile Species Detections during 2018 and 2019 Surveys within the Proposed FRTC Expansion Areas

Species	Total Survey Detections*	Incidental Detections*	Total Detections
AMPHIBIANS			
American bullfrog	45	3	**48**
Great Basin spadefoot	1	3	**4**
Amphibians Subtotal	**46**	**6**	**52**
REPTILES – SNAKES			
California kingsnake	1	0	**1**
Desert striped whipsnake	4	1	**5**
Great Basin gophersnake	8	7	**15**
Great Basin rattlesnake	13	9	**22**
Red racer	5	1	**6**
Western groundsnake	5	5	**10**
Western patch-nosed snake	3	2	**5**
Snake skin – unidentified	7	1	**8**
Snakes Subtotal	**46**	**26**	**72**
REPTILES – LIZARDS			
Desert horned lizard†	75	32	**107**
Great Basin collared lizard†	326	9	**335**
Great Basin fence lizard	660	22	**615**
Great Basin whiptail	223	19	**242**
Long-nosed leopard lizard†	154	35	**189**
Nevada side-blotched lizard	715	48	**740**
Northern sagebrush lizard	77	3	**80**
Northern zebra-tailed lizard	369	32	**401**
Sceloporus sp.	4	1	**5**
Yellow-backed spiny lizard	147	25	**172**
Lizards Subtotal	**2750**	**226**	**2886**
Total	**2,842**	**258**	**3,010**

Note: *Total Survey Detections includes all individuals and evidence of individuals (animal sign) encountered during surveys. Incidental Detections are those animals or sign that were detected outside of focused survey efforts.
Animal sign: c = casting near ant colony; ss = snake skin/shed.
†Species of Conservation Priority under the Nevada WAP (Nevada WAP Team 2013).

Of the four proposed expansion areas, the proposed DVTA had the most reptile and amphibian detections (1,772), while B-20 had the fewest (187), and B-16 and B-17 fell between, with 310 and 741 detections, respectively (Table 3-9). Species detections by proposed expansion area are:

- B-16: 11 species – 3 snakes (Figure 3-11) and 8 lizards (Figure 3-12 and Figure 3-13).
- B-17: 12 species – 4 snakes (Figure 3-14) and 8 lizards (Figure 3-15, Figure 3-16, and Figure 3-17).
- B-20: 7 species – 7 lizards (Figure 3-18); no snake species were detected.
- DVTA: 18 species – 2 amphibians (Figure 3-19 and Figure 3-20), 7 snakes (Figure 3-21 and Figure 3-22), and 9 lizards (Figure 3-23 and Figure 3-24).

Importantly though, survey effort within vegetation alliances, elevations, and land areas all differed across survey periods and between the proposed expansion areas. In particular, the 2019 efforts only surveyed portions of the proposed northern DVTA and the southeastern B-17 expansion areas.

Table 3-9. Summary of Individual Amphibians and Reptiles Detected within Each of the Proposed FRTC Expansion Areas during 2018 and 2019 Surveys*

Species	Proposed Expansion Area				Total
	B-16	B-17	B-20	DVTA	
AMPHIBIANS					
American bullfrog	0	0	0	48	**48**
Great Basin spadefoot	0	0	0	4(2 t)	**4**
Amphibians Subtotal (Species)	**0**	**0**	**0**	**52 (2)**	**52 (2)**
REPTILES – SNAKES					
California kingsnake	0	0	0	1(ss)	**1**
Desert striped whipsnake	2(2 ss)	0	0	3(2 ss)	**5**
Great Basin gophersnake	0	5(1 ss)	0	10(1 ss)	**15**
Great Basin rattlesnake	1	3(1 ss)	0	18(4 ss)	**22**
Red racer	0	0	0	6(3 ss)	**6**
Western groundsnake	0	1(ss)	0	9(5 ss)	**10**
Western patch-nosed snake	1	2	0	2	**5**
Snake skin - unidentified	1	2	0	5	**8**
Snake Detections (Species)	**5 (3)**	**13 (4)**	**0**	**54 (7)**	**72 (7)**
REPTILES – LIZARDS					
Desert horned lizard†	19	47	5	36(3 c)	**107**
Great Basin collared lizard†	66	32	20	217	**335**
Great Basin fence lizard	42	92	0	481	**615**
Great Basin whiptail	5	125	4	108	**242**
Long-nosed leopard lizard†	9	64	20	96	**189**
Nevada side-blotched lizard	108	179	23	430	**740**
Northern sagebrush lizard	0	0	0	80	**80**
Northern zebra-tailed lizard	25	170	101	105	**401**
Yellow-backed spiny lizard	30	19	14	109	**172**
Sceloporus sp.	1	0	0	4	**5**
Lizard Detections (Species)	**305 (8)**	**728 (8)**	**187 (7)**	**1630 (9)**	**2886 (9)**
Total Detections (Species)	**310 (11)**	**741 (12)**	**187 (7)**	**1,772 (18)**	**3,010 (18)**

Notes: *Includes all survey and incidental detections and animal sign. Values in superscript parentheses are detections by animal sign: c = casting near ant colony, ss = snake skin/shed, t = tadpoles.

†Species of Conservation Priority under the Nevada WAP (Nevada WAP Team 2013).

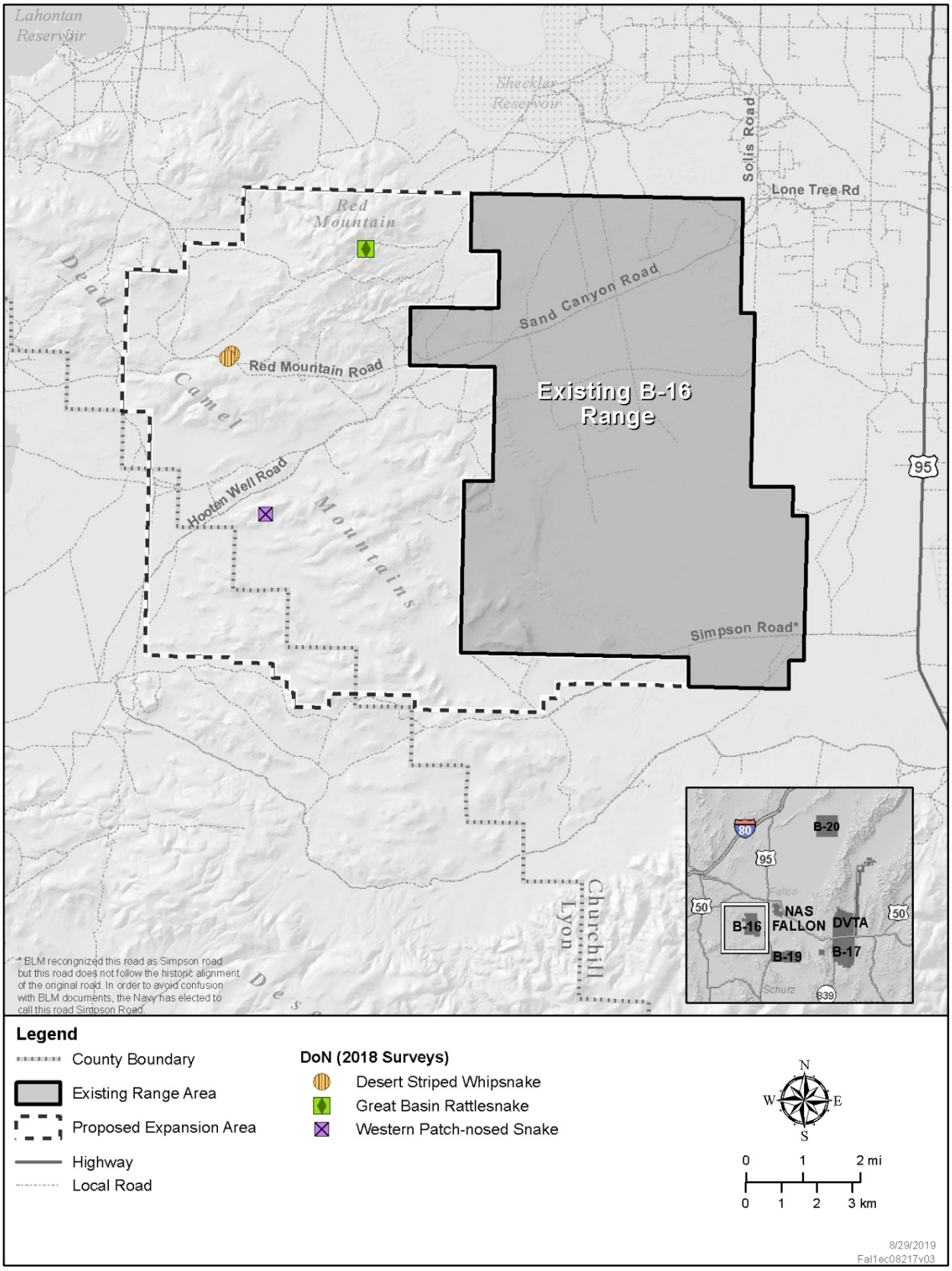

Figure 3-11. Snake Species Detections within the Proposed B-16 Expansion Area during 2018 Surveys

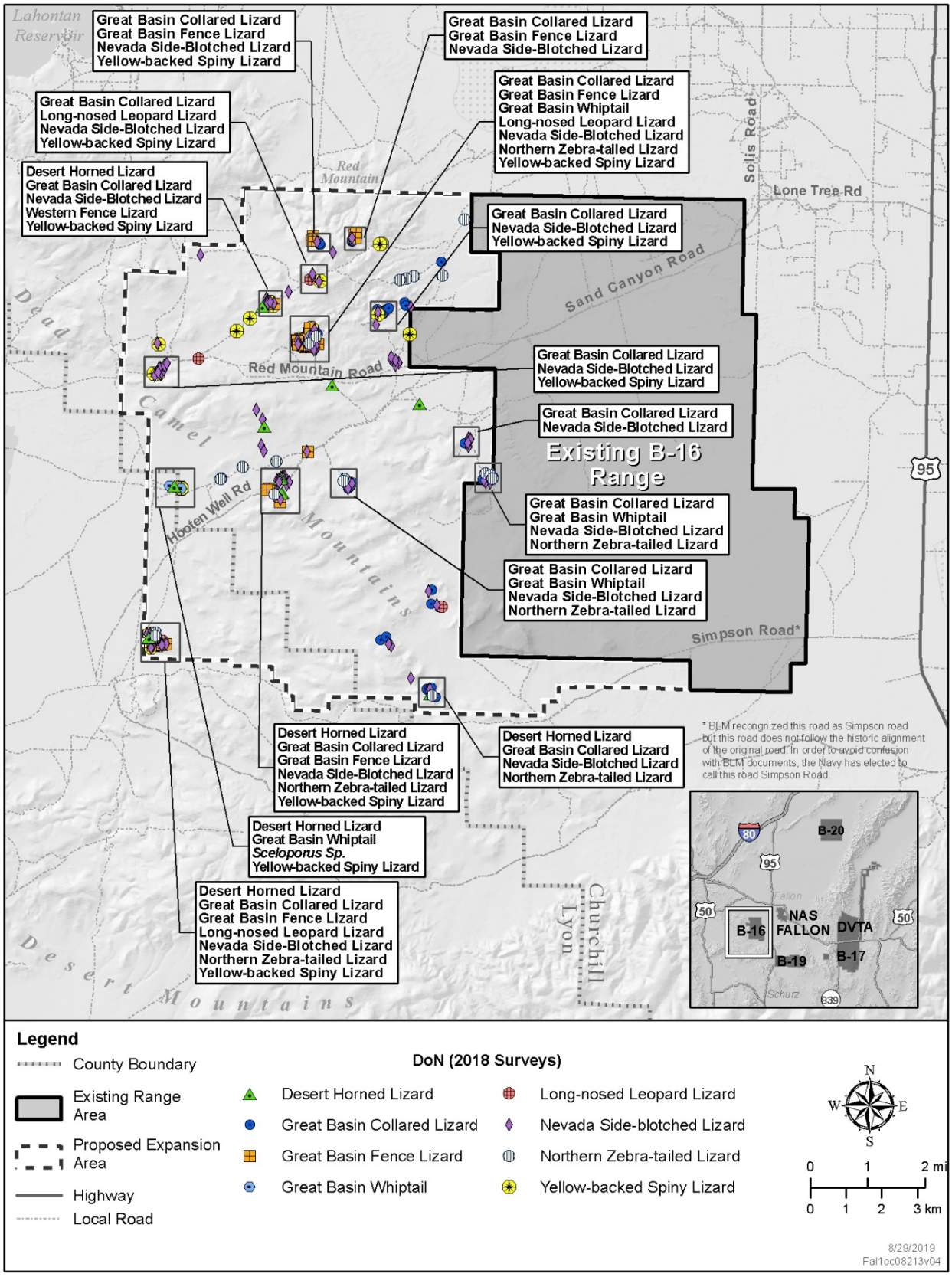

Figure 3-12. Lizard Species Detections within the Proposed B-16 Expansion Area during 2018 Surveys

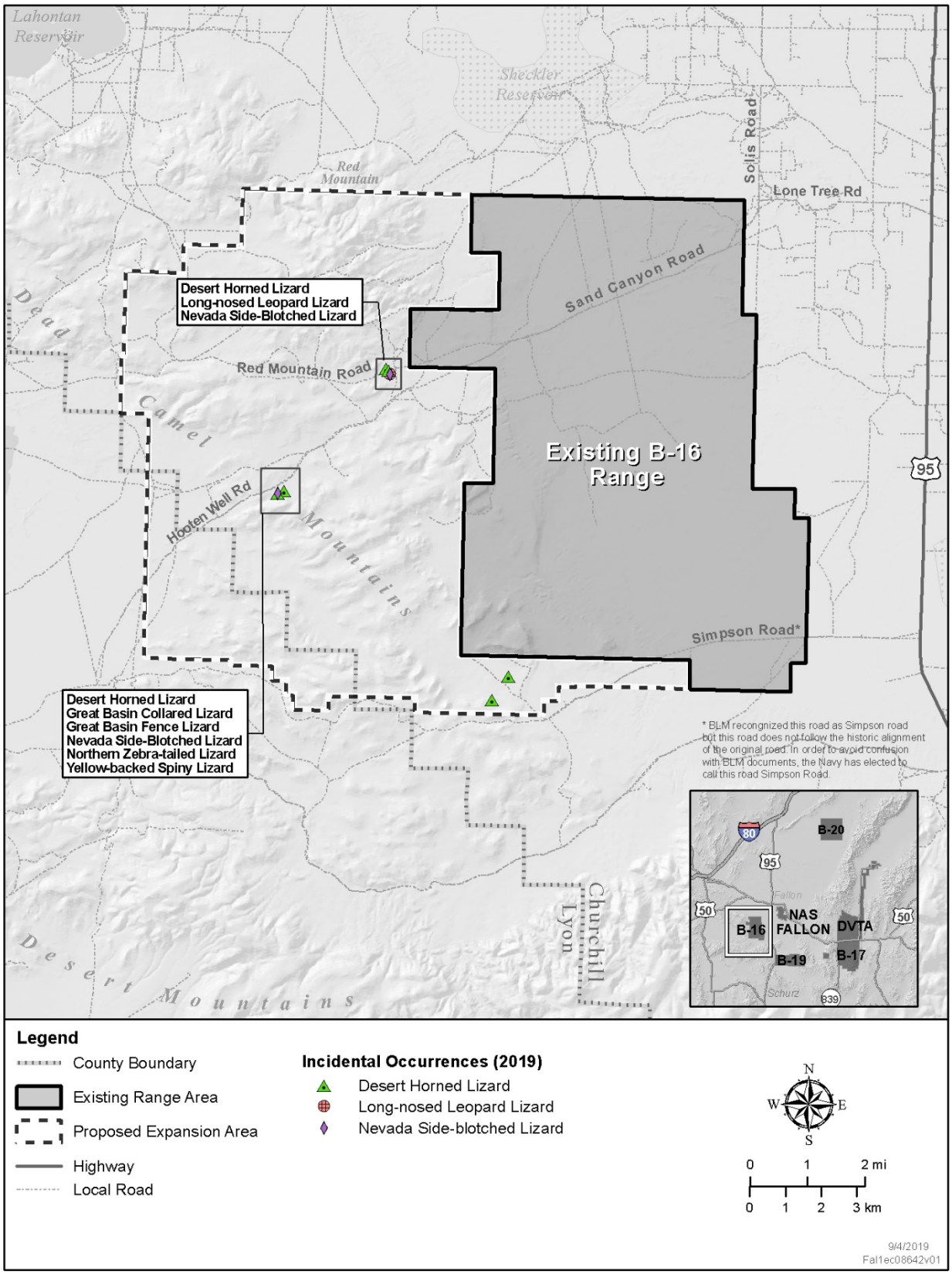

Figure 3-13. Incidental Lizard Species Detections within the Proposed B-16 Expansion Area during 2019 Surveys

