Final Avian Survey Report in Support of the Proposed Fallon Range Training Complex Expansion, Nevada



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Cover - <u>Left</u>: Brewer's sparrow (*Spizella breweri*). <u>Upper right</u>: Black-throated sparrow (*Amphispiza bilineata*). <u>Lower right</u>: Chipping sparrow (*Spizella passerina*). All photos by E. Rose.

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Acronyms and Abbreviations

ас	acre(s)
BCC	Bird of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
°C	degrees Celsius
DoN	Department of the Navy
DVTA	Dixie Valley Training Area
°F	degrees Fahrenheit
FRTC	Fallon Range Training Complex
ft	foot/feet
GBBO	Great Basin Bird Observatory
GIS	geographic information system
GPS	global positioning system
ha	hectare(s)
km	kilometer(s)
m	meter(s)
NAS	Naval Air Station
NNHP	Nevada Natural Heritage Program
U.S.	United States
USFWS	U.S. Fish and Wildlife Service
WAP	Wildlife Action Plan

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1.0 INTRODUCTION

Naval Air Station (NAS) Fallon manages the Fallon Range Training Complex (FRTC), which currently encompasses a combination of withdrawn and acquired lands totaling approximately over 223,600 acres (ac) (90,490 hectares [ha]) of military training land located southeast of Fallon, Nevada (Figure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 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 diurnal and nocturnal avian surveys conducted in 2016-2017 under contract N62742-14-D-1863, Task Order FZNG and in 2018-2019 under Task Order FZNG, Modification 4 (Figure 1-1).

The project 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 mountains 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 ranges. This desert covers 158,000 square miles (409,218 square kilometers [km]) of southern Idaho, southeastern Oregon, western Utah, eastern California, and nearly all of Nevada (MacMahon 1985) (Figure 1-2). The Great Basin is a high cold desert, with most of it over 4,000 feet (ft) (1,200 meters [m]). Precipitation is primarily 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



Figure 1-2. Occurrence of the Great Basin within the Western United States

2.0 BACKGROUND

2.1 Vegetation Communities

Vegetation communities within Nevada typically align with its diverse topography, transitioning from one type to another as rainfall increases and temperature decreases from valley bottoms to mountain peaks. Vegetation communities occurring within the proposed FRTC expansion areas can be grouped into several distinct types: salt desert scrub (dominated by shrubs and sub-shrubs in the Chenopodiaceae family), sagebrush (*Artemisia* spp.), sagebrush grassland, and pinyon-juniper woodland (trees dominated by *Pinus monophyla* and *Juniperus* spp.). Salt desert scrub is characterized by shadscale (*Atriplex confertifolia*) and greasewood (*Sarcobatus* spp.) which are well adapted to high salt levels and drought conditions. At somewhat higher elevations and on well-drained soils, salt desert scrub transitions into sagebrush (*A. nova*), Mormon tea (*Ephedra* spp.), antelope bitterbrush (*Purshia tridentata*), spiny hopsage (*Grayia spinosa*), and desert gooseberry (*Ribes velutinum*). These species typically require higher annual precipitation levels. The vegetation alliances referenced in this survey report are based on the vegetation community mapping that was done as another task order in support of the ecological surveys conducted within the proposed FRTC expansion areas (DoN 2019).

Although various vegetation communities within the proposed FRTC expansion areas are resistant to the environmental extremes of the Great Basin Desert, changes in the fire regime, overgrazing, and/or agricultural conversion can affect wildlife habitats and take decades if not centuries to reestablish. The encroachment of native invasive species, such as Utah juniper (*Juniperus osteosperma*), or nonnative invasive species, such as Utah juniper (*Juniperus osteosperma*), or nonnative invasive species, such as cheatgrass (*Bromus tectorum*), can alter the density of shrub species and otherwise negatively impact habitats. Many native plants of the Great Basin Desert are not adapted to frequent fire and cannot recover quickly, particularly when fire frequency exceeds the pre-historical norm. Cheatgrass, in contrast, recovers from fire very rapidly and takes advantage of the low-competition, high-nutrient, and ample light in post-fire conditions to rebound in even greater numbers, thereby further increasing the likelihood of future fires and reducing wildlife diversity (Young and Tipton 1990; U.S. Fish and Wildlife Service [USFWS] 2014a).

2.2 Avian Species

A total of over 480 species of birds have been recorded in Nevada and of these, approximately 252 species are known to currently breed within the state. Many of Nevada's breeding birds are landbirds, but a large percentage are shorebirds and waterbirds, relying heavily on water bodies in the U.S.'s driest state, which may only see 9 inches (23 centimeters) of precipitation in a year (Great Basin Bird Observatory [GBBO] 2010). Important Bird Areas (IBAs) have been designated by the Audubon Society to highlight the most important conservation landscapes for bird diversity in the state, with emphasis on species of conservation priority. Nevada contains 4 global IBAs, as recognized by BirdLife International (Devenish et al. 2009), and 38 state IBAs (Lahontan Audubon Society 2018). Notably, the Lahontan Valley Wetlands State IBA includes more than 430,500 ac (174,220 ha) of the Lahontan Valley and extends from the vicinity of the Lahontan Reservoir into the Carson Sink, encompassing the town of Fallon, the Stillwater and Fallon National Wildlife Refuges, and the southwestern portion of the proposed B-20 expansion area. This IBA includes wetlands that are among the most important waterfowl breeding and migratory sites in Nevada and that are critical to many species that use the Pacific Flyway—the major north-south migratory flyway extending from Alaska to Patagonia (Neel and Henry 1987).

Table 2-1 provides a list of special-status species that are known to or potentially occur within the proposed FRTC expansion areas, which are located within portions of Churchill, Nye, Mineral, Pershing, and Lyon counties. For the purposes of the current survey efforts, special-status species are defined as:

- Species listed under the Endangered Species Act (ESA).
- Species listed as Sensitive by the Bureau of Land Management (BLM), Carson City District (BLM 2017).
- Bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) pursuant to the Bald and Golden Eagle Protection Act (BGEPA).
- Birds of Conservation Concern as identified by the USFWS as species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the ESA. The survey area falls within Bird Conservation Region 9, Great Basin (USFWS 2008).
- Species listed as threatened, endangered, sensitive, or otherwise protected by the State of Nevada under Nevada Administrative Code.
- Species listed as Species of Conservation Priority in the 2013 Nevada Wildlife Action Plan (WAP) (Nevada WAP Team 2013).
- Species ranked by the Nevada Natural Heritage Program (NNHP) as critically imperiled, imperiled, or vulnerable (NNHP 2018). The NNHP has identified many avian species that could be declining within the state, some of which are known to occur within the proposed FRTC expansion areas. The NNHP collects information on at-risk, rare, state-listed, and federally listed avian species that are deemed sensitive as a result of habitat fragmentation, climate change, human development, fire, and/or grazing practices

A total of 40 special-status bird species are known to or potentially occur within the proposed FRTC expansion areas (Table 2-1). Of these 40 species, 30 have been documented as occurring on existing Navyadministered FRTC lands. In addition, all of the special-status bird species except for the greater sagegrouse (*Centrocercus urophasianus*) and mountain quail (*Oreortyx pictus*) are listed under the Migratory Bird Treaty Act (MBTA). This survey report aims to establish baseline information about these species in addition to other commonly encountered species found within the proposed FRTC expansion areas.

		Stat	tus*		NNHP Climate Change
Common Name (Scientific Name)	USFWS	BLM	State	NNHP	Vulnerability Index
American avocet (Recurvirostra americana)	MBTA	-	WAP	S4B	Presumed stable
American white pelican (Pelecanus erythrorhynchos)	MBTA	-	WAP	S2B	Moderately vulnerable
Bald eagle (Haliaeetus leucocephalus)	BCC, BGEPA, MBTA	S	E, WAP	\$1B,\$3N	Presumed stable
Black rosy-finch (Leucosticte atrata)	MBTA, BCC	S	WAP	S3	Highly vulnerable
Black tern (Chlidonias niger)	MBTA	-	WAP	S2S3B	Presumed stable
Brewer's sparrow (Spizella breweri)	MBTA, BCC	S	S, WAP	S4B	Moderately vulnerable
Canvasback (Aythya valisineria)	MBTA	-	WAP	S3S4	Presumed stable
Cassin's finch (Carpodacus cassinii)	MBTA	-	WAP	S5	Presumed stable
Common nighthawk (Chordeiles minor)	MBTA	-	WAP	S5B	Presumed stable
Dusky grouse (Dendragapus obscurus)	MBTA	-	PB, WAP	S3	Presumed stable
Eared grebe (Podiceps nigricollis)	MBTA, BCC	-	-	S4B	Presumed stable
Ferruginous hawk (Buteo regalis)	MBTA, BCC	S	WAP	S2	Presumed stable
Flammulated owl (Psiloscops flammeolus)	MBTA, BCC	S	WAP	S4B	Presumed stable
Golden eagle (Aquila chrysaetos)	BCC, BGEPA, MBTA	S	WAP	S4	Presumed stable
Gray-crowned rosy-finch (Leucosticte tephrocotis)	MBTA	S	WAP	S3N	Highly vulnerable
Great Basin willow flycatcher (Empidonax traillii adastus)	MBTA, BCC	S	WAP	S1S2	Presumed stable
Greater sage-grouse (Centrocercus urophasianus)	BCC	S	WAP	S3	Highly vulnerable
Green-tailed towhee (Pipilo chlorurus)	MBTA, BCC	-	-	S5B	Presumed stable
Least bittern (Ixobrychus exilis)	MBTA	S	WAP	S2B	Presumed stable
Lewis's woodpecker (Melanerpes lewis)	MBTA, BCC	S	WAP	S3	Presumed stable
Loggerhead shrike (Lanius Iudovicianus)	MBTA, BCC	S	S, WAP	S4	Presumed stable
Long-billed curlew (Numenius americanus)	MBTA, BCC	-	WAP	S2S3B	Presumed stable
Long-billed dowitcher (Limnodromus scolopaceus)	MBTA	-	WAP	S4	Presumed stable
Mountain quail (Oreortyx pictus)	-	S	PB, WAP	S3	Presumed stable
Northern goshawk (Accipiter gentilis)	MBTA	S	S, WAP	S2	Moderately vulnerable
Northern pintail (Anas acuta)	MBTA	-	WAP	S5	Presumed stable
Olive-sided flycatcher (Contopus cooperi)	MBTA	-	WAP	S2B	Increase likely
Peregrine falcon (Falco peregrinus)	MBTA, BCC	S	E, WAP	S2	Presumed stable
Pinyon jay (Gymnorhinus cyanocephalus)	MBTA, BCC	S	WAP	S3S4	Presumed stable

Table 2-1. Known or Potential Occurrence of Special-status Bird Species within the Proposed FRTC Expansion Areas

·		Stat	NNHP Climate Change		
Common Name (Scientific Name)	USFWS	BLM	State	NNHP	Vulnerability Index
Prairie falcon (Falco mexicanus)	MBTA	-	WAP	S4	Presumed stable
Redhead (Aythya americana)	MBTA	-	WAP	S4B	Presumed stable
Sagebrush sparrow (Artemisiospiza nevadensis)	MBTA, BCC	-	WAP	-	Not assessed
Sage thrasher (Oreoscoptes montanus)	MBTA, BCC	S	S, WAP	S5B	Moderately vulnerable
Sandhill crane (Antigone canadensis)	MBTA	S	WAP	S2B,S3M	Presumed stable
Short-eared owl (Asio flammeus)	MBTA	S	WAP	S4	Presumed stable
Swainson's hawk (Buteo swainsoni)	MBTA	S	-	S2B	Presumed stable
Western burrowing owl (Athene cunicularia hypugaea)	MBTA	S	WAP	S3B	Presumed stable
Western snowy plover (Charadrius alexandrinus nivosus)	MBTA, BCC	S	WAP	S3B	Moderately vulnerable
White-faced ibis (Plegadis chihi)	MBTA	-	WAP	S3B	Presumed stable
Yellow-billed cuckoo (Coccyzus americanus) – Western DPS	T, MBTA, BCC	S	S, WAP	S1B	Moderately vulnerable

Table 2-1. Known or Potential Occurrence of Special-status Bird Species within the Proposed FRTC Expansion Areas

Notes: *DPS = Distinct Population Segment; E = endangered; S = sensitive; T = threatened; WAP = Nevada Wildlife Action Plan.

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.
- S#S# = Range Rank a numeric range rank (e.g., S2S3 or S1S3) is used to indicate uncertainty about the exact status of a taxon.
- ? = Questionable taxonomy taxonomic distinctiveness of the entity at the current level is questionable or currently being reviewed; resolution of this uncertainty may result in change from a species to a subspecies, variety or hybrid, or the inclusion of this taxon in another taxon, with the resulting taxon having a lower-priority conservation status.
- B = Breeding conservation status refers to the breeding population of the element in the state.

N = Non-breeding – conservation status refers to the non-breeding population of the element in the state (e.g., wintering bird population). *Sources*: USFWS 2008, 2014b; GBBO 2010; Nevada WAP Team 2013; BLM 2017; NNHP 2018.