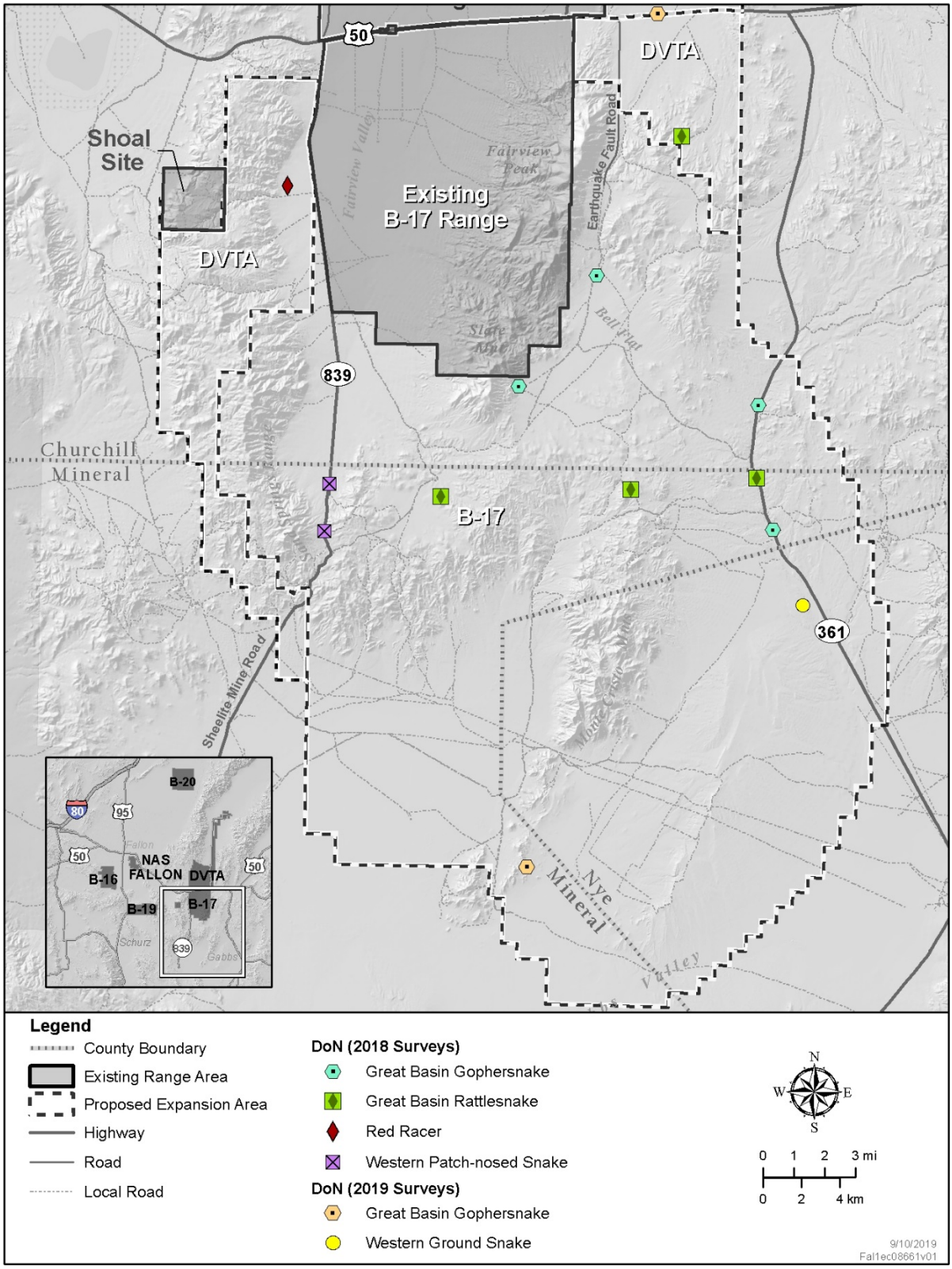

Figure 3-14. Snake Species Detections within the Proposed B-17 and Southern DVTA Expansion Areas during 2018 and 2019 Surveys

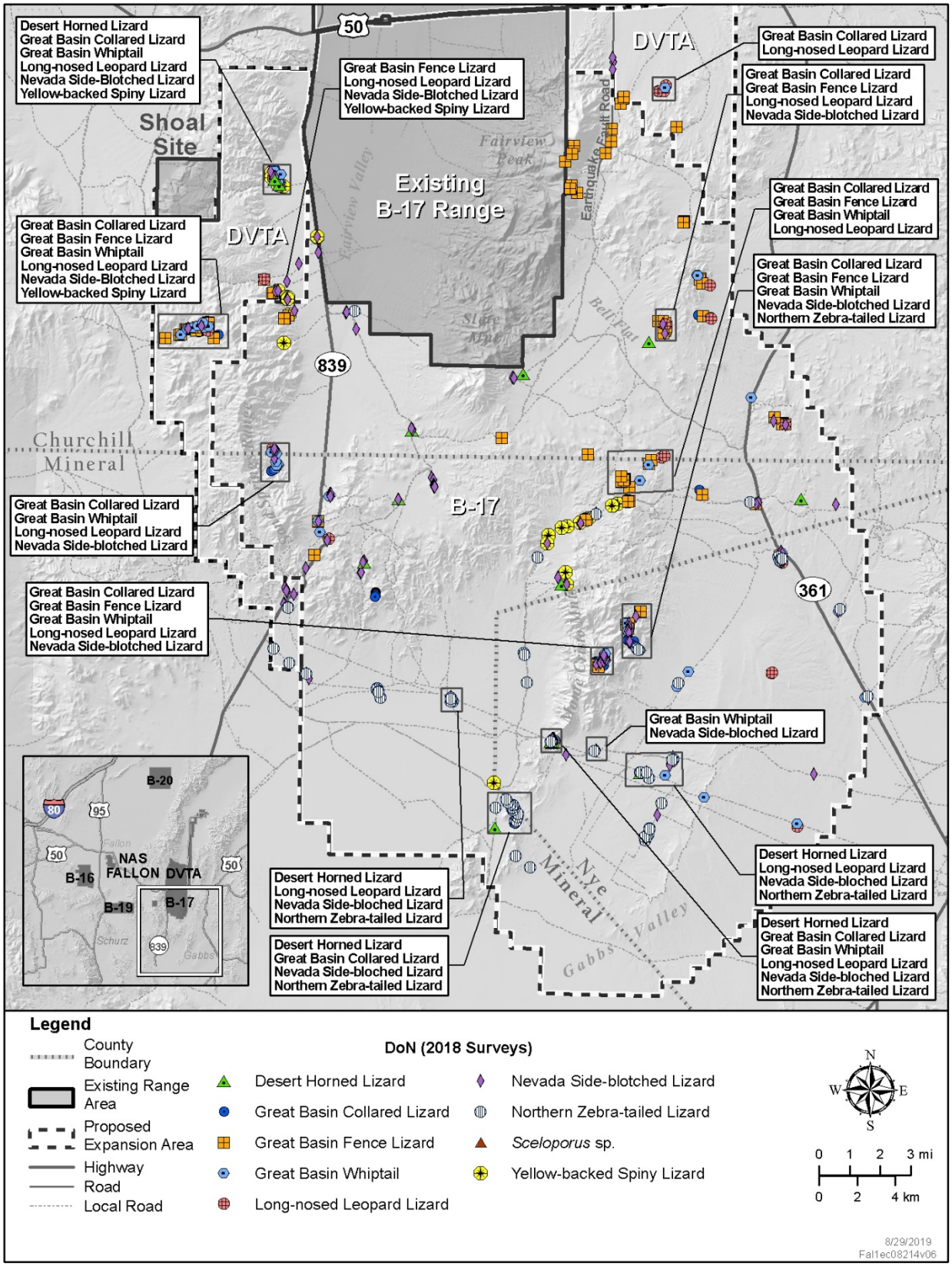

Figure 3-15. Lizard Species Detections within the Proposed B-17 and Southern DVTA Expansion Areas during 2018 Surveys

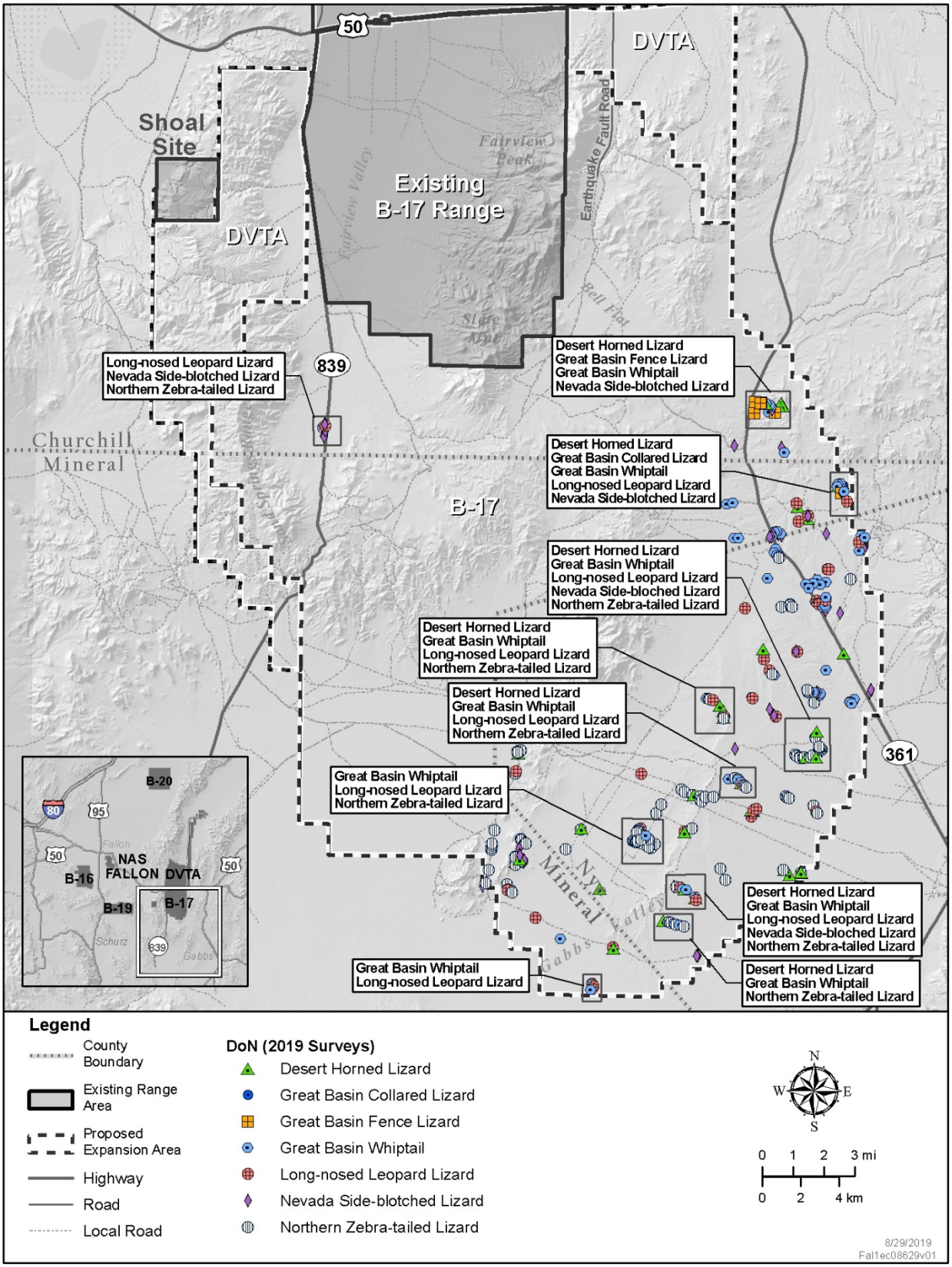

Figure 3-16. Lizard Species Detections within the Proposed B-17 Expansion Area during 2019 Surveys

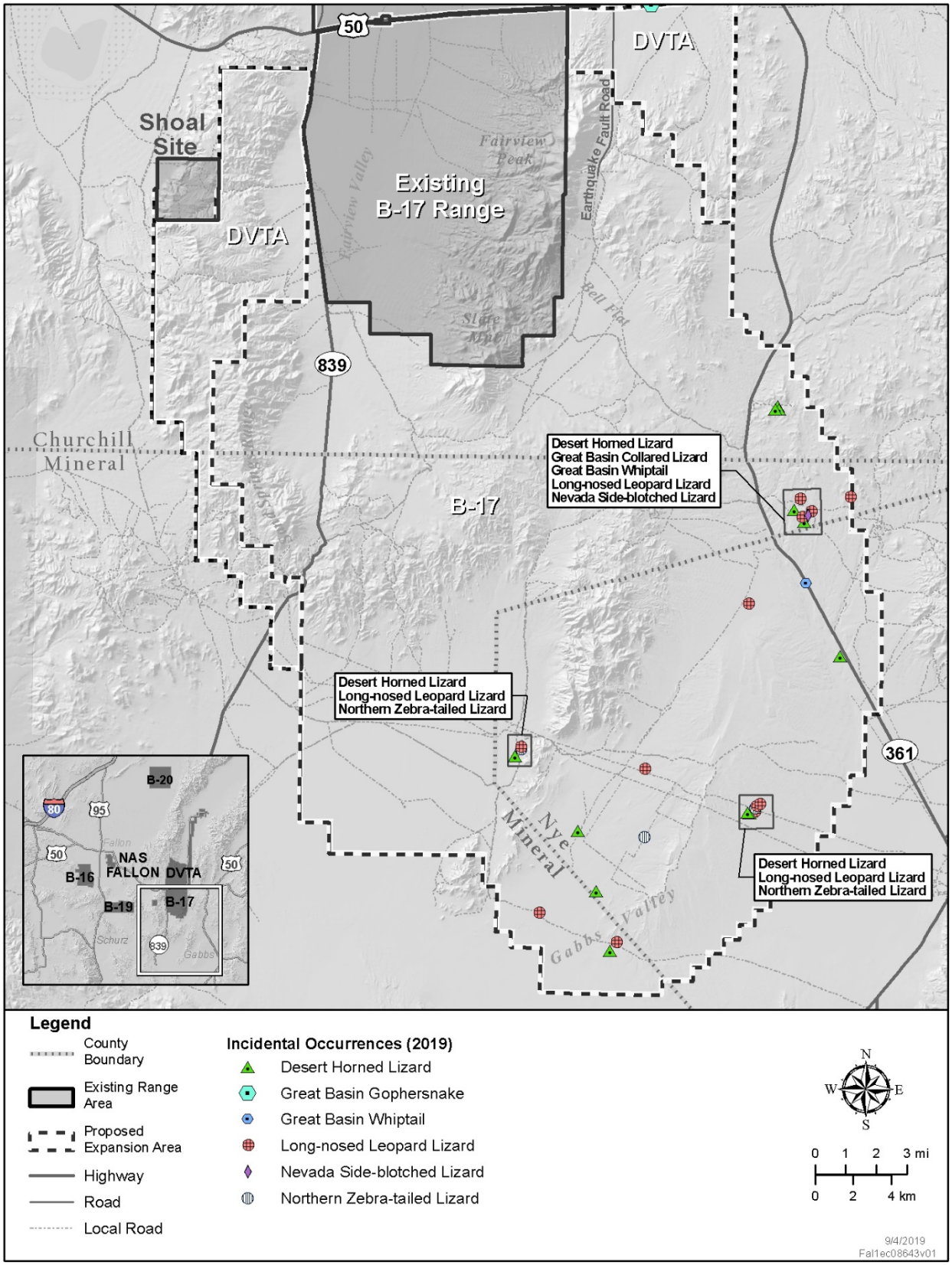

Figure 3-17. Incidental Snake and Lizard Species Detections within the Proposed B-17 Expansion Area during 2019 Surveys

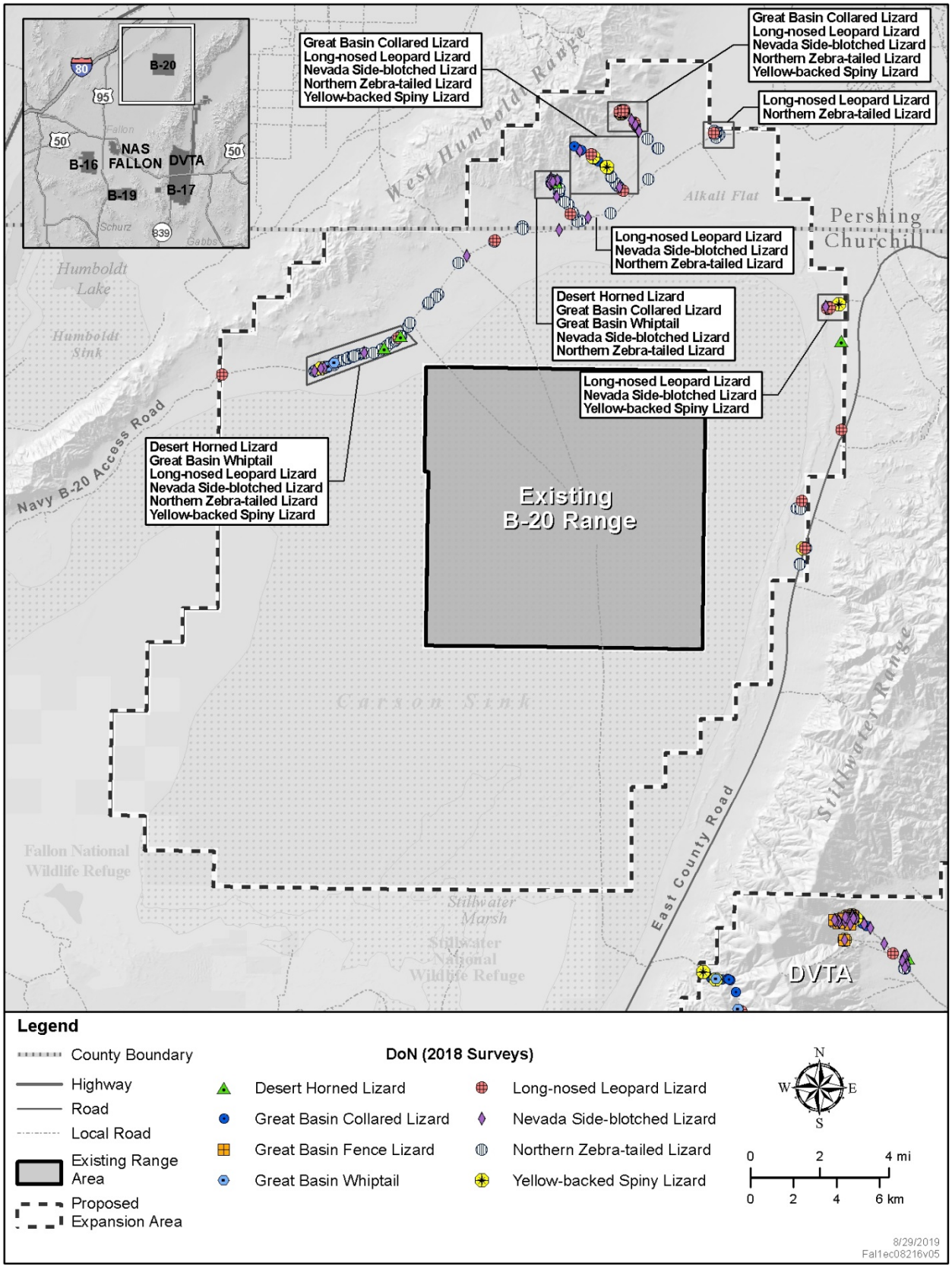

Figure 3-18. Lizard Species Detections within the Proposed B-20 Expansion Area during 2018 Surveys

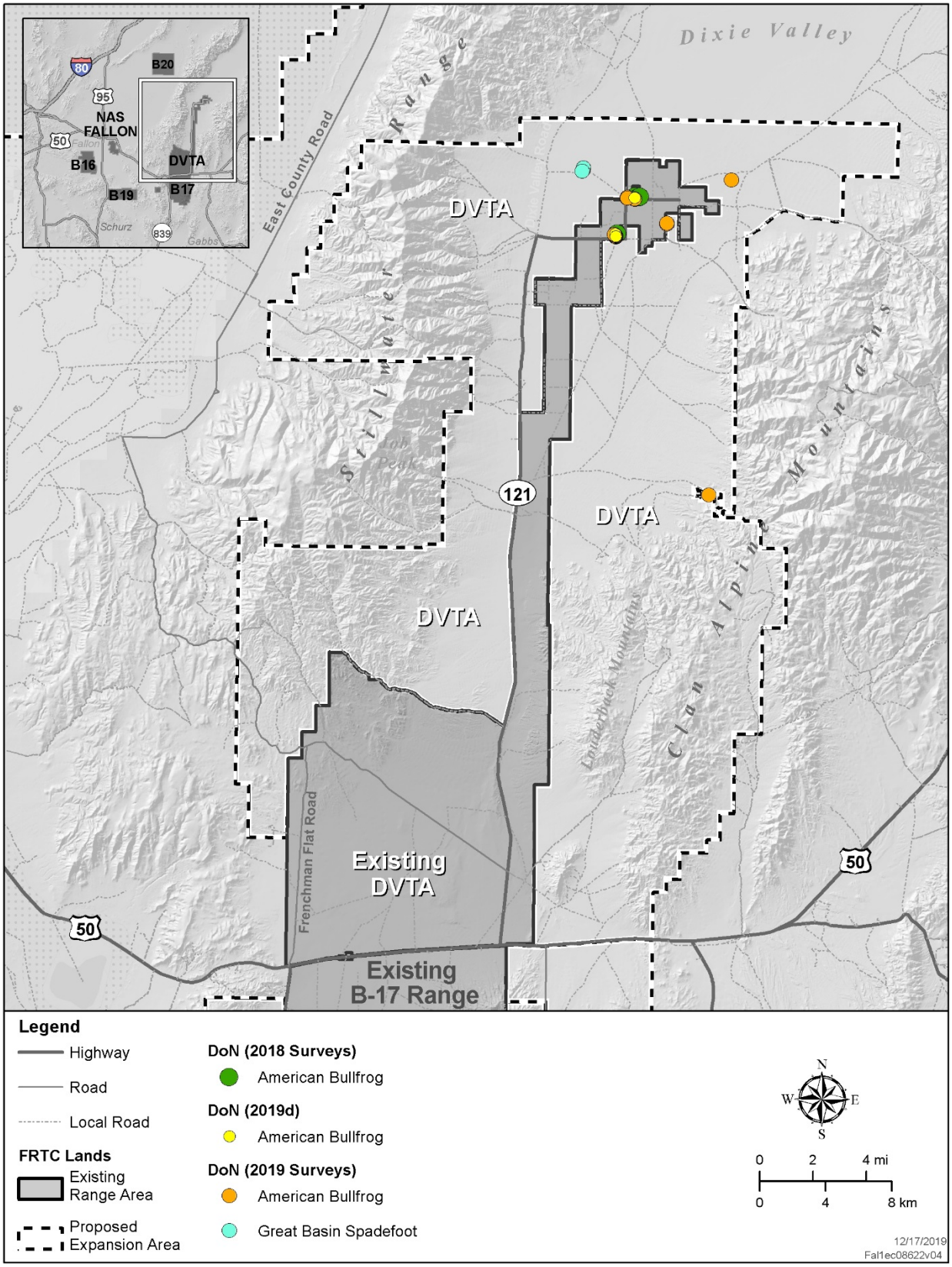

Figure 3-19. American Bullfrog and Great Basin Spadefoot Detections within the Proposed Northern DVTA Expansion Area

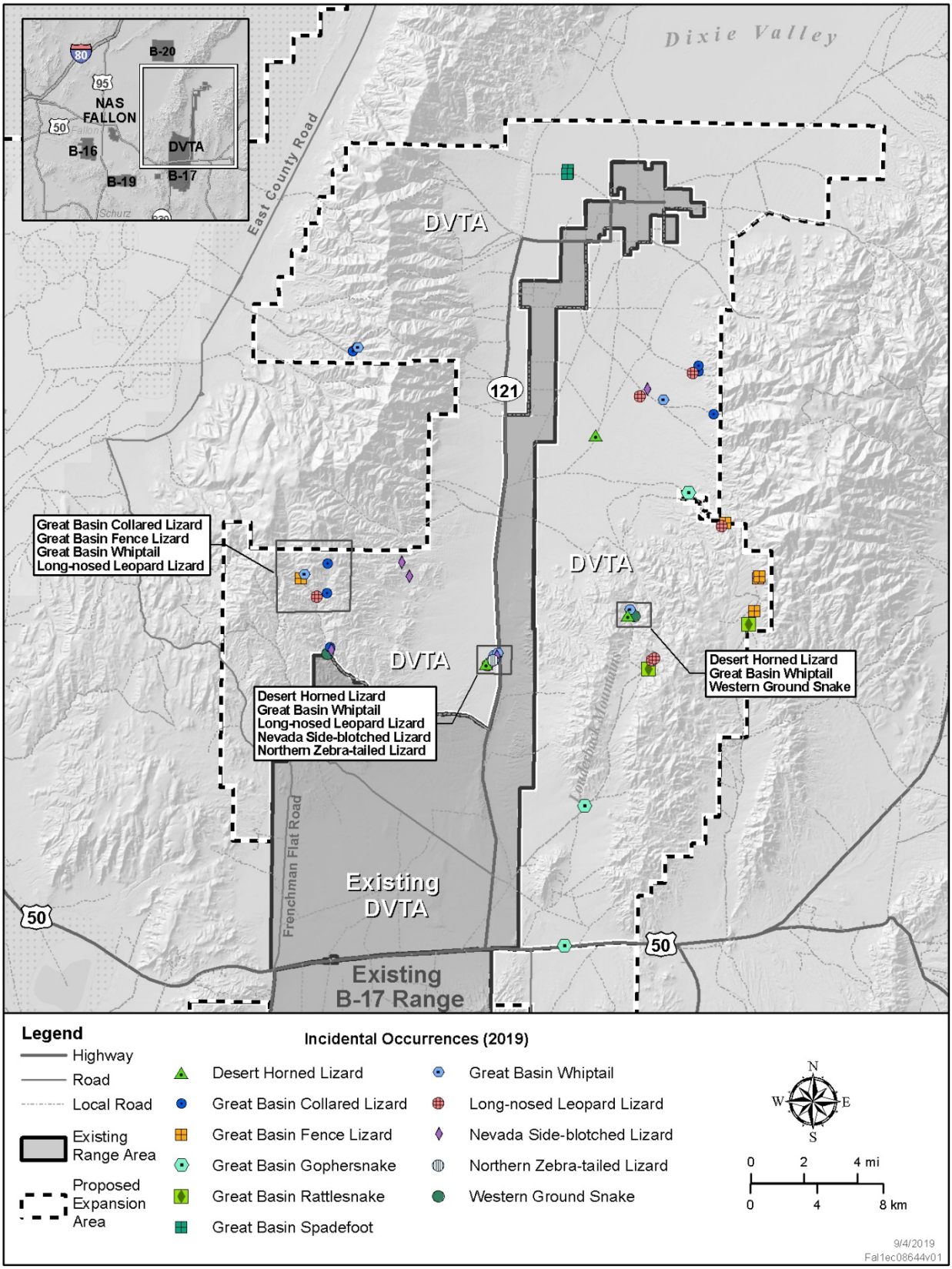

Figure 3-20. Incidental Snake and Lizard Species Detections within the Proposed Northern DVTA Expansion Area during 2019 Surveys

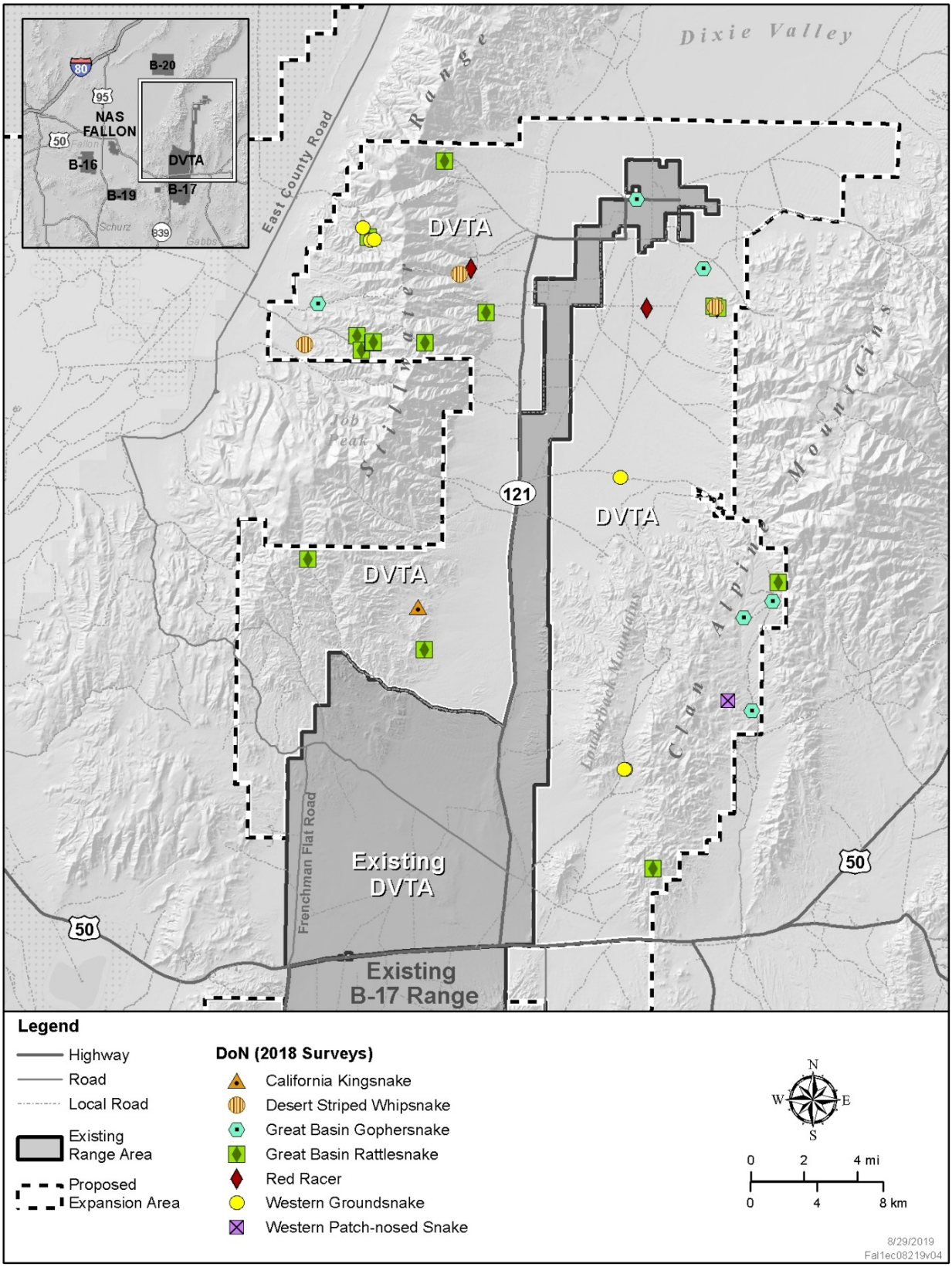

Figure 3-21. Snake Species Detections within the Proposed Northern DVTA Expansion Area during 2018 Surveys

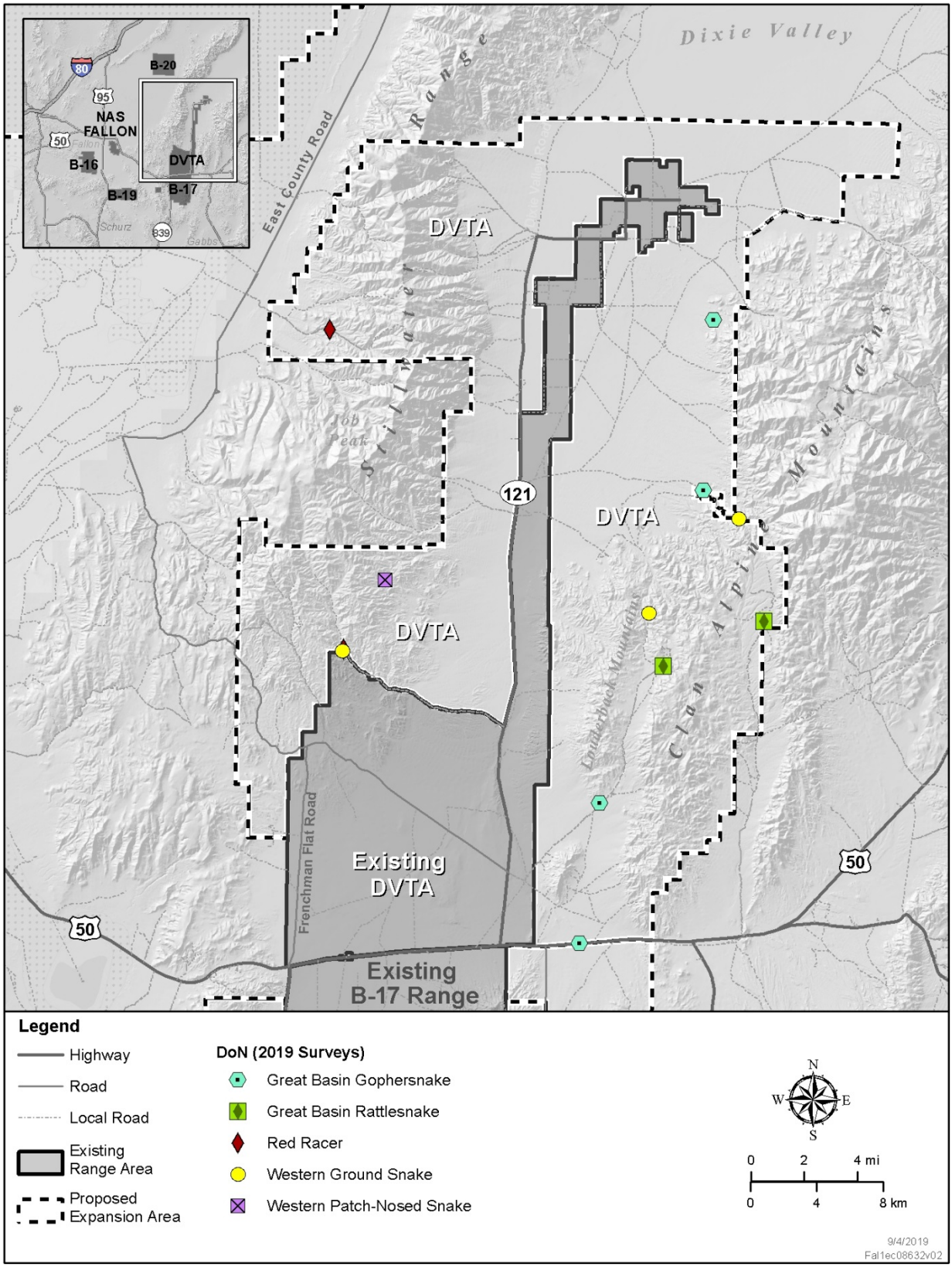

Figure 3-22. Snake Species Detections within the Proposed Northern DVTA Expansion Area during 2019 Surveys