3.0 METHODS

Because the intention of the survey effort was to provide an inventory of bird use within target habitats across the proposed FRTC expansion areas, avian use data was collected in as many regions as possible using four different survey protocols. Two protocols targeted avian taxa generally active during the day (diurnal grid surveys and diurnal riparian surveys), and two protocols targeted avian taxa generally active at night, notably owls (nocturnal road-based surveys and nocturnal riparian surveys). A third nocturnal survey type was initiated in December 2016 but abandoned by January 2017 as the other two methods were more efficient (see Section 3.2, Nocturnal Surveys). Since the intent of this effort was to collect inventory level information, these protocols were optimized to detect as many species as possible throughout a calendar year and were not optimized to determine species-specific patterns of seasonality or abundance.

Survey methods were aimed at maximizing the number of species detected within focal habitat types, and at providing as much information as feasible about each species status within those habitat types throughout a calendar year. As such, efforts were made to conduct surveys in all habitat types during each month. Similarly, there was an attempt to standardize the amount of survey effort within each habitat type. The extent to which these objectives were not achieved was generally the result of inclement weather or logistical constraints. Importantly, winter 2016-2017 was uncharacteristically extreme in terms of winter storms, making it difficult to access the higher elevations (mostly woodland surveys) during some months (i.e., December 2016 and January 2017). In contrast, survey efforts for novel habitats (i.e., playa and developed) were generally low as these habitats are typically not very biodiverse and are underrepresented within the proposed expansion area. As a result, novel habitats were surveyed opportunistically, with fewer surveys conducted overall within those habitats.

3.1 Diurnal Surveys

Diurnal surveys, both grid and riparian surveys, were initiated after sunrise and were generally finished prior to 10:00 a.m., unless weather conditions were more conducive later in the day. In addition, all diurnal surveys were conducted during fair weather (no precipitation), when temperatures were between 32 and 86 degrees Fahrenheit (°F) (0 and 30 degrees Celsius [°C]), and wind speeds were \leq 15 miles per hour (24 km per hour).

3.1.1 Diurnal Grid Surveys

To identify target avian survey areas, the geographic information system (GIS) ArcGIS was used to subdivide the project area into 656 x 656-ft (200 x 200-m) grid cells. Next, grid cells that were within 0.5 mile (0.8 km) of any primary road were discarded. The remaining grid cells were then laid over the 2008 NNHP Vegetation Synthesis Map (Peterson 2008) and cells with less than 95% uniformity of a habitat type were discarded. Each grid cell was then labeled with one of the primary habitat communities from the 2008 Vegetation Synthesis Map: grasslands, alkaline scrub, upland scrub, and woodlands. Additional grid cells were established within novel habitats (i.e., playas, developed areas). A different survey protocol was utilized for riparian habitats, discussed below.

Using the random selection tool, primary and secondary survey ranks were assigned to grid cells to maximize unbiased, spatial coverage across the landscape. These cells also randomly received a target survey month. In the event that primary and secondary grid cells were inaccessible or otherwise unable to be sampled (e.g., road washouts, hunters), alternate survey cells were assigned that the avian surveyor could opportunistically select once in the field (Figure 3-1 through Figure 3-4). With few exceptions, target grid cells were surveyed once during the annual cycle.



Figure 3-1. Avian Survey Grid Cells within the Proposed B-16 Expansion Area



Figure 3-2. Avian Survey Grid Cells within the Proposed B-17 and Southern DVTA Expansion Areas



Figure 3-3. Avian Survey Grid Cells within the Proposed B-20 Expansion Area



Figure 3-4. Avian Survey Grid Cells within the Proposed Northern DVTA Expansion Area

Diurnal grid surveys were modified from the area search methods used by the national Australian Bird Count (Ambrose 1989) to increase the number of grid cells that could be visited each day. The amount of time spent within each grid cell was reduced and surveyors did not visit grid cells more than one time. These methods resulted in additional grid cell surveys, with the intention of detecting more species, at the expense of statistical tractability.

Each month, target grid cells were surveyed by methodically walking an "S-shaped" transect through the 200 x 200-m target grid cell (Figure 3-5). To start each survey, the observer recorded the start time and initiated a track file using a Garmin handheld global positioning system (GPS) unit. From the start location, the observer conducted an initial scan of the grid and surrounding area recording all birds observed, how they were initially detected (song, visual, call, drumming, humming, wing whir, or if they flew over the grid), and whether they were inside or outside the target grid cell.



Figure 3-5. Example Survey Track within a Target Grid Cell

Following the initial scan, the observer walked the S-shaped transect recording all additional birds encountered, making efforts to avoid double counting individuals. At the end of the transect, the observer recorded the stop time and the distance traveled to quantify survey effort. From the center of the grid, habitat photos were taken in each of the four cardinal directions (N, E, S, and W) and weather conditions were recorded. All observations were recorded on the Diurnal Grid Survey Data Form (Appendix A).

3.1.2 Diurnal Riparian Surveys

Riparian habitats are typically linear, therefore the diurnal protocol was modified to reflect this characteristic. The main differences between the diurnal avian grid and riparian survey methods is that riparian survey transect length varied and followed a drainage, rather than winding through a grid cell (Figure 3-6). Importantly, while riparian habitats are linear, riparian habitats do not generally follow a straight line. As such, riparian transects were not confined to, or associated with, grid cells. In most cases, suitable riparian drainages were identified using a GIS shapefile of riparian areas, although additional transects were included when quality riparian habitat was discovered during field activities. One or more diurnal riparian surveys were conducted each month. Target transects were identified at the beginning of

each month with the intention of achieving even coverage across the proposed FRTC expansion areas that contained riparian habitat.

At the start of a diurnal riparian survey, the observer initiated a GPS track file, noted the start time, and recorded all birds observed and how they were detected on the Diurnal Riparian Survey Data Form (Appendix B), making efforts to track bird movement and avoid double counting. All birds detected during the transect survey were noted, regardless of their distance from the observer or the stream drainage.

Importantly, riparian habitats within the proposed FRTC expansion areas vary in length due to differences in hydrological conditions. As a consequence, survey transect length ranged from less than 0.3 mile (0.4 km) to more than 3 miles (4.8 km). To account for differences in raw counts between surveys, counts were standardized by transect length and results are reported as the number of individuals observed per km traveled.

3.2 Nocturnal Surveys

In addition to diurnal surveys, both nocturnal road-based and nocturnal riparian surveys were conducted. In addition, six nocturnal surveys were conducted using grid cells in December 2016 in an attempt to make diurnal and nocturnal surveys spatially explicit. This approach however, using the 200 x 200-m grid cells, was not efficient or particularly effective for detecting nocturnal species and was abandoned by January 2017. Using the 200 x 200-m grid cells required substantial travel time during which species could be disturbed and elude detection. As a result, beginning in January 2017 efforts were shifted to road-based point count methods and riparian transects for the nocturnal surveys.