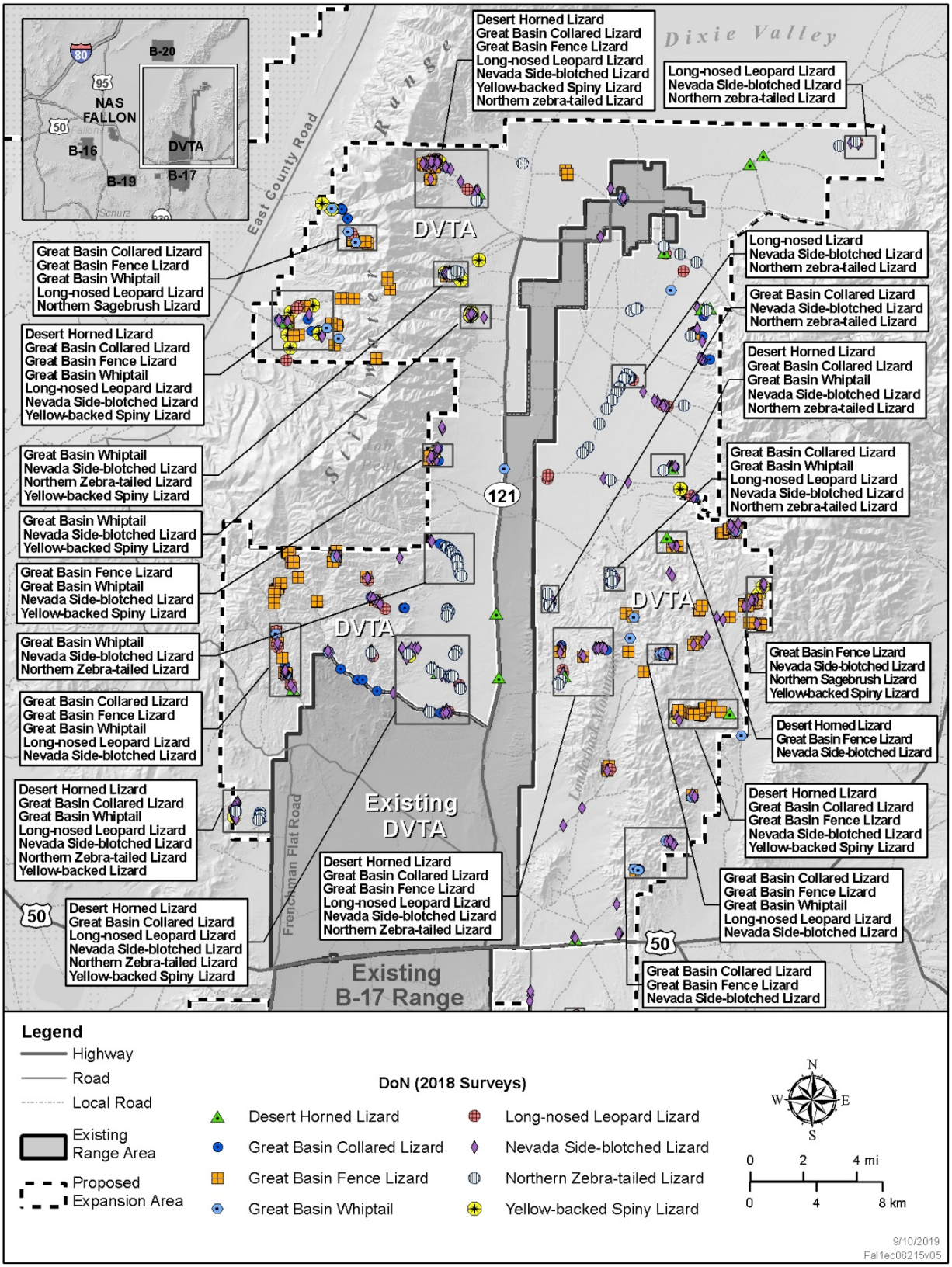

Figure 3-23. Lizard Species Detections within the Proposed Northern DVTA Expansion Area during 2018 Surveys

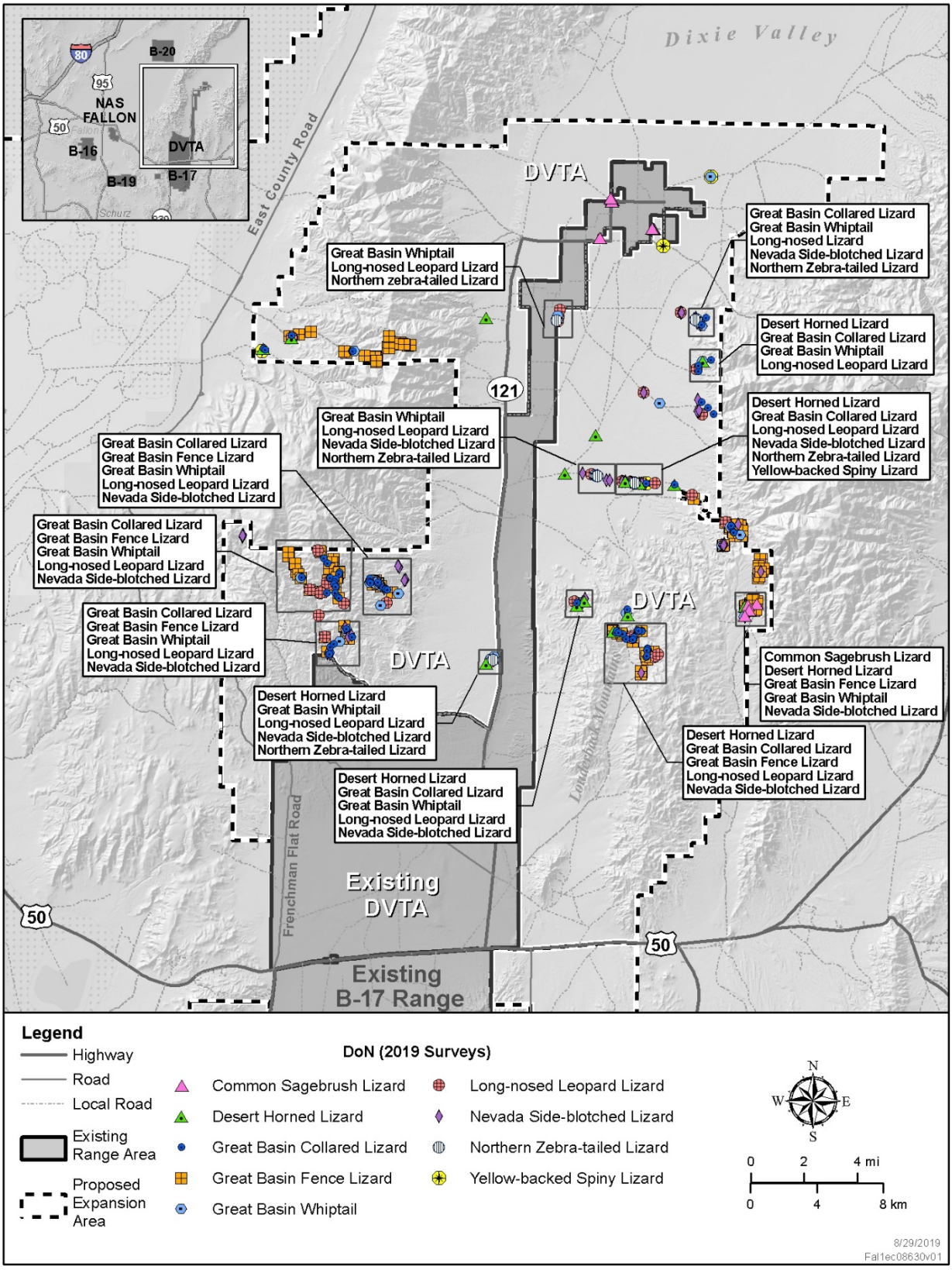

Figure 3-24. Lizard Species Detections within the Proposed Northern DVTA Expansion Area during 2019 Surveys

Survey transects were conducted entirely within, or by traversing across, 21 of the 26 mapped vegetation alliances within the proposed FRTC expansion areas. Although no survey detections were encountered within Saltgrass Alkaline Wet Meadow or Winterfat Steppe Dwarf Shrubland, incidental detections were recorded in both of these vegetation alliances (Appendix C). No detections were recorded in two alliances, though they were not extensively surveyed: Fourwing Saltbush – Rubber Rabbitbrush Desert Wash (0.05 mi [0.08 km] surveyed) and Western Wildrye Alkaline Wet Meadow (0.10 mi [0.16 km] surveyed). While some target species, including Nevada side-blotched lizard and desert horned lizard were widespread across vegetation alliances, other species were common within only a few vegetation alliances (e.g., California kingsnake within one alliance; Great Basin spadefoot within two alliances; and American bullfrog and desert striped whipsnake within three alliances) (Table 3-10).

Unsurprisingly, the vegetation alliance with the greatest cumulative survey track length (Bailey's Greasewood Shrubland: 510 mi [821 km] surveyed) had the greatest number of reptile and amphibian species detected: 16 (Table 3-10). The vegetation alliances with the highest reptile and amphibian density (>4.0 detections/mi surveyed) include Ruderal Tamarisk Riparian Scrub (8.5 detections/mi), Arroyo Willow Wet Shrubland (6.6 detections/mi), and Great Basin Singleleaf Pinyon - Utah Juniper/Shrub Woodland (4.9 detections/mi) (Appendix C).

3.2. AMPHIBIANS

Despite extensive efforts, surveys resulted in the detection of only two of the five amphibian species known from the region: non-native American bullfrog and native Great Basin spadefoot. Both species were encountered within the proposed northern DVTA expansion area in Ruderal Tamarisk Riparian Scrub and Western Baltic Rush - Mexican Rush Wet Meadow vegetation alliances, and the bullfrog was also encountered with Arroyo Willow Wet Shrubland (Table 3-10; Figure 3-19 and Figure 3-20). The areas where the individuals were observed all had surface water throughout the survey periods.

The Great Basin spadefoot was observed on four occasions within the proposed DVTA expansion area: once while on a survey (Figure 3-19) and three times incidentally (Figure 3-20). The survey detection and one of the incidental detections consisted of observations of 100s of tadpoles; the other two detections were of adults.

Although amphibian surveys were focused near known water sources, few areas within the proposed expansion area are known to contain water throughout the year. Most perennial water sources within the study area are associated with heavy disturbance from livestock. In addition to the wet meadows within the proposed DVTA expansion area, two other water sources occur within the proposed expansion areas: livestock guzzlers and intermittent streams. The perennial sources of water associated with livestock guzzlers generally do not provide suitable habitat for the region's amphibian species owing to heavy disturbance and poor local habitat conditions. Although there are a handful of mountain springs and canyon seeps, many of these remain cold for large portions of the year.

Although potentially suitable habitat for the western toad and Dixie Valley toad occurs within the proposed expansion areas, none of these species were detected. Populations may exist within the proposed DVTA expansion area; however, most of the patches of potentially suitable habitat within the proposed expansion area are small and isolated from one another, making colonization and population persistence unlikely. In addition, the presence of the American bullfrog within potentially suitable amphibian habitat may preclude the occurrence of native amphibian species.

Table 3-10. Summary of Amphibian and Reptile Species Detections by Vegetation Alliance within the Proposed FRTC Expansion Areas during 2018 and 2019 Surveys*

Species	Arroyo Willow Wet Shrubland	Bailey's Greasewood Shrubland	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland	Black Sagebrush Steppe & Shrubland	Cheatgrass Ruderal Grassland	Fremont's Smokebush - Nevada Smokebush Desert Wash Scrub	Intermountain Greasewood Wet Shrubland	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	Mojave Seablite - Red Swampfire Alkaline Wet Scrub	Nevada Joint-fir Scrub	Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush	Ruderal Tamarisk Riparian Scrub	Saltgrass Alkaline Wet Meadow	Shadscale Saltbush Scrub	Great Basin Singleleaf Pinyon - Utah Juniper/Shrub Woodland	Utah Juniper/Shrub Woodland	Western Baltic Rush - Mexican Rush Wet Meadow	Winterfat Steppe Dwarf Shrubland	Wyoming Big Sagebrush Dry Steppe & Shrubland	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	No. Vegetation Alliances
AMPHIBIANS																						
American bullfrog	X												X					I X				3
Great Basin spadefoot													I					I X				2
REPTILES – SNAKES																						
California kingsnake		X																				1
Red racer		X				X		I												X		4
Desert striped whipsnake		X											X							X		3
Great Basin gophersnake		I X	X			X		I					X			I X						6
Western groundsnake		I X	I X		I			I								X						5
Western patch-nosed snake		I		I	X										X					X		5
Great Basin rattlesnake		I X	X		I X								X			X	I X					6
REPTILES – LIZARDS																						
Great Basin collared lizard		I X	I X	X	X	X		X	X						X	I X	I X			X		11
Long-nosed leopard lizard		I X	X	X	I X	X	I	I X	I X	X						I X		I		I X		12
Northern zebra-tailed lizard		I X	X		X			I X	I X	X		I	I X		I							9
Desert horned lizard		I X	X	X	I X	X	I	I X	I X	I					X	X			I	X	I	14
Northern sagebrush lizard	I	X			X	X		X					X	I		X		X		X		10
Yellow-backed spiny lizard		I X	I X	X	I X	X	X	I X	X				I X		X	X				I X		12
Great Basin fence lizard	I X	X	I X	X	X			X	I X				I X		X	I X	X			I X		12
Sceloporus sp.					X			I X								X						3
Nevada side-blotched lizard		I X	I X	X	X	X	I X	X	I X	X	X	X	I X	I	X	I X			I	X	X	18
Great Basin whiptail		I X	X	X	I X	X		I X	I X				I X			I X		X		I X	X	12
No. Species	**3**	**16**	**11**	**8**	**12**	**9**	**4**	**12**	**8**	**4**	**1**	**2**	**11**	**2**	**7**	**11**	**3**	**5**	**2**	**11**	**3**	

Note: *X = species that were detected during focused transects; I = species that were detected incidentally and outside of focused transects.

3.3. REPTILES

3.3.1 Snakes

Within the proposed FRTC expansion areas, survey personnel documented 8 unidentified snake skins/sheds and 64 other individual snakes or snake skins, representing a total of 7 snake species (Table 3-9). Six of these species have been previously documented on NAS Fallon-managed lands (Table 1-3). The detection of the western groundsnake (*Sonora semiannulata*) represents a new snake species that had not been previously detected in other regional reptile surveys (NAS Fallon 1997, 2008; Todd et al. 2011).

The western groundsnake has no federal or state regulatory status and is ranked by the NNHP as secure (NNHP 2018a). Although not uncommon, it is considered secretive, remaining underground in the daytime, surfacing at night or during heavy rains. Groundsnakes inhabit areas with surface cover and some moisture: grassland, river bottoms, desert flats, ranchland, sand hummocks, open rocky hillsides with loose soil, sandy washes, dry streambeds, and riparian thickets. They prey on small invertebrates, including spiders, scorpions, centipedes, crickets, and insect larvae (CaliforniaHerps.com 2018).

Western Groundsnake
(*Photo*: E. Rose)

Nine western groundsnakes (four live animals and five snake skins) were detected within the proposed DVTA expansion area and one snake skin was found in the proposed B-17 expansion area (Table 3-9; Figure 3-14, Figure 3-21, and Figure 3-22). All of the detections occurred prior to 1 July, with five during focused surveys and five as incidental detections. The detections occurred within five vegetation alliances: Bailey's Greasewood Shrubland, Great Basin Singleleaf Pinyon-Utah Juniper/Shrub Woodland, Black Sagebrush Steppe & Shrubland, Intermountain Greasewood Wet Shrubland, and Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland (Table 3-6). Detections ranged in elevation from 3,962 to 5,513 ft (1,208 to 1,680 m). The individual encountered at the lowest elevation was seen basking on a dirt road within Bailey's Greasewood Shrubland following recent rains (see photo at right).

Overall, snake detections included 5 within the proposed B-16 expansion area representing 3 species (Figure 3-11), 13 in the proposed B-17 expansion area representing 4 species (Figure 3-14), none in the proposed B-20 expansion area, and 54 in the proposed DVTA expansion area representing 7 species (Figure 3-20, Figure 3-21, and Figure 3-22; Table 3-9). As is common for snakes, they proved difficult to detect across the proposed expansion areas, with only 72 survey detections (43 live individuals and 29 snake skins) during approximately 700 survey hr (Table 3-2 and Table 3-4).

A total of 22 Great Basin rattlesnakes were detected, including 5 molted snake skins (Table 3-9). Two of the individuals were juveniles, including a single shed snake skin found in May and one individual detected in September. Of the 22 records, 3 were in the proposed B-17 expansion area (Figure 3-14), 1 was in the proposed B-16 expansion area (Figure 3-11), and the remaining 18 were in the proposed DVTA expansion area (Figure 3-20, Figure 3-21, and Figure 3-22). The rattlesnakes were not found consistently within any one vegetation alliance, though most detections came from woodland- or sagebrush-dominated habitats (Table 3-10).

Of the 15 Great Basin gophersnake detections (Table 3-9), 5 individuals were found in the proposed B-17 expansion area (Figure 3-14) and 10 individuals were found in the proposed DVTA expansion area (Figure 3-20, Figure 3-21, and Figure 3-22). The gophersnake detections included 4 juveniles, 10 adults, and 1 unknown age. One adult gophersnake was observed in a rock crevice suffocating an antelope ground squirrel (*Ammospermophilus leucurus*) by squeezing it between its body and the rock.

Five desert striped whipsnakes were documented within the proposed expansion areas: four were molted snake skins and one was a live individual (Table 3-9). Two of the snake skins were in the proposed B-16 expansion area (Figure 3-11) and two skins and one live individual were in the proposed DVTA expansion area (Figure 3-21). The live individual was found in May in the Ruderal Tamarisk Riparian Scrub vegetation alliance.

There were six red racer detections within the proposed DVTA expansion area: three molted snake skins and three live individuals (Table 3-9; Figure 3-21 and Figure 3-22).

Five live western patch-nosed snakes were detected consisting of three adults encountered during focused surveys, and a single juvenile and a single neonate were encountered incidentally while driving. The two incidental detections were in the proposed B-17 expansion area, while one adult was found in the proposed B-16 expansion area (Figure 3-11) and two in the proposed DVTA expansion area (Figure 3-21 and Figure 3-22).

In addition to the other six snake species, a single juvenile California kingsnake skin was found within Bailey's Greasewood Shrubland in the proposed DVTA expansion area (Table 3-9; Figure 3-21).

3.3.2 Lizards

Lizard detections, totaling 2,886 records, far outnumbered those of amphibians or snakes (Table 3-9). The lizard community within the proposed FRTC expansion areas is diverse, with nine species ranging in size from the small Nevada side-blotched lizard (mean SVL = 1.8 in [4.8 cm]; n = 21) to the comparatively large long-nosed leopard lizard (mean SVL = 3.6 in [9.1 cm]; n = 29). All nine species had been previously documented within the area (NAS Fallon 1997, 2008; Todd et al. 2011). Three lizard species considered Species of Conservation Priority under the Nevada WAP (Nevada WAP Team 2013) were detected: Great Basin collared lizard (335 detections), long-nosed leopard lizard (189 detections), and desert horned lizard (107 detections) (Table 3-9).

During the 2018 surveys, most species were relatively common within the proposed expansion areas, with greater than 100 detections for all but the desert horned lizard (52 total detections) and the northern sagebrush lizard (60 detections) (Table 3-6). Although most lizard species were relatively common, the conditions under which they could be found varied across temperature gradient, elevation, and habitat type. The large number of lizard detections provided an opportunity to explore lizard associations with these variables based on the 2018 data. Sagebrush lizards were excluded from these analyses because most individuals were detected during a small number of surveys and ground temperatures were only recorded for two individuals.

Thermal conditions varied widely during surveys, both daily and seasonally. Large numbers of lizard detections allowed identification of thermal activity windows, thereby helping to inform future survey efforts. Although there is substantial overlap for most species, data collected during the current surveys provided evidence of species-specific thermal activity windows. While most species show a relatively consistent thermal boundary for ground temperature in the shade, hereafter referred to as "ground shade" (Figure 3-25A), activity varied substantially across species based on ground temperatures in the

sun, hereafter "ground sun" (Figure 3-25B). While side-blotched lizards, fence lizards, yellow-backed spiny lizards, and desert horned lizards were all commonly found when ground sun temperatures were around 120-130 °F, collared lizards, leopard lizards, zebra-tailed lizards, and whiptail lizards remained active even when ground sun temperatures exceeded 150 °F (Figure 3-25B).

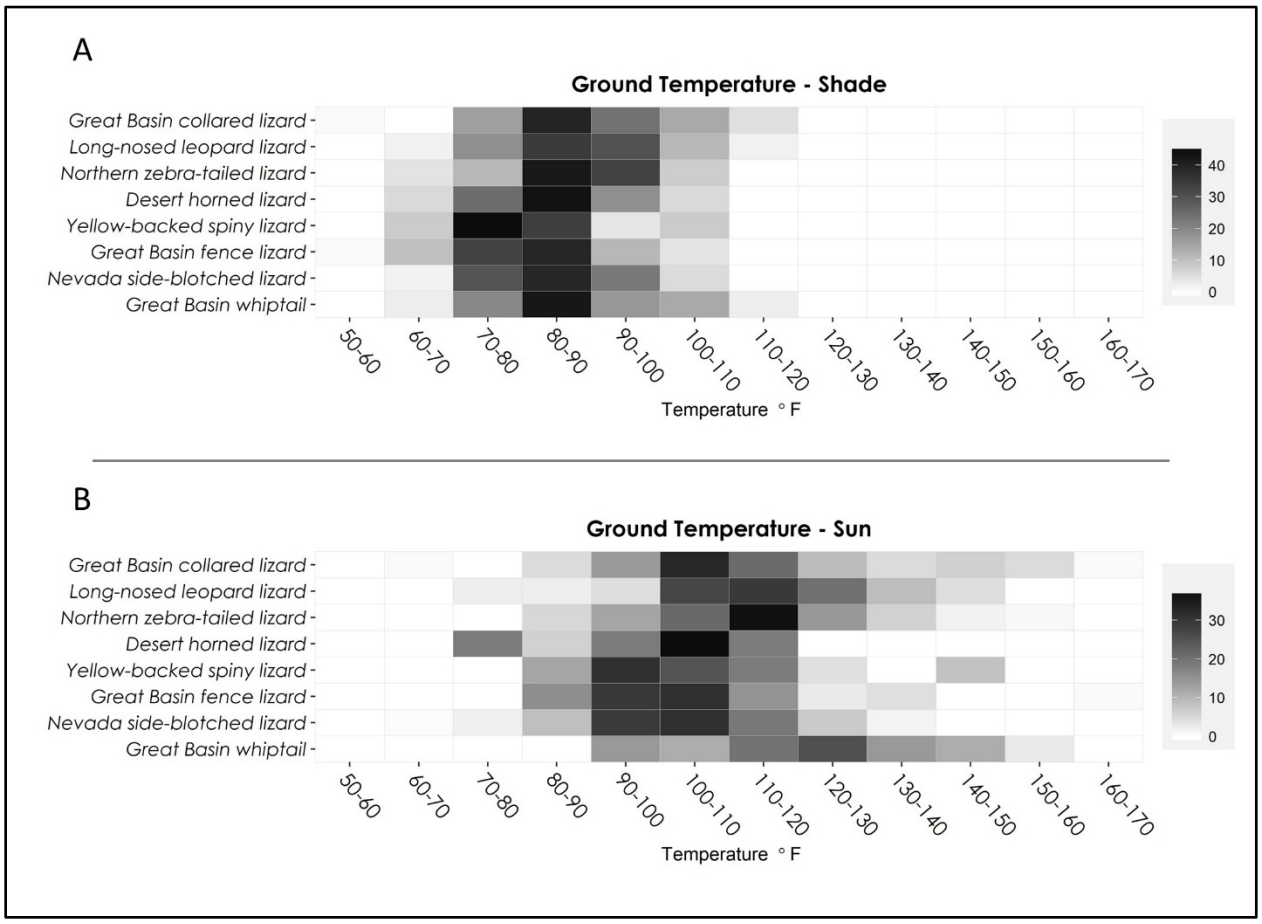

Figure 3-25. Observed Lizard Thermal Associations during 2018 Surveys within the Proposed FRTC Expansion Areas

Note: Shading intensity indicates the percent of detections that occurred when ground temperatures in the shade (A) or the sun (B) were within each thermal band. The x-axis shows 10 °F thermal bands spanning the range of conditions in which individuals were encountered.

Elevation has a strong influence on thermal conditions, vegetation composition, prey availability, and an array of other factors that influences a species distribution. In order to explore elevational associations across lizard taxa, the number of individuals detected/km surveyed within 656-ft (200-m) elevation bands was calculated. Unsurprisingly, the lizards within FRTC's proposed expansion areas were not evenly distributed across elevations (Figure 3-26). The only lizard regularly encountered above 7,217 ft (2,200 m) elevation was the Great Basin fence lizard. In fact, while the fence lizard was regularly found up to 8,530 ft (2,600 m), most species showed a maximum elevational limit around 7,218 ft (2,200 m). In contrast, zebra-tailed and desert horned lizards were generally found below 5,249 ft (1,600 m) and, along with the side blotched lizard, they were found down to the lowest elevations within the proposed expansion areas.

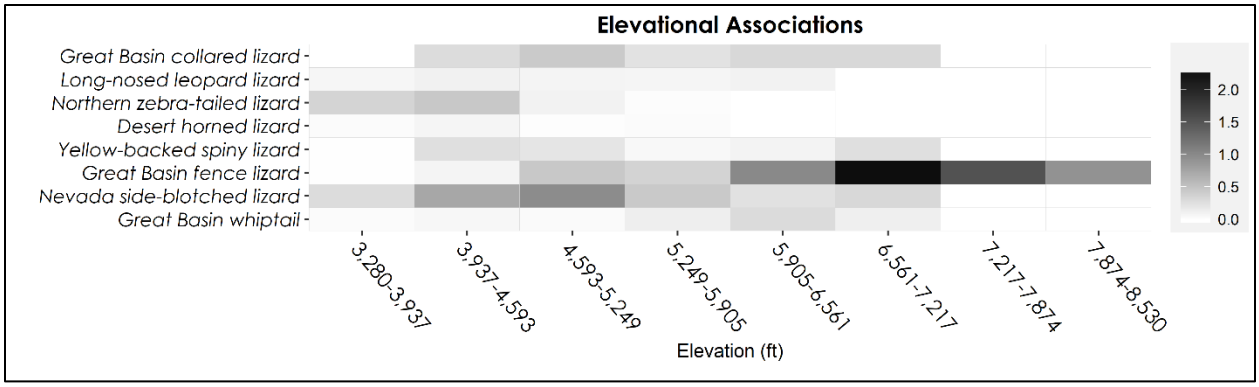

Figure 3-26. Observed Lizard Elevational Associations during 2018 Surveys within the Proposed FRTC Expansion Areas

Note: Shading intensity indicates the number of individuals detected/km during focused survey efforts. The x-axis shows 656-ft (200-m) elevation bins spanning the range of elevations surveyed within the proposed expansion areas.

Lizards are generally adapted to hot, dry conditions and have developed a wide variety of strategies aimed at broadening their thermal activity window. These strategies generally entail seeking out microclimates that optimize thermal conditions, such as exploiting warm roadways during cooler periods. One strategy observed regularly within the proposed FRTC expansion areas was basking at the top of a bush, where temperatures can be cooler than on the ground in the sun, or even in the shade, during extremely hot conditions. This activity was primarily observed in collard lizards, but also seen in yellow-backed spiny lizards and zebra tailed lizards (Figure 3-27).

Figure 3-27. Examples of Lizards Exploiting Cooler Temperatures above the Ground Surface during Extremely Hot Conditions: (A) Great Basin Collared Lizard, (B) Yellow-backed Spiny Lizard, (C) Northern Zebra-tailed Lizard

(*Photos*: V. Prado [A] and E. Rose [B and C]).

Within the proposed FRTC expansion areas, many of the lizard species were encountered more frequently in areas with specific vegetation alliances (Figure 3-28). After controlling for the amount of survey effort within each vegetation alliance and restricting the data to survey detections (Appendix C), the number of lizards/km surveyed varied widely, with a given species being absent in one vegetation type and relatively abundant in another. For example, Great Basin fence lizards were extremely common in Arroyo Willow Wet Shrublands, but none were encountered in Fremont's Smokebush – Nevada Smokebush Desert Wash Scrub. Vegetation alliances without adequate sampling (less than 0.6 mi [1 km] of survey effort) were excluded from this analysis.

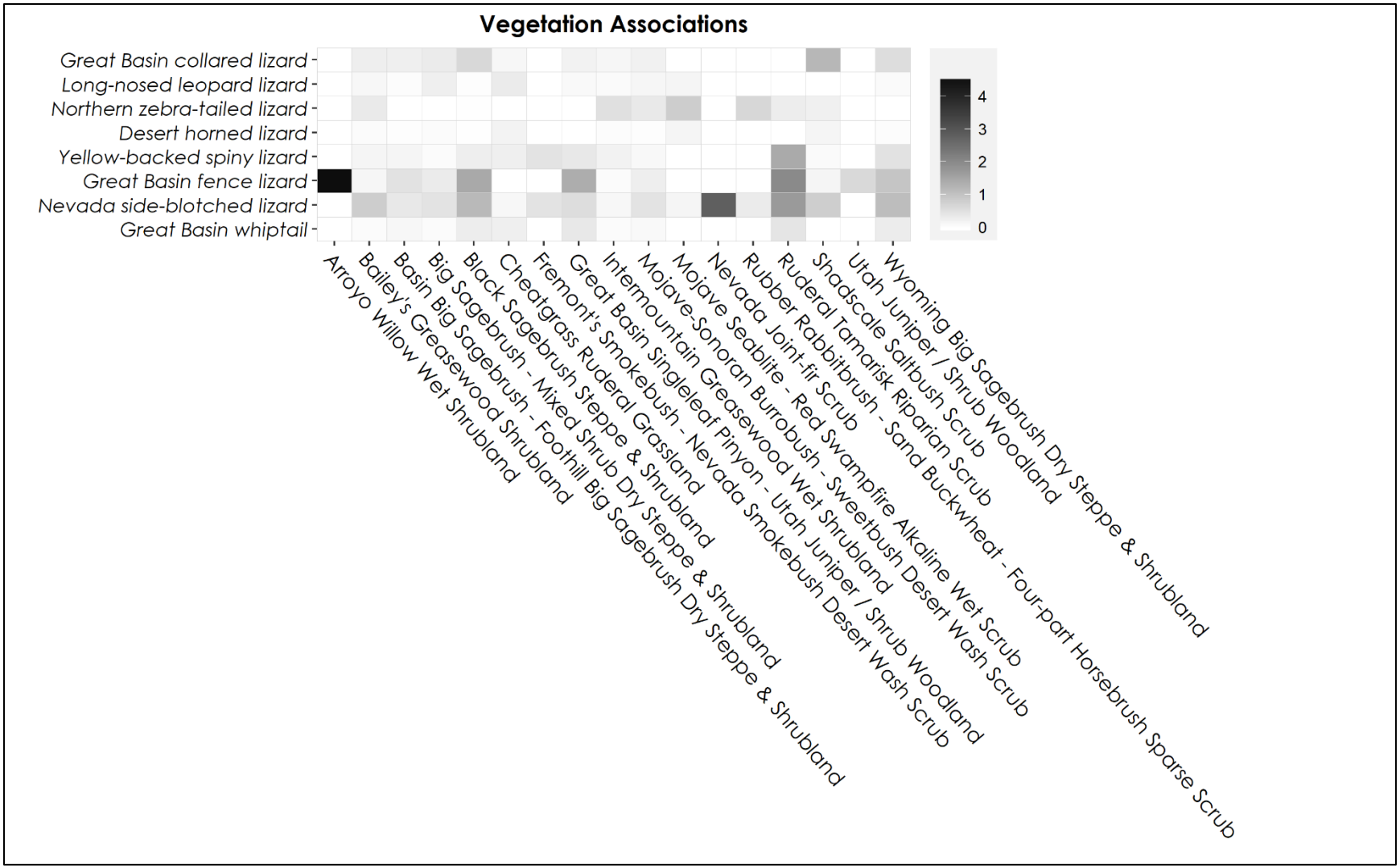

Figure 3-28. Associations of Lizard Species with Vegetation Alliances from 2018 Surveys within Proposed FRTC Expansion Areas

Note: Shading intensity indicates the number of individuals encountered/km of focused survey effort (see Appendix C).