Nocturnal road-based point counts were established in alkaline scrub, upland scrub, woodland, playa, grassland, and developed habitat types. In contrast to diurnal surveys, nocturnal surveys were conducted between sunset and sunrise to target species active at night, notably owls. Surveys were generally conducted between sunset and midnight, but for logistical reasons a handful of nocturnal surveys were conducted between 3:00 a.m. and sunrise. Logistical constraints also made it impractical to consider moon phase when scheduling nocturnal surveys. Similar to diurnal surveys, all nocturnal surveys were conducted during fair weather (no precipitation), when temperatures were between 32 and 86 °F (0 and 30 °C), and wind speeds were \leq 15 miles per hour (24 km per hour).

All nocturnal surveys were conducted by broadcasting the common calls of target species following methods outlined in Ralph et al. (1993). These methods involved a 10-minute sampling period that consisted of a 5-minute passive listening period followed by 5 minutes of active broadcast. During the active broadcast period, the songs and calls of eight target species were broadcast using a portable mp3 player and amplified speaker. During this 5-minute broadcast period, common calls of each target species were broadcast for approximately 15 seconds followed by 15 seconds of silence. This was done for eight focal owl species known to inhabit the Great Basin region. When birds were detected, observers noted the location, the species, how it was initially detected (visual, call, drumming, humming, wing whir, or if they flew over the plot), whether the bird was detected during the passive or active period, and how far the bird was from the survey point.

The active broadcast period included calls of the following focal species: barn owl (*Tyto alba*), burrowing owl (*Athene cunicularia*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), northern pygmy owl (*Glaucidium gnoma*), northern saw-whet owl (*Aegolius acadicus*), short-eared owl (*Asio flammeus*), and western screech-owl (*Megascops kennicottii*). Occasionally, calls for flammulated owl (*Psiloscops flammeolus*) were played if habitat conditions appeared conducive to detecting the species (i.e., woodlands dominated by *Pinus* spp.).



Figure 3-6. Diurnal and Nocturnal Riparian and Road-based Nocturnal Transects

3.2.1 Nocturnal Road-based Surveys

A GIS-based model was used to identify road segments within areas with \ge 95% continuous habitat (alkaline scrub, upland scrub, grasslands, woodlands, and developed habitat types). If possible, 12 to 14 point count stations were established 0.3 mile (0.5 km) apart along roads (Figure 3-6). In instances where a passable road did not occur within a target habitat (e.g., woodlands), or habitat types changed over short distances, the number of point count stations was modified in order to ensure detection of species within that habitat. Since a lack of roads within continuous habitat reduced the total number of possible transects, some transects were visited multiple times over the annual cycle. However, no two transects were sampled in consecutive months.

At each road-based point, observers recorded all birds encountered during both a 5-minute passive period and a 5-minute active broadcast period. All birds encountered during the 10-minute survey were recorded on the Nocturnal Survey Data Form (Appendix C). Road-based surveys were generally done using a 4wheel drive truck or utility terrain vehicle to travel between survey points, as high-quality habitat was readily found in proximity to roads. Prior to initiating each survey the observer would move away from the vehicle to increase the possibility of detecting birds in the area.

3.2.2 Nocturnal Riparian Surveys

Nocturnal riparian surveys generally targeted the same stream drainages that were targeted during diurnal riparian surveys. Additional riparian areas, or washes subject to seasonal flooding, were added as possible survey routes when quality habitat was discovered. Similar to diurnal riparian surveys, nocturnal surveys were conducted within one or more riparian area each month and routes were chosen to maximize coverage of proposed FRTC expansion areas (Figure 3-6). Nocturnal riparian surveys were only conducted a single time within riparian stream drainages during the annual cycle.

Although nocturnal riparian surveys were conducted using similar methods, there were important differences associated with accessibility and sampling point location. Since most riparian corridors within the proposed FRTC expansion areas were not adjacent to established roads, riparian surveys were generally done on foot. In addition, many riparian areas were not extensive enough to accommodate more than one survey point using the 0.3-mile (0.5-km) spacing of road-based surveys. As a result, riparian sampling was done opportunistically, allowing the surveyor to optimize playback locations based on the extent and quality of the habitat. Importantly, regardless of habitat quality, all call-broadcast locations were ≤ 0.3 mile (0.5 km) apart. Similarly, regardless of transect length, playback was conducted at both the beginning and the end of each riparian transect. For nocturnal riparian surveys, transect length was used to quantify survey effort rather than the number of playback locations. Playback locations were however, recorded when birds were detected. All birds encountered during nocturnal riparian surveys, regardless of taxa, were recorded on the Nocturnal Survey Data Form (Appendix C).

3.3 Data Management and Quality Control

All survey information was recorded on datasheets and reviewed for completeness and accuracy immediately following each survey. As soon as the observer returned from the field, all data were entered into the private, online eBird database by the individual that conducted the survey, then digital copies of all datasheets were created and stored as Adobe pdf documents as soon as practical. Online data was periodically downloaded and stored in Excel (xls) files for review and additional backup. Survey data, track files, and photographs were all reviewed for accuracy by the end of each month and backed up regularly.

In addition to procedural quality control steps, R scripts were developed (R version 3.3.1) using R-Studio (<u>https://www.rstudio.com</u>), to identify inconsistencies across datasets and to provide summary

information that was used to cross-check against tracking notes recorded throughout annual data collection.

Summary information and tables were generated in Microsoft Excel or R and statistical analyses were done in R. Species richness and diversity indices were calculated in R using the vegan package (Oksanen et al. 2018). All maps were created with, and all geospatial information was stored and manipulated using, ESRI's ArcGIS software.

4.0 **RESULTS AND DISCUSSION**

4.1 Avian Presence and Survey Effort

A total of 1,166 diurnal and nocturnal avian surveys were conducted within the proposed FRTC expansion lands during December 2016 – November 2017 and September 2018 – July 2019 (Table 4-1 through Table 4-4):

- 329 diurnal grid cell surveys;
- 21 diurnal riparian surveys;
- 793 stations on nocturnal road-based surveys;
- 17 nocturnal riparian surveys; and
- 6 nocturnal grid cell surveys (discontinued after December 2016; only a single species, great horned owl, was detected during the initial nocturnal grid cell surveys).

Cumulatively, 6,241 detections (survey detections and incidental detections) were recorded representing 96 species (Table 4-5 and Table 4-6). A total of 350 diurnal surveys resulted in 5,993 detections of 77 species and 816 nocturnal surveys resulted in 135 detections of 12 species across the habitat types surveyed (Table 4-5). There were an additional 113 incidental detections (i.e., outside of a formal survey) of 38 species, 12 of which were not detected during formal diurnal or nocturnal surveys.