Importantly, in some cases lizard elevational distributions coincided with their distributions across vegetation alliances. For instance, the zebra tailed lizard was frequently encountered at lower elevations within Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub, Mojave Seablite – Red Swampfire Alkaline Wet Scrub, and Intermountain Greasewood Wet Shrubland, but was absent from higher elevations and any of the vegetation associations containing sagebrush, pinyon pine, or juniper.

4. DISCUSSION

Within Nevada, the only reptile or amphibian species currently listed by the USFWS under the ESA is the desert tortoise (*Gopherus agassizii*). The desert tortoise has not been documented within NAS Fallon-managed lands or the proposed FRTC expansion areas.

Listed under the Nevada WAP as Species of Conservation Priority (Nevada WAP Team 2013), the Dixie Valley toad, whose listing status is currently being considered by the USFWS, and the Great Basin spadefoot occur on existing NAS Fallon-managed lands (Table 1-3) (NAS Fallon 1997; Todd et al. 2011). The spadefoot was observed on four occasions within the proposed DVTA expansion area, including two detections of 100s of tadpoles. Although the Dixie Valley toad is known only from Dixie Valley Meadows along the northern perimeter of Dixie Valley Playa, there are small patches of potentially suitable amphibian habitat along the southern perimeter of the playa and within the proposed DVTA expansion area (Figure 4-1). The American bullfrog, a non-native species that significantly impacts native amphibians, other vertebrate species, and aquatic ecosystems occurs within small patches of perennial wetlands habitat within the proposed expansion areas, primarily within the DVTA. These areas also contain potentially suitable habitat for both the Great Basin spadefoot and the Dixie Valley toad. If the proposed expansion areas are approved, it is recommended that these areas be considered for periodic monitoring for the Great Basin spadefoot and Dixie Valley toad and potential control and management of the American bullfrog.

Nevada is home to a number of charismatic reptile species that have been the target of commercial collecting for many years, prompting the state to begin implementing a permitting process in 1986. In September 2017, the NDOW Commission voted to impose further restrictions to commercial collection as part of an effort to manage reptile populations (NDOW 2017). This change came in response to the large number of reptiles removed annually and the recognition that reptiles are among the most difficult species to manage due to inventory and monitoring challenges (Nevada WAP Team 2013). With the exception of a few species (notably the desert tortoise), long-term monitoring of Nevada's reptile populations has lagged behind that of other taxa. Importantly, a wide range of methods for monitoring reptiles have been developed, and the most reliable methods tend to be taxa-specific and rely on a detailed understanding of the habitats and life history of the focal species. Although methods that target specific taxa are critically important for monitoring population change, community level occurrence data, such as the data collected during this study, can make important contributions toward developing species distribution models (Guisan et al. 2013) and informing long-term population trends for common species (Becker et al. 2013).

Surveys within the proposed expansion areas largely documented the same snake and lizard species documented during prior surveys of existing NAS Fallon-managed lands. Notably, survey personnel detected 10 western groundsnakes (4 live individuals and 6 shed skins), a species not previously recorded from the area (Linsdale 1940; NAS Fallon 1997, 2008; Todd et al. 2011).

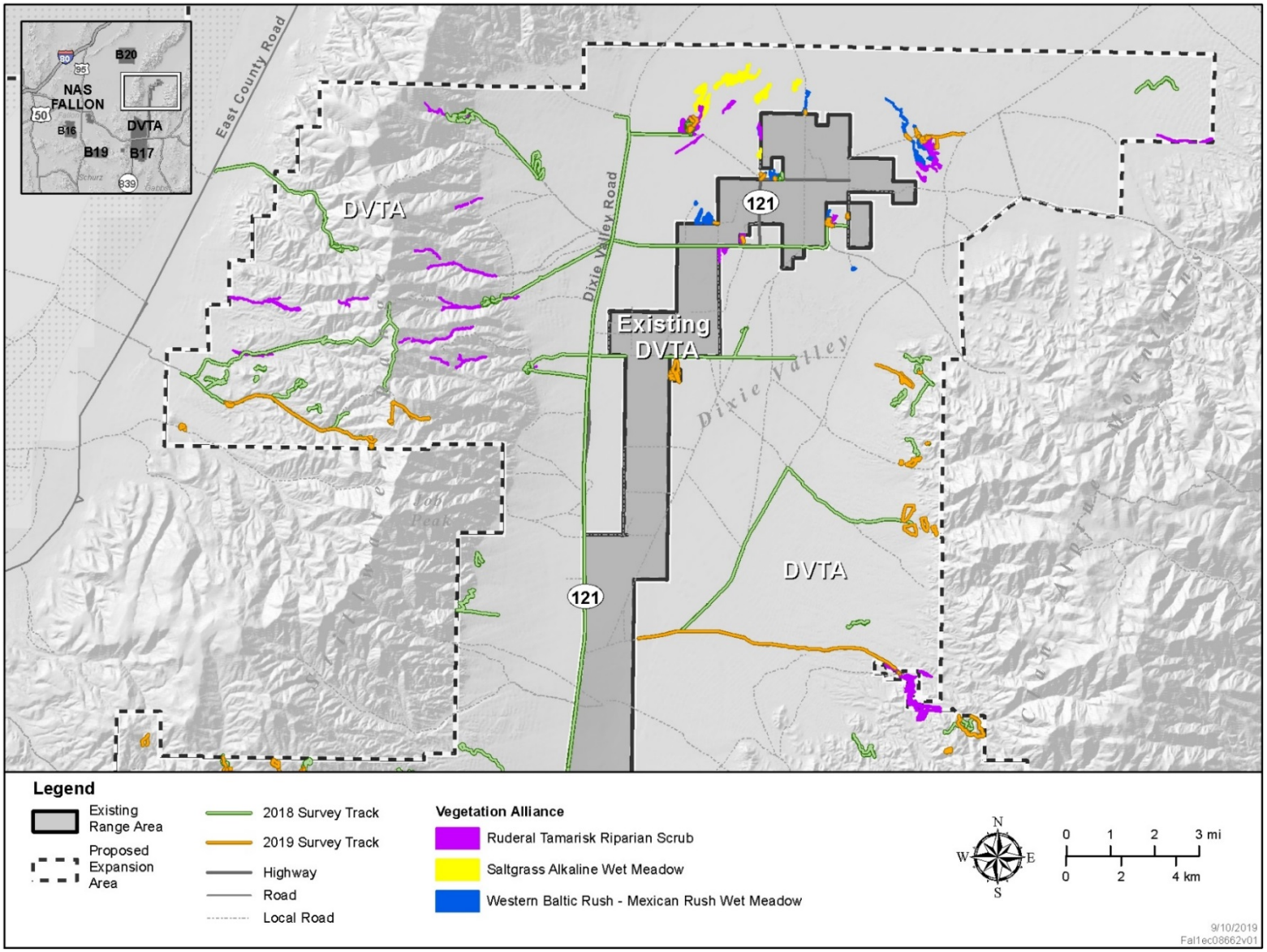

Figure 4-1. Wetland and Riparian Vegetation Alliances Supporting Potential Amphibian Habitat within the Proposed Northern DVTA Expansion Area

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APPENDIX A: Nevada Department of Wildlife Scientific Collection/Possession/Education Permit – Application and Issued Permit

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APPLICATION
SCIENTIFIC COLLECTION/POSSESSION/EDUCATION PERMIT

[Check one]: [X] **1 Year Permit** **$50.00 – (22.85)**
[ ] **2 Year Permit** **$100.00 – (22.92)**

PROCESSING TIME: All applications will be routed for review and approval, which can take up to 6 weeks, depending on complexity and Division recommendations.

- Please **PRINT** all information **except for your signature**. Incomplete or illegible applications will be returned.
- SLAP Entity ID (Special Permit and License ID) - New applicants SLAP ID will be assigned when the permit is issued.
- Federal Tax ID or SSN only required for new applicants.

PURPOSE: (check one) [X] Scientific [ ] Educational

I hereby make application for:

[ ] New application: Complete the entire applicant information block and all sections. Sign and date the application. **Do not send fee until notified of approval.**

[X] Renewal of last year's PERMITTED projects **with changes** or new projects: Complete the entire applicant information block and then complete all other sections in the application where changes are being requested. CLEARLY DESCRIBE CHANGES. Sign and date the application. **Do not send fee until notified of approval.**

[ ] Renewal of last year's PERMITTED projects **without changes**: Complete the entire applicant information block. Sign and date the application. **Do not send fee until notified of approval.**

INSTITUTION OR BUSINESS ENTITY INFORMATION- (Institution or business entity the permit is for.)

INSTITUTION OR BUSINESS ENTITY NAME: (If same as responsible party indicate SAME) ManTech International Corporation			SLAP Entity ID
MAILING ADDRESS: 420 Stevens Ave., Suite 300			FEDERAL TAX ID: 22-1852179
CITY: Solana Beach	STATE: CA	ZIP: 92075	E-MAIL ADDRESS:
PHYSICAL ADDRESS: Same as mailing address			
CITY:	STATE:	ZIP:	TELEPHONE:

RESPONSIBLE PARTY– Person responsible for permit

NAME [LAST] Spaulding	[FIRST] Rick	[MIDDLE]		SLAP Entity ID
MAILING ADDRESS: 6765 NE Day Rd.				SSN
CITY: Bainbridge Island	STATE: WA	ZIP: 98110	E-MAIL ADDRESS: rick.spaulding@mantech.com	
PHYSICAL ADDRESS: Same as mailing address				
CITY:	STATE:	ZIP:	TELEPHONE: 206-855-4997	
HEIGHT:	WEIGHT:	HAIR:	EYES:	GENDER:
DRIVER'S LICENSE NUMBER		STATE: WA		DATE ISSUED: 31 Aug 2016
OCCUPATION: Sr Wildlife Biologist/Project Manager		EMPLOYER: ManTech International Corporation		
WORK ADDRESS: Same as mailing address				

1. In the table below, list the species and number of each that you intend to capture and possess, kill, band and release, etc. by each specific capture situation(C.S.)/method. Do not combine several capture situations with a single number; e.g. "200 - - a, b, c, d." Provide a specific number with each capture situation/method. (See example below in table.) If animals are intended to be euthanized we need a euthanasia protocol and a copy of IACUC review for the project.

Capture Situations/Methods:
a. Salvage specimens found dead.
b. Capture live specimens, transport and maintain alive in captivity.
c. Collect/capture specimens and sacrifice on-site.
d. Capture, identify, sample, mark, and release at the site where taken.
e. Other (specify): _____

Species (common & scientific names)	#/Site/ Year	C.S.	**Species** (common & scientific names)	#/Site/ Year	C.S.
(Example*): Pahrump Killifish* *Empetrichthys latos*	*10* - - - - - - *15*	*b* - - - - - - *c*			
	[See attached pages]				

2. Give dates and locations of sampling or educational activity. Provide your best estimate of the specific location(s) (body of water, mountain range, stream, drainage, etc.) include county as part of the location whenever possible with the dates of the proposed trapping/collecting/sampling or educational activity.
Example: Maggie Creek, Elko Co.; June – Aug, 2007; Monitor Range, Nye Co.; Nov – Dec, 2007

Various locations in Churchill, Mineral, and Nye counties; Apr - July 2019; see attached pages - Figure 1.

3. Provide the purpose and justification for this project request. Attach a synopsis of this project, not exceeding 5 pages, of the research or educational project being proposed, including methods of capture and the names of additional collectors/agents. Also, describe your qualifications.

[See attached pages]

4. Disposition: Name and address of the public, scientific, or educational institution(s) to which all specimens will be transferred.

Museum of Natural History, University of Nevada, Reno
1664 N. Virginia St.
Reno, NV 89557

5. Federal Permits: Attach a copy of your federal permit, issued by the U.S. Fish and Wildlife Service, which is valid for Nevada (required for threatened or endangered wildlife and migratory birds unless specifically exempted by the Service).

I, the signator, in signing this application, hereby state that I am entitled to this permit under the laws of the State of Nevada and that no false information or false statement has been made by me to obtain this license.

_____ 20 November 2018
Signature of Applicant Date

Do not send fee until notified of approval.

Submit your completed application to*:*
Nevada Department of Wildlife
License Office – Scientific Collection

FOR DEPARTMENT USE ONLY
Date Received: _____
Date Returned for Add'l Information: _____
Date Approved: _____
Date Disapproved: _____

6980 Sierra Center Pkwy, Ste-120
Reno, NV 89511

Dept. Representative:_____

REASON FOR DISAPPROVAL

1. In the table below, list the species and number of each that you intend to capture and possess, kill, band and release, etc. by each specific capture situation (CS)/method. Do not combine several capture situations with a single number; e.g. "200 - - a, b, c, d." Provide a specific number with each capture situation/method (see example below in table). If animals are intended to be euthanized we need a euthanasia protocol and a copy of IACUC review for the project.

Capture Situations/Methods (CS): a. Salvage specimens found dead.
b. Capture live specimens, transport and maintain alive in captivity.
c. Collect/capture specimens and sacrifice on-site.
d. Capture, identify, sample, mark, and release at the site where taken.
e. Other (specify): Capture, identify, and release at the site of capture.

Table 1. Wildlife Expected to be Encountered and Captured within the Survey Areas

Species (Common & Scientific Names)	*#/Site/Year*	*CS*
FISH		
Green sunfish (*Lepomis cyanellus*)	10	c, e
Largemouth bass (*Micropterus salmoides*)	5	c, e
Bluegill (*Lepomis macrochirus*)	5	c, e
Mosquito fish (*Gambusia affinis*)	5	c, e
Tui chub (*Siphateles bicolor*)	5	c, e
Brook trout (*Salvelinus fontinalis*)	5	c, e
AMPHIBIANS		
American bullfrog (*Lithobates catesbeianus*)	10	c, e
Great Basin spadefoot (*Spea intermontana*)	10	a, e
Western toad (*Anaxyrus boreas*)	10	a, e
REPTILES		
California kingsnake (*Lampropeltis californiae*)	10	a, e
Great Basin gophersnake (*Pituophis catenifer deserticola*)	10	a, e
Red racer (*Coluber flagellum piceus*)	10	a, e
Desert striped whipsnake (*Masticophis taeniatus taeniatus*)	10	a, e
Western patch-nosed snake (*Salvadora hexalepis*)	10	a, e
Great Basin rattlesnake (*Crotalus oreganos lutosus*)	10	a, e
Zebra-tailed lizard (*Callisaurus draconoides*)	20	a, e
Great Basin collared lizard (*Crotaphytus bicinctores*)	20	a, e
Long-nosed leopard lizard (*Gambelia wislizenii*)	20	a, e
Desert horned lizard (*Phrynosoma platyrhinos*)	20	a, e
Great Basin whiptail (*Aspidoscelis tigris tigris*)	20	a, e
Nevada side-blotched lizard (*Uta stansburiana nevadensis*)	20	a, e
Common sagebrush lizard (*Sceloporus graciosus*)	20	a, e
Yellow-backed spiny lizard (*Sceloporus uniformis*)	20	a, e
Western fence lizard (*Sceloporus occidentalis*)	20	a, e
SMALL MAMMALS		
White-tailed antelope ground squirrel (*Ammospermophilus leucurus*)	50	a, d
Long-tailed pocket mouse (*Chaetodipus formosus*)	50	a, d
Desert kangaroo rat (*Dipodomys deserti*)	50	a, d
Merriam's kangaroo rat (*Dipodomys merriami*)	50	a, d
Great Basin kangaroo rat (*Dipodomys microps*)	50	a, d
Ord's kangaroo rat (*Dipodomys ordi*)	50	a, d
Panamint kangaroo rat (*Dipodomys panamintinus*)	50	a, d
Sagebrush vole (*Lemmiscus curtatus*)	50	a, d
Dark kangaroo mouse (*Microdipodops megacephalus*)	50	a, d

Table 1. Wildlife Expected to be Encountered and Captured within the Survey Areas

Species (Common & Scientific Names)	*#/Site/Year*	*CS*
Pale kangaroo mouse (*Microdipodops pallidus*)	50	a, d
Longtail vole (*Microtus longicaudus*)	50	a, d
Montane meadow mouse (*Microtus montanus*)	50	a, d
Bushytail woodrat (*Neotoma cinerea*)	50	a, d
Desert woodrat (*Neotoma lepida*)	50	a, d
Northern grasshopper mouse (*Onychomys leucogaster*)	50	a, d
Southern grasshopper mouse (*Onychomys torridus*)	50	a, d
Little pocket mouse (*Perognathus longimembris*)	50	a, d
Canyon mouse (*Peromyscus crinitus*)	50	a, d
Great Basin pocket mouse (*Perognathus parvus*)	50	a, d
North American deermouse (*Peromyscus maniculatus*)	50	a, d
Pinyon deermouse (*Peromyscus truei*)	50	a, d
Western harvest mouse (*Reithrodontomys megalotis*)	50	a, d
Merriam shrew (*Sorex merriami*)	5	a, d
Water shrew (*Sorex palustris*)	5	a, d
Great Basin dwarf shrew (*Sorex tenellus*)	5	a, d
Vagrant shrew (*Sorex vagrans*)	5	a, d

3. Provide the purpose and justification for this project request. Attach a synopsis of this project, not exceeding 5 pages, of the research or educational project being proposed, including methods of capture and the names of additional collectors/agents. Also, describe your qualifications.

3.1. SYNOPSIS OF PROJECT

Naval Air Station (NAS) Fallon manages the Fallon Range Training Complex (FRTC), which currently encompasses a combination of withdrawn and acquired lands totaling approximately over 223,600 acres (ac) (90,490 hectares [ha]) of military training land located near Fallon, Nevada (Figure 1-1). The FRTC is the U.S. Department of the Navy's (hereinafter referred to as the 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 buffers required 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 684,000 ac (276,800 ha). The proposed expansion areas are broken into 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):

- The area west of B-16 is referred to herein as the proposed B-16 Expansion Area.
- The area surrounding B-20 is the proposed B-20 Expansion Area.
- The area west of B-17 and north of Highway 50 surrounding the DVTA is the proposed DVTA Expansion Area.
- The area south of B-17 and Highway 50 and east of B-17 is referred to as the proposed B-17 Expansion Area.

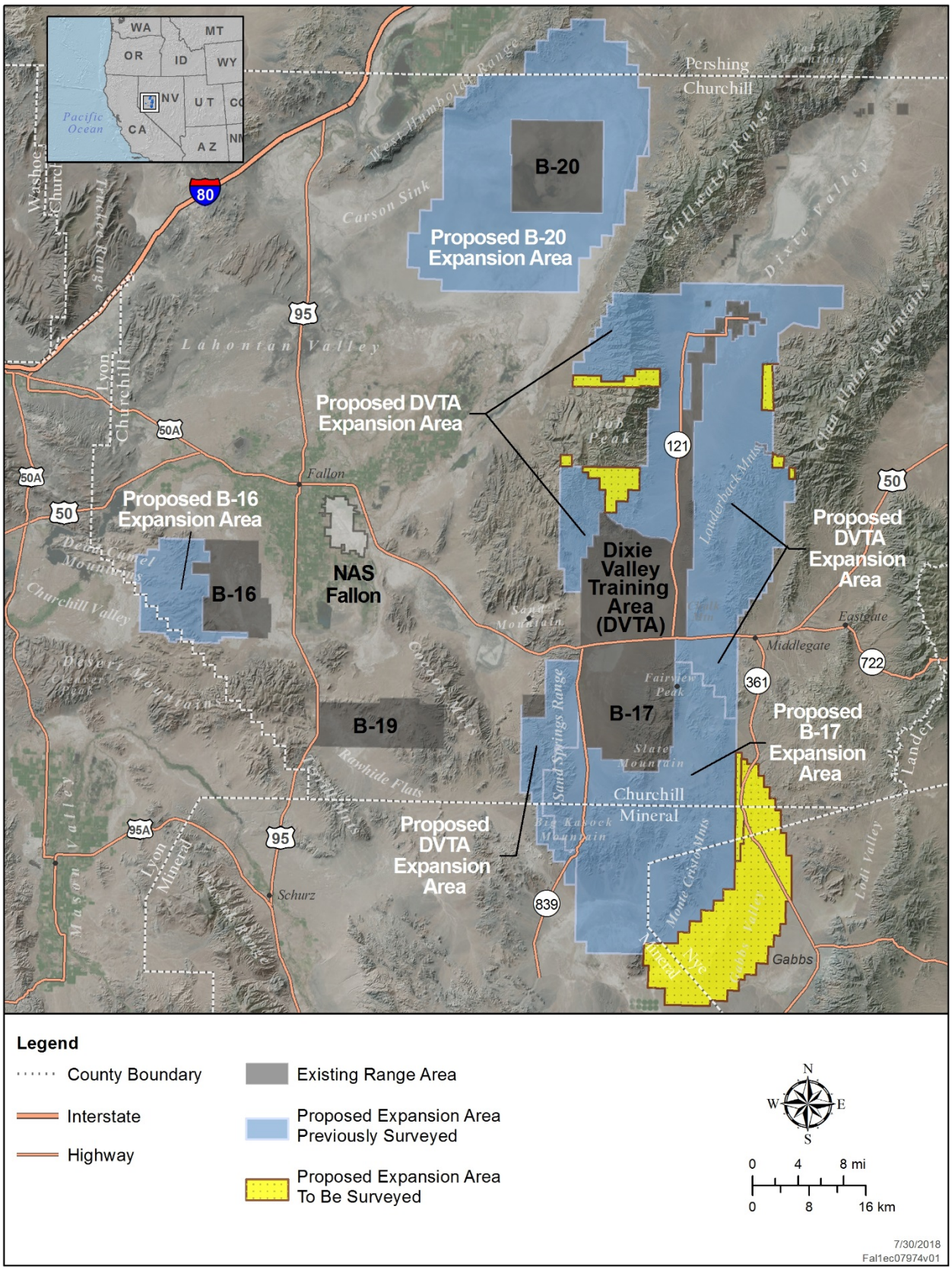

Figure 1. Regional Location of the Proposed FRTC Expansion Areas to be Surveyed in 2019

The Navy has contracted ManTech SRS Technologies, Inc. (MSRS) to perform a variety of ecological surveys to inventory the flora and fauna within the proposed FRTC expansion areas in support of the FRTC Modernization Environmental Impact Statement (EIS) being prepared in accordance with the National Environmental Policy Act (NEPA). Surveys were conducted in 2018 within the previously surveyed areas shown in Figure 1. The Navy has proposed a new EIS alternative within larger proposed expansion areas. The requested permit renewal is to support the additional surveys in support of the modified alternative of the FRTC Modernization EIS. The modified alternative added an additional 95,489 ac (38,643 ha) to the proposed withdrawal footprint which requires that the same biological surveys that were conducted for the original contract are to be conducted within the revised footprint (Figure 1).

3.2. SURVEY METHODS

The current efforts covered under this permit application include fish, reptile and amphibian, and small mammal surveys. The following provides a summary of the proposed survey methods that would be used. It should be noted that these methods are subject to change based on the field conditions and logistical constraints encountered at the time of the surveys. The purpose of all surveys is to document the presence/absence of species in the study area and not to provide a quantitative estimate of populations, productivity, habitat preference, etc. Surveys will be conducted by experienced MSRS biologists with extensive familiarity with local flora and fauna. Biologists will be proficient in the identification of all amphibians, reptiles, birds, mammals, and plants potentially present in the survey area. Survey results will be presented in survey reports submitted to the Navy per the terms of the contract and will also support the EIS discussion of the baseline conditions within the project area.

3.2.1. Fish Inventory and Habitat Assessment

A fish inventory and habitat assessment will be conducted in all suitable fish habitat in April/May. Potential suitable fish habitat will be initially identified based on the most current aerial photography and aerial reconnaissance conducted during other on-going MSRS survey efforts in the area. Fish sampling will use a combination of sampling techniques, including electrofishing, minnow-gee trapping, seining, and snorkeling. Minnow trapping and electrofishing will not be used in areas where potential sensitive species occur. Once captured, fish will be identified to the lowest taxonomic level possible, measured (standard length in millimeters), and released at the point of capture. Voucher photographs will be taken for all species captured. If field identification is not possible, a voucher specimen may be collected and transported to the lab/office for later identification. Specimens shall be curated in accordance with any necessary permits. Field-collected information will be recorded on waterproof data sheets for subsequent input into the database. Following each field data collection effort, data sheets shall be entered into the database and reviewed for accuracy. Also, data and information shall be provided to GIS for mapping purposes.

3.2.2. Reptiles and Amphibians

Visual encounter surveys will be adventitious (looking for animals while meandering through appropriate habitat) and directed (targeting habitats and methods that are suitable for certain taxa, for example using dirt rakes to search for fossorial animals, and perennial or ephemeral water sources for amphibians). Area searches will also include looking under cover objects (e.g., woody debris, rocks, man-made items) and through ground litter. In addition, road cruising surveys will be conducted when conditions are favorable for reptiles or amphibians to be active. Dead individuals (roadkill) that are encountered may be salvaged if in good condition, preserved, and curated at the Museum of Natural History, University of Nevada, Reno (UNR). If the UNR does not need the specimens, they will be provided to the Herpetology Collection, Cheadle Center for Biodiversity and Ecological Restoration, University of California, Santa Barbara.

At the start and end of each survey, surveyors will record the air temperature, ground temperature at shaded sites, ground temperature at open sites, average and maximum wind speed, cloud cover, and relative humidity. Surveyors will record time spent, distance traveled, and herpetofauna observed within each sampling event. For each species observed, approximate snout vent length (SVL), age, sex, and the ground temperature and dominant habitat at the observation site will be recorded. If the identification of an individual is not possible by simple visual observation, the individual will be captured using standard herpetological techniques (e.g., noose pole, snake hook, tongs, by hand). Identification will be confirmed either by experience or using a dichotomous key. Collected data for captured individuals will include species, SVL, age, sex, and the ground temperature at the observation site. All captured individuals will be photographed and released at the point of capture. Survey routes will be recorded via GPS.

3.2.3. Small Mammals

Small mammal trapping transects will be conducted in a minimum of five, and no more than seven, habitat communities. Each transect within a habitat community will consist of 50 traps per line, 2 traps (1 large and 1 small Sherman trap) per set location, separated by 10 m along a 240-m transect or equivalent grid spacing if the targeted habitat does not enable the necessary linear transect distance. Traps will be set prior to sunset and checked immediately the next morning. Each transect will be open, checked, and closed after one night and moved to a different location for the next trap night. The survey effort will occur in late summer/early fall of 2018 and include up to a total of 3,000 trap nights. Captured individuals will be identified to species and released at the point of capture. The requisite measurements will be collected to identify species that can only be identified by morphometrics (e.g., total length, length of tail and hind foot, height of ear, weight). Trap locations will be recorded via GPS.

3.3. SURVEY PERSONNEL

Table 2 provides a list of survey personnel, their qualifications, and the team for each survey effort.

Table 2. Proposed Survey Personnel and Qualifications

Personnel: Highest Degree and Experience	*Survey*		
	Reptiles & Amphibians	*Small Mammals*	*Fish*
Alice Abela: BS, Biology; 15 years planning and leading survey efforts in California, Arizona, and Nevada desert systems; advanced insect, amphibian, reptile, bird, mammal, and plant ID; and handling, collecting, and preparing specimens for vouchers and museum collections.	✓	✓	
Morgan Ball: BS, Ecology and Evolutionary Biology; 25 years planning and leading survey efforts in California, Arizona, and Nevada desert systems. Advanced insect, amphibian, reptile, bird, mammal, and plant ID; and handling, collecting, and preparing specimens for vouchers and museum collections.	✓	✓	
Sean Carson: BA, Environmental Studies; 8 years of experience surveying general flora and fauna in California.	✓	✓	
Danny Heilprin: MS, Marine Sciences; 32 years of experience focusing on ecological monitoring, taxonomy, and environmental impact assessments of fish and fisheries in freshwater and marine environments; freshwater experience includes fish, amphibian, and invertebrate surveys in California arid environments.			✓
Sangeet Khalsa: AA, Biology; 20 years of experience in identifying the regional flora and herpetofauna of Mojave and Great Basin desert ecosystems.	✓	✓	
John LaBonte: PhD, Herpetology, Ecology, and Evolutionary Biology; 20 years of experience planning and leading survey and collection efforts in California, Arizona and Nevada desert systems; advanced herpetofauna ID skills.	✓		
Ken Niessen: MS, Botany; over 30 years of experience in identifying the regional flora and fauna of desert ecosystems.	✓	✓	

Table 2. Proposed Survey Personnel and Qualifications

Personnel: *Highest Degree and Experience*	*Survey*		
	Reptiles & Amphibians	*Small Mammals*	*Fish*
Katrina Olthof: BS, Biology; 12 years of experience planning and leading survey efforts in California, Arizona, Nevada, Oregon, and Washington desert systems; advanced avian, herpetofauna, and mammal ID skills; and handling, collecting, and preparing specimens for vouchers and museum collections.	✓	✓	
Eli Rose: MS, Zoology; 20 years of experience in California, Nevada, and Oregon, with advanced avian and wildlife ID; and handling, collecting, and preparing specimens for vouchers and museum collections.	✓	✓	✓
*Rick Spaulding: MS, Wildlife and Fisheries Science; 22 years planning and leading survey efforts in California, Arizona, New Mexico, and Nevada desert systems; amphibian, reptile, bird, and mammal ID; and handling, collecting, and preparing specimens for vouchers and museum collections.	✓	✓	✓

*Permit Responsible Party

State of Nevada Department of Wildlife (NDOW)

6980 Sierra Center Pkwy, STE 120
Reno, NV 89511
(775) 688-1512

December 10, 2018

MAN TECH INTERNATIONAL CORPORATION
SPAULDING, RICK, Responsible Party
420 STEVENS AVE STE 300
SOLANA BEACH, CA 92075

Greetings:

This document represents your newly issued **Scientific Collection Permit 1 Year**.

IT IS THE SLAP HOLDER'S RESPONSIBILITY TO CONSULT CURRENT REGULATIONS FOR SPECIFIC REQUIREMENTS

MAN TECH INTERNATIONAL CORPORATION **Client ID: 4542980** **DOB: N/A - Entity**
420 STEVENS AVE STE 300
SOLANA BEACH, CA 92075

Special License/Permit Details:

License Year:	**2019**	Class: **2285**	License Number:	**39386**	Fee: **$ 50.00**
Date Issued:	**12/10/2018**		Issuing Agent:	**194100 - Headquarters**	
Description:	**Scientific Collection Permit 1 Year**				
Valid From:	**01/01/2019**		Valid Through:	**12/30/2019 23:59:59**	

In compliance with the conditions listed below and pursuant to provisions of NRS 503.597 & 503.650, the permittee, each permit year during the designated sampling period, is authorized to:

a) **Salvage specimens found dead**
b) **Capture live specimens, transport & maintain alive in captivity.**
c) **Collect/capture specimens & sacrifice on-site.**
d) **Capture, identify, sample, mark & release at site taken.**
e) **Capture, identify and release at site take.**

The following species and numbers per site/per year listed in Attachment I.

Authorized Sampling Area: Churchill, Mineral and Nye counties.

This permit does NOT authorize trespass and/or collecting activities on state or federal wildlife refuges or reserves, or other public and private property without the permission from landowner or custodian.

Period of Field Collection: April 1 – September 30, 2019.

Destination of Collection: Salvage specimens – Museum of Natural History, University of Nevada Reno or the Herpetology Collection Cheadle Center for Biodiversity & Ecological Restoration, University of California, Santa Barbara.

Additional Authorized Collectors: Authorized personnel under the direction of the permittee.

Note: Prior to surveys for small mammals in any area of Nevada, permittee must contact the appropriate NDOW field biologist prior to any wildlife capture or survey efforts (See Attachment for NDOW field biologists and area map).