When considered together, diurnal surveys (grid and riparian) resulted in more than 96% (5,993 of 6,241) of the detections and 80% (77 of 96) of the total species encountered throughout the survey area. Unsurprisingly, nocturnal surveys resulted in substantially fewer detections (135) and fewer species (12) than diurnal surveys. As expected, not all species were encountered during all survey types and some species were encountered during only one survey type. Seven species were encountered only during nocturnal surveys including barn owl, western screech-owl, northern pygmy-owl, burrowing owl, short-eared owl, northern saw-whet owl, and common poorwill (*Phalaenoptilus nuttallii*) (Table 4-6). A total of 12 species were only detected incidentally: American avocet (*Recurvirostra americana*), American cliff swallow (*Petrochelidon pyrrhonota*), American coot (*Fulica americana*), barn swallow (*Hirundo rustica*), black-necked stilt (*Himantopus mexicanus*), brown-headed cowbird (*Molothrus ater*), common yellowthroat (*Geothlypis trichas*), greater sage-grouse, northern shoveler (*Spatula clypeata*), western kingbird (*Tyrannus verticalis*), white-throated swift (*Aeronautes saxatalis*), and yellow-rumped warbler (*Setophaga coronata*).

Although survey efforts were intended to identify the presence of avian species within focal habitat types, efforts were also made to provide survey coverage within each of the four proposed FRTC expansion areas (B-16, B-17, B-20, and DVTA). However, not all habitat types were common, or present, within each of the training areas. Specifically, riparian and woodland habitats were primarily limited to within B-17 and the DVTA. As a result, survey effort across the proposed FRTC expansion areas reflected the amount and type of available habitat within each area. While all of the diurnal riparian surveys were conducted within the proposed DVTA expansion area, of the 329 diurnal avian grid surveys, 10 were within the proposed B-16

expansion area, 147 within the proposed B-17 expansion area, 10 within B-20, and 162 within DVTA (Table 4-1 and Table 4-2). Similarly, all nocturnal riparian surveys were also conducted within DVTA, and of the 793 nocturnal road-based survey points, 42 were within B-16, 372 within B-17, 27 within B-20, and 352 within DVTA.

Surveys conducted within the proposed DVTA expansion area resulted in 4,436 detections, approximately 71% of the total 6,241. The proposed B-17 expansion area had 1,708 detections (27%), and both the proposed B-16 and B-20 expansion areas had <1% of the total detections, with 87 and 10, respectively. With respect to number of species detected within each proposed FRTC expansion area, 90 species were detected in the DVTA, 48 species in B-17, 10 in B-16, and 4 in B-20 (Table 4-7; Figure 4-1 through Figure 4-6).

Proposed Expansion Area	Dec 2016	Jan-Nov 2017	Sep-Dec 2018	Jan-Jul 2019	Total
Diurnal Grid Surveys (trans	ect/area searc	ch)			
B-16	0	10	0	0	10
B-17	5	64	17	61	147
B-20	1	9	0	0	10
DVTA	4	86	30	42	162
Total	10	169	47	103	329
Diurnal Riparian Surveys (ti	ansects)				
B-16	0	0	0	0	0
B-17	0	0	0	0	0
B-20	0	0	0	0	0
DVTA	1	18	2	0	21
Total	1	18	2	0	21
Nocturnal Road Based Surv	eys (points)				
B-16	0	42	0	0	42
B-17	0	167	54	151	372
B-20	0	27	0	0	27
DVTA	0	202	76	74	352
Total	0	438	130	225	793
Nocturnal Grid Surveys (tra	nsect/area se	arch)			
B-16	0	0	0	0	0
B-17	2	0	0	0	2
B-20	0	0	0	0	0
DVTA	4	0	0	0	4
Total	6	0	0	0	6
Nocturnal Riparian Surveys	(transects)				
B-16	0	0	0	0	0
B-17	0	0	0	0	0
B-20	0	0	0	0	0
DVTA	0	17	0	0	17
Total	0	17	0	0	17

	Fable 4-1. Avian Survey Effo	rts by Propo	sed Expansion	Area and Year (2	2016-2017 and	2018-2019
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Proposed Expansion Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Diurnal Grid Surveys (transect/area searc	h)												
B-16	0	0	0	1	1	0	0	0	4	4	0	0	10
B-17	11	12	14	20	12	15	8	11	10	12	12	10	147
В-20	0	6	0	0	0	0	3	0	0	0	0	1	10
DVTA	15	6	15	18	13	21	13	9	14	12	14	12	162
Total 200 by 200-m Grid Cells Surveyed													329
Diurnal Riparian Surveys (transect)													
DVTA	1	3	1	2	3	2	1	2	2	2	1	1	21
Total Transects Surveyed												21	
Nocturnal Road-based Surveys (point)													
B-16	14	0	0	14	0	0	14	0	0	0	0	0	42
B-17	31	44	39	30	44	31	26	23	31	28	30	15	372
B-20	0	3	0	0	12	0	12	0	0	0	0	0	27
DVTA	31	22	34	35	31	42	16	21	31	30	36	23	352
									Total	Statio	ns Surv	veyed	793
Nocturnal Grid Surveys (transect/area search)													
B-17	0	0	0	0	0	0	0	0	0	0	0	2	2
DVTA	0	0	0	0	0	0	0	0	0	0	0	4	4
						Тс	otal 20	0 by 2	00-m 0	Grid Ce	lls Surv	veyed	6
Nocturnal Riparian Surveys (point)													
DVTA	1	2	1	2	1	2	0	2	4	1	1	0	17

Table 4-2. Diurnal and Nocturnal Survey Efforts by Proposed Expansion Area, Survey Type, and Month (2016-2017 and 2018-2019)

Habitat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Diurnal Grid Surveys (transect/area search)													
Bailey's Greasewood Shrubland	10	8	13	22	16	18	7	5	13	11	8	8	139
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shruhland	1	3	1	1	0	3	2	0	0	0	0	0	11
Black Sagebrush Steppe & Shrubland	3	0	2	4	0	5	3	0	1	7	1	1	27
Cheatgrass Ruderal Grassland	5	1	1	0	2	2	0	1	0	1	1	0	14
Intermountain Greasewood Wet Shrubland	0	1	0	2	0	0	4	1	3	1	6	0	18
Microphytic Playa	0	3	0	0	0	2	3	0	0	0	0	1	9
Mojave Seablite - Red Swampfire Alkaline Wet Scrub	0	1	0	0	0	0	0	0	0	0	0	0	1
Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	0	1	0	0	0	1	0	0	0	0	0	0	2
Rubber Rabbitbrush - Sand Buckwheat - Four- part Horsebrush Sparse Scrub	0	0	0	1	0	0	0	0	0	0	0	0	1
Ruderal Tamarisk Riparian Scrub	0	0	0	0	0	0	0	0	0	0	1	0	1
Shadscale Saltbush Scrub	0	0	0	0	1	0	0	1	0	0	0	0	2
Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland	2	2	6	6	4	3	3	4	4	3	5	3	45
Utah Juniper / Shrub Understory Woodland	4	1	5	2	2	1	0	3	5	1	2	5	31
Western Baltic Rush - Mexican Rush Wet Meadow	0	0	0	1	0	0	0	0	0	0	0	0	1
Wyoming Big Sagebrush Dry Steppe & Shrubland	1	2	1	0	1	1	2	5	0	4	2	3	22
Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	0	1	0	0	0	0	0	0	2	0	0	2	5
Total 200 x 200-m Grid Cells Surveyed	26	24	29	39	26	36	24	20	28	28	26	23	329
Diurnal Riparian Surveys (transect)													
Riparian	1	3	1	2	3	2	1	2	2	2	1	1	21