Attachment I

Species	#'s per site/per year	C/S
FISH		
Green sunfish *(Lepomis cyanellus)*	10	c, e
Largemouth bass *(Micropterus salmoides)*	5	c, e
Bluegill *(Lepomis macrochirus)*	5	c, e
Mosquito fish *(Gambusia affinis)*	5	c, e
Tui chub *(Siphateles bicolor)*	5	c, e
Brook trout *(Salvelinus fontinalis)*	5	c, e
AMPHIBIANS		
American bullfrog *(Lithobates catesbeianus)*	10	c, e
Great Basin spadefoot *(Spea intermontana)*	10	a, e
Western toad *(Anaxyrus boreas)*	10	a, e
REPTILES		
California kingsnake *(Lampropeltis californiae)*	10	a, e
Great Basin gophersnake *(Pituophis catenifer deserticola)*	10	a, e
Red racer *(Coluber flagellum piceus)*	10	a, e
Desert striped whipsnake *(Masticophis taeniatus taeniatus)*	10	a, e
Western patch-nosed snake *(Salvadora hexalepis)*	10	a, e
Great Basin rattlesnake *(Crotalus oreganos lutosus)*	10	a, e
Zebra-tailed lizard *(Callisaurus draconoides)*	20	a, e
Great Basin collared lizard *(Crotaphytus bicinctores)*	20	a, e
Long-nosed leopard lizard *(Gambelia wislizenii)*	20	a, e
Desert horned lizard *(Phrynosoma platyrhinos)*	20	a, e
Great Basin whiptail *(Aspidoscelis tigris tigris)*	20	a, e
Nevada side-blotched lizard *(Uta stansburiana nevadensis)*	20	a, e
Common sagebrush lizard *(Sceloporus graciosus)*	20	a, e
Yellow-backed spiny lizard *(Sceloporus uniformis)*	20	a, e
Western fence lizard *(Sceloporus occidentalis)*	20	a, e
SMALL MAMMALS		
White-tailed antelope ground sguirrel *(Ammospermophilus leucurus)*	50	a, d
Long-tailed pocket mouse *(Chaetodipus formosus)*	50	a, d
Desert kangaroo rat *(Dipodomys deserti)*	50	a, d
Merriam's kangaroo rat *(Dipodomys merriami)*	50	a, d
Great Basin kangaroo rat *(Dipodomys microps)*	50	a, d
Ord's kangaroo rat *(Dipodomys ordi)*	50	a, d
Panamint kangaroo rat *(Dipodomys panamintinus)*	50	a, d
Sagebrush vole *(Lemmiscus curtatus)*	50	a, d
Dark kangaroo mouse *(Microdipodops megacephalus)*	50	a, d
Pale kangaroo mouse *(Microdipodops pallidus)*	50	a, d
Long-tailed vole *(Microtus longicaudus)*	50	a, d
Montane meadow mouse *(Microtus montanus)*	50	a, d
Bushy-tailed woodrat *(Neotoma cinerea)*	50	a, d
Desert woodrat *(Neotoma lepida)*	50	a, d
Northern grasshopper mouse *(Onychomys leucogaster)*	50	a, d
Southern grasshopper mouse *(Onychomys torridus)*	50	a, d
Little pocket mouse *(Perognathus longimembris)*	50	a, d
Canyon mouse *(Peromyscus crinitus)*	50	a, d
Great Basin pocket mouse *(Perognathus parvus)*	50	a, d
North American deer mouse *(Peromyscus maniculatus)*	50	a, d
Pinyon deer mouse *(Peromyscus truei)*	50	a, d
Western harvest mouse *(Reithrodontomys megalotis)*	50	a, d
Merriam shrew *(Sorex merriami)*	5	a, d
Water shrew *(Sorex palustris)*	5	a, d
Great Basin dwarf shrew *(Sorex tenellus)*	5	a, d
Vagrant shrew *(Sorex vagrans)*	5	a, d

CONDITIONS:

A copy of this permit and any permits required by the U.S. Fish and Wildlife Service must be in the possession of the permittee and any authorized collectors while conducting collection/salvage activities. The permittee must comply with all terms, conditions and restrictions of the federal permit. This permit is invalid for the taking, collection, or salvage of migratory birds, threatened or endangered species, absent any permit required by the Service for that activity.

Activities authorized under this permit to collect and/or possess wildlife, parts thereof, or their progeny, shall be in compliance with all other state and federal regulations.

All specimens authorized under the authority of this permit, including offspring, are property of the State of Nevada and as such, they shall not be sold, bartered, traded, converted to personal use or otherwise disposed of without written approval of the Department except provided under Destination of Collection. This condition remains in effect indefinitely.

No fee may be charged to the public for the privilege to view wildlife which is held under the authority of this permit.

Permit Cancellation: A violation of a condition or stipulation is cause for the cancellation of the permit.

REPORTING REQUIREMENTS:

Annual Report: A record will be created for each specimen (or group of specimens of a single species) taken at each site locality. "Taken" means salvaged; captured & released; collected; banded; trapped & killed; seined; netted; snared; sacrificed; reduced to possession; etc. The following information will be recorded for each specimen taken: By date, the number of specimens of each species taken; species name; the habitat type where each specimen was taken; numeric breakdown of sex whenever possible; and a description of the location where each specimen was taken, by the following method: (Don't use common geographic names)

– UTM Coordinates, NAD 83, Zone 11, rounded to the nearest meter;

The records must be submitted to the Nevada Department of Wildlife, License Office – Scientific Collection Report, 6980 Sierra Center Pkwy, Suite 120, Reno, NV 89511, by 1/30/20 for 2019 "take" activities. Digital reports in Excel spreadsheet (preferred) or Quattro Pro are accepted (please follow column sequence as outlined in the Department report form, 22.85 5.)

A copy of all pertinent research or technical papers must be submitted to the Department

STATE OF NEVADA – DEPARTMENT OF WILDLIFE **SLAP 22.85-5**

SCIENTIFIC COLLECTION REPORT FORM

Submit To: Nevada Department of Wildlife, License Office, 6980 Sierra Center Parkway, Ste-120, Reno, NV 89511

NOTE: Consult your permit for the DUE date.

(Digital reports in Quattro Pro or Excel spreadsheet (*preferred*) are accepted; use column & data sequence as outlined below.)

Permittee's Name: Rick Spaulding – ManTech International Corp Permit Number: 39386 Page _____ of _____

Date of Capture/ Collection (m/d/yy)	Species Name (*Common & Scientific Name*)	Number Taken by Method A. Salvage of dead specimens B. Live-trap, maintain live C. Sacrifice (in field or lab) *D. Capture & Release				Specify the Location of "take" by: *(-No Common Names-)* 1. UTM's, NAD 83, Zone 11 rounded to the nearest meter ,*OR* 2. Longitude & latitude, WGS 84, in *decimal-degrees* to 4 places (117°.2635); *OR* 3. Township/Range/ & *1/4* Section.	Habitat (Key on Reverse)	Number by Sex		
		A.	B.	C.	D.			M	F	Unk

* **D.--Capture & Release (*includes* any banding, marking, tagging, etc.)**

--Turn Over For Habitat Key--

Habitat KEY For Scientific Collection Reports

Key No.	Habitat Type
1.	Salt desert scrub
2.	Joshua tree woodland
3.	Creosote scrub
4.	Sagebrush scrub
5.	Mountain brush
6.	Yellow pine, white fir
7.	Lodgepole pine, red fir
8.	Pinyon-juniper
9.	Subalpine
10.	Alpine tundra
11.	Riparian (A=Aspen; C=Cottonwood; N=Native Hay; W=Willow)
12.	Springs
13.	Playa
14.	Marsh
15.	Urban
16.	Cave
17.	Rock Outcrop
18.	Artificial (Describe:_____)
19.	Other (Describe:_____)

APPENDIX B: Summary of Amphibian and Reptile Detections by Survey Period and Proposed FRTC Expansion Area

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Table B-1. Amphibian and Reptile Counts within the Proposed B-16 Expansion Area by 2018 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	5	Total Detections
Amphibians	American bullfrog	0	0	0	0	0	0	**0**
Snakes	California kingsnake	0	0	0	0	0	0	**0**
	Red racer	0	0	0	0	0	0	**0**
	Desert striped whipsnake	0	0	0	2	0	0	**2**
	Great Basin gophersnake	0	0	0	0	0	0	**0**
	Western groundsnake	0	0	0	0	0	0	**0**
	Western patch-nosed snake	0	0	1	0	0	0	**1**
	Great Basin rattlesnake	1	0	0	0	0	0	**1**
	Snake Skin - unidentified	0	0	0	1	0	0	**1**
	Snakes Subtotal	**1**	**0**	**1**	**3**	**0**	**0**	**5**
Lizards	Great Basin collared lizard	0	9	10	19	28	0	**66**
	Long-nosed leopard lizard	1	3	2	1	1	0	**8**
	Northern zebra-tailed lizard	0	9	1	2	13	0	**25**
	Desert horned lizard	3	7	2	1	0	0	**13**
	Northern sagebrush lizard	0	0	0	0	0	0	**0**
	Yellow-backed spiny lizard	6	4	0	9	11	0	**30**
	Great Basin fence lizard	0	5	0	28	9	0	**42**
	Sceloporus sp.	1	0	0	0	0	0	**1**
	Nevada side-blotched lizard	2	34	10	28	32	0	**106**
	Great Basin whiptail	1	3	0	1	0	0	**5**
	Lizards Subtotal	**14**	**74**	**25**	**89**	**94**	**0**	**296**

Table B-2. Amphibian and Reptile Counts within the Proposed B-17 Expansion Area by 2018 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	5	Total Detections
Amphibians	American bullfrog	0	0	0	0	0	0	**0**
Snakes	California kingsnake	0	0	0	0	0	0	**0**
	Red racer	0	0	0	0	0	0	**0**
	Desert striped whipsnake	0	0	0	0	0	0	**0**
	Great Basin gophersnake	2	1	0	0	1	0	**4**
	Western groundsnake	0	0	0	0	0	0	**0**
	Western patch-nosed snake	2	0	0	0	0	0	**2**
	Great Basin rattlesnake	1	1	0	0	0	1	**3**
	Snake Skin - unidentified	0	1	0	0	0	1	**2**
	Snakes Subtotal	**5**	**3**	**0**	**0**	**1**	**2**	**11**
Lizards	Great Basin collared lizard	0	1	28	0	0	1	**30**
	Long-nosed leopard lizard	1	2	9	0	7	3	**22**
	Northern zebra-tailed lizard	8	7	16	0	20	11	**62**
	Desert horned lizard	3	7	1	0	1	1	**13**
	Northern sagebrush lizard	0	0	0	0	0	0	**0**
	Yellow-backed spiny lizard	4	1	0	2	0	12	**19**
	Great Basin fence lizard	4	1	43	0	0	37	**85**
	Sceloporus sp.	0	0	0	0	0	0	**0**
	Nevada side-blotched lizard	6	38	35	7	24	9	**119**
	Great Basin whiptail	2	4	20	0	6	1	**33**
	Lizards Subtotal	**28**	**61**	**152**	**9**	**58**	**75**	**383**

Table B-3. Amphibian and Reptile Counts within the Proposed B-20 Expansion Area by 2018 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	5	Total Detections
Amphibians	American bullfrog	0	0	0	0	0	0	**0**
Snakes	**Snakes Subtotal**	0	0	0	0	0	0	**0**
Lizards	Great Basin collared lizard	0	0	0	11	9	0	**20**
	Long-nosed leopard lizard	3	0	0	6	11	0	**20**
	Northern zebra-tailed lizard	8	0	0	59	34	0	**101**
	Desert horned lizard	1	0	0	2	2	0	**5**
	Northern sagebrush lizard	0	0	0	0	0	0	**0**
	Yellow-backed spiny lizard	0	1	0	4	9	0	**14**
	Great Basin fence lizard	0	0	0	0	0	0	**0**
	Sceloporus sp.	0	0	0	0	0	0	**0**
	Nevada side-blotched lizard	1	1	0	6	15	0	**23**
	Great Basin whiptail	0	0	0	3	1	0	**4**
	Lizards Subtotal	**13**	**2**	**0**	**91**	**81**	**0**	**187**

Table B-4. Amphibian and Reptile Counts within the Proposed DVTA Expansion Area by 2018 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	5	Total Detections
Amphibians	American bullfrog	3	27	0	0	0	0	30
Snakes	California kingsnake	0	0	0	0	0	1	1
	Red racer	1	0	1	0	1	1	4
	Desert striped whipsnake	1	1	0	0	0	1	3
	Great Basin gophersnake	2	1	2	0	0	1	6
	Western groundsnake	3	2	1	0	0	0	6
	Western patch-nosed snake	0	0	1	0	0	0	1
	Great Basin rattlesnake	5	3	2	1	1	4	16
	Snake Skin - unidentified	1	0	0	1	0	2	4
	Snakes Subtotal	**13**	**7**	**7**	**2**	**2**	**10**	**41**
Lizards	Great Basin collared lizard	1	0	44	34	16	42	137
	Long-nosed leopard lizard	9	0	10	13	8	20	60
	Northern zebra-tailed lizard	12	0	0	2	21	61	96
	Desert horned lizard	4	1	4	3	0	9	21
	Northern sagebrush lizard	3	49	5	2	0	1	60
	Yellow-backed spiny lizard	15	25	17	15	20	12	104
	Great Basin fence lizard	12	8	71	71	36	96	294
	Sceloporus sp.	0	2	2	0	0	0	4
	Nevada side-blotched lizard	26	42	20	78	52	151	369
	Great Basin whiptail	6	4	31	12	3	12	68
	Lizards Subtotal	**88**	**131**	**204**	**230**	**156**	**404**	**1,213**

Table B-5. Amphibian and Reptile Counts within the Proposed B-16 Expansion Area by 2019 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	Total Detections
Lizards	Long-nosed leopard lizard	1	0	0	0	0	1
	Desert horned lizard	6	0	0	0	0	6
	Nevada side-blotched lizard	5	0	0	0	0	5

Table B-6. Amphibian and Reptile Counts within the Proposed B-17 Expansion Area by 2019 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	Total Detections
Snakes	Great Basin gophersnake	0	0	0	0	1	1
	Western ground snake	0	0	0	0	1	1
Lizards	Great Basin collared lizard	0	0	0	2	0	2
	Long-nosed leopard lizard	12	7	7	0	16	42
	Northern zebra-tailed lizard	3	39	14	1	51	108
	Desert horned lizard	12	11	0	1	10	34
	Great Basin fence lizard	0	0	0	1	7	8
	Nevada side-blotched lizard	1	9	5	11	35	61
	Great Basin whiptail	2	8	7	5	70	92

Table B-7. Amphibian and Reptile Counts within the Proposed DVTA Expansion Area by 2019 Survey Period

Species		Incidental Detections	Survey Period 1	2	3	4	Total Detections
Amphibians	American bullfrog	0	2	4	9	3	18
	Great Basin spadefoot	3	1	0	0	0	4
Snakes	Red racer	0	0	2	0	0	2
	Great Basin gophersnake	3	0	0	0	1	4
	Western ground snake	2	1	0	0	0	3
	Western patch-nosed snake	0	0	0	0	1	1
	Great Basin rattlesnake	2	0	0	0	0	2
Lizards	Great Basin collared lizard	8	2	34	2	34	80
	Long-nosed leopard lizard	8	8	13	1	6	36
	Northern zebra-tailed lizard	1	4	1	0	3	9
	Desert horned lizard	3	4	5	0	3	15
	Northern sagebrush lizard	0	0	13	1	6	20
	Yellow-backed spiny lizard	0	1	2	0	2	5
	Great Basin fence lizard	6	10	153	0	84	253
	Nevada side-blotched lizard	7	30	8	5	30	80
	Great Basin whiptail	8	2	4	0	26	40

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APPENDIX C: Summary of Amphibian and Reptile Detections and Survey Effort within Each Vegetation Alliance

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Table C-1. Summary of Total Distance Surveyed within Each Vegetation Alliance and Number of Survey and Incidental Detections during 2018 and 2019 Surveys within Proposed FRTC Expansion Areas

Vegetation Alliance	Survey Distance (mi)	Survey Detections	Incidental Detections	Total Detections	Survey Detections/mi Surveyed
Ruderal Tamarisk Riparian Scrub	14.17	120	11	131	8.5
Arroyo Willow Wet Shrubland	2.71	18	3	21	6.6
Great Basin Singleleaf Pinyon - Utah Juniper/Shrub Woodland	58.64	286	17	303	4.9
Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	14.51	55	8	63	3.8
Black Sagebrush Steppe & Shrubland	81.53	305	10	315	3.7
Western Baltic Rush - Mexican Rush Wet Meadow	5.38	19	5	24	3.5
Wyoming Big Sagebrush Dry Steppe & Shrubland	45.16	145	5	150	3.2
Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	2.00	6	1	7	3.0
Nevada Joint-fir Scrub	2.14	6	0	6	2.8
Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland	19.51	44	1	45	2.2
Shadscale Saltbush Scrub	14.63	31	3	34	2.1
Bailey's Greasewood Shrubland	509.92	1,083	103	1,186	2.1
Utah Juniper / Shrub Woodland	25.97	41	5	46	1.6
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	90.39	147	20	167	1.6
Mojave Seablite - Red Swampfire Alkaline Wet Scrub	77.68	127	8	135	1.6
Cheatgrass Ruderal Grassland	15.69	24	0	24	1.5
Intermountain Greasewood Wet Shrubland	131.73	165	30	195	1.2
Microphytic Playa	8.06	7	2	9	0.9
Fremont's Smokebush - Nevada Smokebush Desert Wash Scrub	8.67	8	7	15	0.9
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	5.03	3	2	5	0.6
Fourwing Saltbush - Rubber Rabbitbrush Desert Wash	0.05	0	0	0	0
Winterfat Steppe Dwarf Shrubland	0.24	0	2	2	0
Saltgrass Alkaline Wet Meadow	0.87	0	3	3	0
Western Wildrye Alkaline Wet Meadow	0.10	0	0	0	0

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