Table 4-3. Avian Survey Effort by Habitat, Survey Type, and Month within the Proposed FRTC Expansion Areas (2016-2017 and 2018-2019)

Habitat	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Nocturnal Grid Cell Surveys (transect/area search)												
Bailey's Greasewood Shrubland					Not	applica	ble					3	3
Utah Juniper / Shrub Understory Woodland					Not	applica	ble					2	2
Wyoming Big Sagebrush Dry Steppe & Shrubland		Not applicable							1	1			
						То	tal 200) x 200-r	n Grid (Cells Su	rveyed	6	6
Nocturnal Road-based Surveys (point)													
Arroyo Willow Wet Shrubland	0	1	0	0	1	0	0	0	0	0	1	0	3
Bailey's Greasewood Shrubland	33	37	5	36	47	27	24	19	13	20	16	17	294
Basin Big Sagebrush - Foothill Big Sagebrush Dry	12	1	9	11	3	9	3	0	2	3	11	1	65
Big Cogobrush Mixed Shruh Dry Stoppe 8													
Big Sagebrush - Mixed Shrub Dry Steppe &	1	0	1	1	0	1	1	0	1	0	0	0	6
Black Sagebruch Steppe & Shrubland	6	0	Δ	0	0	0	6	0	0	6	0	0	22
Fourwing Solthush - Bubbar Babbithrush Dosort	0	0	4	0	0	0	0	0	0	0	0	0	22
Wash	0	0	0	1	0	0	0	0	0	0	1	0	2
Intermountain Greasewood Wet Shrubland	2	1	12	7	1	1	14	3	2	3	15	1	62
Microphytic Playa	0	3	0	0	12	0	12	3	5	2	0	0	37
Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	2	18	0	6	8	9	1	8	0	8	2	2	64
Ruderal Tamarisk Riparian Scrub	0	0	0	1	0	0	0	0	0	0	1	0	2
Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland	6	3	12	5	6	9	7	7	11	6	3	11	86
Utah Juniper / Shrub Understory Woodland	8	4	14	4	8	4	0	4	11	9	8	3	77
Western Baltic Rush - Mexican Rush Wet	-	_	-		-	-	-	-	-	-		-	-
Meadow	0	0	0	1	0	0	0	0	0	0	1	0	2
Wyoming Big Sagebrush Dry Steppe & Shrubland	6	0	2	5	1	6	0	0	3	1	7	2	33
Yellow Star-thistle - Dyer's Woad - Prickly	0	1	14	1	0	7	0	0	14	0	0	1	20
Russian-thistle Ruderal Annual Forb	0	T	14	T	0	/	0	0	14	0	0	T	50
Total Stations Surveyed	76	69	73	79	87	73	68	44	62	58	66	38	793
Nocturnal Riparian Surveys (transect)													
Riparian	1	2	1	2	1	2	0	2	4	1	1	0	17

Table 4-4. Nocturnal Survey Effort by Habitat, Survey Type, and Month within the Proposed FRTC Expansion Areas (2016-2017 and 2018-2019)

	Diurn	al	Noctu	rnal		Tota	al
	No.	No.	No.	No.	Incidentals	No.	No.
Habitat	Detections	Species	Detections	Species	Detections	Detections	Species
Arroyo Willow Wet Shrubland	0	0	0	0	7	7	2
Bailey's Greasewood Shrubland	1,804	26	37	8	12	1,853	36
Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	93	12	11	6	4	108	19
Big Sagebrush - Mixed Shrub Dry Steppe & Shrubland	7	2	0	0	1	8	2
Black Sagebrush Steppe & Shrubland	194	21	2	2	2	198	23
Cheatgrass Ruderal Grassland	270	10	0	0	0	270	10
Fourwing Saltbush - Rubber Rabbitbrush Desert Wash	0	0	1	1	0	1	1
Great Basin Fremont Cottonwood Riparian Forest	0	0	0	0	3	3	1
Intermountain Greasewood Wet Shrubland	129	18	7	2	27	163	25
Microphytic Playa	5	3	0	0	0	5	3
Mojave Seablite - Red Swampfire Alkaline Wet Scrub	2	1	0	0	0	2	1
Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	42	4	4	4	4	50	8
Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	9	1	0	0	0	9	1
Ruderal Tamarisk Riparian Scrub	117	7	1	1	8	126	10
Shadscale Saltbush Scrub	2	2	0	0	0	2	2
Singleleaf Pinyon - Utah Juniper / Shrub Understory Woodland	1,281	53	32	5	25	1,338	57
Utah Juniper / Shrub Understory Woodland	662	26	7	3	1	670	29
Western Baltic Rush - Mexican Rush Wet Meadow	43	15	1	1	18	62	17
Wyoming Big Sagebrush Dry Steppe & Shrubland	238	18	3	2	1	242	20
Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	7	2	2	2	0	9	4
Riparian	1,088	50	27	4	0	1,115	52
Total	5,993	77*	135	12*	113	6,241	96*

Table 4-5. Summary of Number of Detections and Species by Survey and Habitat Type

Note: *The number of species is based on the number of individual species across the categories as some species were detected within multiple survey types and habitats and some species were only detected within one survey type or habitat.

Common Name	Scientific Name	D-GC	D-Rip	N-RB	N-GC	N-Rip	Inc	Total
American Avocet	Recurvirostra americana	0	0	0	0	0	4	4
American Cliff Swallow	Petrochelidon pyrrhonota	0	0	0	0	0	2	2
American Coot	Fulica americana	0	0	0	0	0	2	2
American Crow	Corvus brachyrhynchos	0	2	0	0	0	0	2
American Kestrel	Falco sparverius	2	0	0	0	0	0	2
American Pipit	Anthus rubescens	4	1	0	0	0	0	5
American Robin	Turdus migratorius	12	6	0	0	0	2	20
Ash-throated Flycatcher	Myiarchus cinerascens	1	0	0	0	0	0	1
Barn Owl	Tyto alba	0	0	3	0	0	0	3
Barn Swallow	Hirundo rustica	0	0	0	0	0	1	1
Bewick's Wren	Thryomanes bewickii	20	28	0	0	0	0	48
Black-billed Magpie	Pica hudsonia	21	0	0	0	0	1	22
Black-necked Stilt	Himantopus mexicanus	0	0	0	0	0	2	2
Black-throated Gray Warbler	Setophaga nigrescens	11	5	0	0	0	4	20
Black-throated Sparrow	Amphispiza bilineata	195	3	0	0	0	0	198
Blue-gray Gnatcatcher	Polioptila caerulea	18	36	0	0	0	0	54
Brewer's Blackbird	Euphagus cyanocephalus	24	0	0	0	0	0	24
Brewer's Sparrow	Spizella breweri	99	8	0	0	0	0	107
Broad-tailed Hummingbird	Selasphorus platycercus	4	4	0	0	0	0	8
Brown-headed Cowbird	Molothrus ater	0	0	0	0	0	1	1
Burrowing Owl	Athene cunicularia	0	0	19	0	0	0	19
Bushtit	Psaltriparus minimus	83	52	0	0	0	0	135
California Quail	Callipepla californica	3	5	0	0	0	0	8
Canyon Wren	Catherpes mexicanus	1	4	1	0	0	0	6
Cassin's Finch	, Haemorhous cassinii	8	0	0	0	0	0	8
Chipping Sparrow	Spizella passerina	10	6	0	0	0	3	19
Chukar	Alectoris chukar	76	4	0	0	0	0	80
Clark's Nutcracker	Nucifraga columbiana	40	4	0	0	0	0	44
Common Nighthawk	Chordeiles minor	2	0	12	0	0	0	14
Common Poorwill	Phalaenoptilus nuttallii	0	0	5	0	0	3	8
Common Raven	Corvus corax	786	175	0	0	0	0	961
Common Yellowthroat	Geothlypis trichas	0	0	0	0	0	2	2
Cooper's Hawk	Accipiter cooperii	1	4	0	0	0	0	5
Dark-eyed Junco	Junco hyemalis	40	101	0	0	0	8	149
Downy Woodpecker	Dryobates pubescens	1	0	0	0	0	0	1
Dusky Flycatcher	Empidonax oberholseri	3	0	0	0	0	2	5
European Starling	Sturnus vulgaris	84	0	0	0	0	0	84
Golden Eagle	Aquila chrysaetos	6	2	0	0	0	0	8
Gray Flycatcher	Empidonax wrightii	1	0	0	0	0	3	4
Great Horned Owl	Bubo virginianus	1	2	22	1	1	0	27
Greater Sage-grouse	Centrocercus urophasianus	0	0	0	0	0	1	1
Hairy Woodpecker	Picoides villosus	4	3	0	0	0	1	8
Horned Lark	Eremophila alpestris	1,914	0	0	0	0	0	1,914
House Finch	Haemorhous mexicanus	5	46	0	0	0	0	51
Juniper Titmouse	Baeolophus ridgwayi	32	44	0	0	0	0	76
Killdeer	Charadrius vociferous	2	0	1	0	0	1	4
Lark Sparrow	Chondestes grammacus	5	0	0	0	0	0	5
Lazuli Bunting	Passerina amoena	3	5	0	0	0	1	9
Lesser Goldfinch	Spinus psaltria	3	6	0	0	0	0	9
Loggerhead Shrike	Lanius Iudovicianus	16	2	0	0	0	0	18
Long-eared Owl	Asio otus	0	5	12	15	0	1	33

Table 4-6. Summary of Species Detections by Survey Type (Diurnal, Nocturnal, and Incidenta
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Common Name	Scientific Name	D-GC	D-Rip	N-RB	N-GC	N-Rip	Inc	Total
Merlin	Falco columbarius	1	0	0	0	0	0	1
Mountain Bluebird	Sialia currucoides	102	10	0	0	0	0	112
Mountain Chickadee	Poecile gambeli	24	20	0	0	0	5	49
Mountain Quail	Oreortyx pictus	0	4	0	0	0	0	4
Mourning Dove	Zenaida macroura	31	30	0	0	0	1	62
Nashville Warbler	Oreothlypis ruficapilla	0	2	0	0	0	0	2
Northern Flicker	Colaptes auratus	52	37	0	0	0	0	89
Northern Harrier	Circus hudsonius	2	1	0	0	0	1	4
Northern Pygmy-Owl	Glaucidium gnoma	0	0	2	0	0	0	2
Northern Saw-whet Owl	Aegolius acadicus	0	0	2	0	0	0	2
Northern Shoveler	Spatula clypeata	0	0	0	0	0	4	4
Olive-sided Flycatcher	Contopus cooperi	0	1	0	0	0	0	1
Peregrine Falcon	Falco peregrinus	1	0	0	0	0	0	1
Pine Siskin	Spinus pinus	37	0	0	0	0	0	37
Pinyon Jay	Gymnorhinus cyanocephalus	397	147	0	0	0	0	544
Plumbeous Vireo	Vireo plumbeus	8	0	0	0	0	0	8
Prairie Falcon	Falco mexicanus	8	2	0	0	0	1	11
Red-breasted Nuthatch	Sitta canadensis	105	69	0	0	0	0	174
Red-tailed Hawk	Buteo jamaicensis	4	4	0	0	0	0	8
Red-winged Blackbird	Agelaius phoeniceus	21	0	0	0	0	19	40
Rock Wren	Salpinctes obsoletus	52	2	0	0	0	3	57
Rough-legged Hawk	Buteo lagopus	1	0	0	0	0	2	3
Sage Thrasher	Oreoscoptes montanus	14	0	0	0	0	0	14
Sagebrush Sparrow	Artemisiospiza nevadensis	227	22	0	0	0	3	252
Savannah Sparrow	Passerculus sandwichensis	6	0	0	0	0	0	6
Say's Phoebe	Sayornis saya	15	1	0	0	0	2	18
Short-eared Owl	Asio flammeus	0	0	7	2	0	0	9
Song Sparrow	Melospiza melodia	1	5	0	0	0	2	8
Spotted Towhee	Pipilo maculatus	64	97	0	0	0	0	161
Swainson's Thrush	Catharus ustulatus	3	0	0	0	0	0	3
Townsend's Solitaire	Myadestes townsendi	1	5	0	0	0	0	6
Tree Swallow	Tachycineta bicolor	1	0	0	0	0	0	1
Turkey Vulture	Cathartes aura	3	8	0	0	0	0	11
Western Bluebird	Sialia mexicana	1	0	0	0	0	0	1
Western Kingbird	Tyrannus verticalis	0	0	0	0	0	8	8
Western Meadowlark	Sturnella neglecta	91	0	0	0	0	3	94
Western Screech-Owl	Megascops kennicottii	0	0	22	8	0	1	31
Western Tanager	Piranga ludoviciana	1	2	0	0	0	0	3
Western Wood-Pewee	Contopus sordidulus	1	2	0	0	0	0	3
White-crowned Sparrow	Zonotrichia leucophrys	30	19	0	0	0	0	49
White-throated Swift	Aeronautes saxatalis	0	0	0	0	0	4	4
Wilson's Snipe	Gallinago delicata	1	0	0	0	0	7	8
Woodhouse's Scrub-Jay	Aphelocoma woodhouseii	57	35	0	0	0	0	92
Yellow Warbler	Setophaga petechia	1	0	0	0	0	1	2
Yellow-rumped Warbler	Setophaga coronata	0	0	0	0	0	1	1
	Total Detections	4,905	1,088	108	26	1	113	6,241
	Total Species Detected	72	49	12	4	1	38	96

Table 4-6. Summary of Species Detections by Survey Type (Diurnal, Noctu	nal, and Incidentals)*
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Notes: *Inc = incidental, D- = diurnal, GC = grid cell, N- = nocturnal, RB = road-based, Rip = riparian.

	Prop	Proposed Expansion		n Area			Proposed Expansion		n Area	
Species	B-16	B-17	B-20	DVTA		Species	B-16	B-17	B-20	DVTA
American Avocet	0	4	0	0		Loggerhead Shrike	0	9	0	9
American Cliff Swallow	0	2	0	0		Long-eared Owl	0	0	0	33
American Coot	0	0	0	2	1	Merlin	0	0	0	1
American Crow	0	0	0	2		Mountain Bluebird	0	28	0	84
American Kestrel	0	1	0	1		Mountain Chickadee	0	0	0	49
American Pipit	0	0	1	4		Mountain Quail	0	0	0	4
American Robin	0	0	0	20		Mourning Dove	0	10	0	52
Ash-throated Flycatcher	0	0	0	1		Nashville Warbler	0	0	0	2
Barn Owl	0	1	0	2		Northern Flicker	0	1	0	88
Barn Swallow	0	0	0	1		Northern Harrier	0	1	0	3
Bewick's Wren	0	0	0	48		Northern Pygmy-Owl	0	0	0	2
Black-billed Magpie	0	0	0	22		Northern Saw-whet Owl	0	0	0	2
Black-necked Stilt	0	2	0	0		Northern Shoveler	0	4	0	0
Black-throated Gray Warbler	0	0	0	20		Olive-sided Flycatcher	0	0	0	1
Black-throated Sparrow	0	112	0	86		Peregrine Falcon	0	0	0	1
Blue-gray Gnatcatcher	0	0	0	54		Pine Siskin	0	17	0	20
Brewer's Blackbird	18	0	0	6		Pinyon Jay	0	193	0	351
Brewer's Sparrow	0	49	0	58		Plumbeous Vireo	0	0	0	8
Broad-tailed Hummingbird	0	2	0	6		Prairie Falcon	0	2	0	9
Brown-headed Cowbird	0	1	0	0		Red-breasted Nuthatch	0	0	0	174
Burrowing Owl	3	15	0	1		Red-tailed Hawk	0	0	0	8
Bushtit	0	7	0	128		Red-winged Blackbird	0	8	0	32
California Quail	0	1	0	7		Rock Wren	1	18	0	38
Canyon Wren	1	1	0	4		Rough-legged Hawk	0	2	0	1
Cassin's Finch	0	2	0	6		Sage Thrasher	0	8	0	6
Chipping Sparrow	0	0	0	19		Sagebrush Sparrow	11	131	1	109
Chukar	0	34	0	46		Savannah Sparrow	0	3	0	3
Clark's Nutcracker	0	1	0	43		Say's Phoebe	1	6	0	11
Common Nighthawk	11	1	0	2		Short-eared Owl	0	3	0	6
Common Poorwill	0	0	0	8		Song Sparrow	0	0	0	8
Common Raven	8	84	3	866		Spotted Towhee	0	6	0	155
Common Yellowthroat	0	2	0	0		Swainson's Thrush	0	0	0	3
Cooper's Hawk	0	0	0	5		Townsend's Solitaire	0	1	0	5
Dark-eyed Junco	0	0	0	149		Tree Swallow	0	0	0	1
Downy Woodpecker	0	0	0	1		Turkey Vulture	0	0	0	11
Dusky Flycatcher	0	0	0	5		Western Bluebird	0	0	0	1
European Starling	0	0	0	84		Western Kingbird	0	3	0	5
Golden Eagle	0	3	0	5		Western Meadowlark	0	34	0	60
Gray Flycatcher	0	0	0	4		Western Screech-Owl	0	1	0	30
Great Horned Owl	0	4	0	23		Western Tanager	0	0	0	3
Greater Sage-grouse	0	0	0	1		Western Wood-Pewee	0	0	0	3
Hairy Woodpecker	0	0	0	8		White-crowned Sparrow	0	6	0	43
Horned Lark	31	880	5	998		White-throated Swift	0	0	0	4
House Finch	2	0	0	49		Wilson's Snipe	0	0	0	8
Juniper Titmouse	0	0	0	76		Woodhouse's Scrub Jay	0	1	0	91
Killdeer	0	2	0	2		Yellow Warbler	0	1	0	1
Lark Sparrow	0	0	0	5		Yellow-rumped Warbler	0	0	0	1
Lazuli Bunting	0	0	0	9		Total Species	10	48	4	90
Lesser Goldfinch	0	0	0	9	1 '					

Table 4-7. Species Detections within the Proposed FRTC Expansion Areas



Figure 4-1. Detections of Avian Species within the Proposed B-16 Expansion Area



Figure 4-2. Detections of Avian Species within the Proposed B-17 and Southern DVTA Expansion Areas (2016-2017)



Figure 4-3. Detections of Avian Species within the Proposed B-17 and Southern DVTA Expansion Areas (2018-2019)



Figure 4-4. Detections of Avian Species within the Proposed B-20 Expansion Area (2016-2017)



Figure 4-5. Detections of Avian Species within the Proposed Northern DVTA Expansion Area (2016-2017)



Figure 4-6. Detections of Avian Species within the Proposed Northern DVTA Expansion Area (2018-2019)

4.2 Avian Species Richness and Diversity

Using data from the diurnal grid cell, nocturnal grid cell and road-based surveys and incidental detections, bird diversity and species richness was not consistent across target habitat types (vegetation alliances) (Figure 4-7 and Appendix D). Species richness (number of species) was greatest within Singleleaf Pinyon-Utah Juniper/Shrub Understory Woodland (59 species) followed by Bailey's Greasewood Shrubland (38 species), and Utah Juniper/Shrub Understory Woodland and Intermountain Greasewood Wet Shrubland with 30 and 29 species, respectively.



Figure 4-7. Species Richness and Diversity across Habitat Types and Proposed Expansion Areas *Notes*: Refer to Appendix D for further details.

<u>Vegetation Alliances:</u> ArrWil = Arroyo Willow Wet Shrubland; BaiGre = Bailey's Greasewood Shrubland; BasBig = Basin Big Sagebrush – Foothill Big Sagebrush Dry Steppe & Shrubland; BigSag = Big Sagebrush – Mixed Shrub Dry Steppe & Shrubland; BlaSag = Black Sagebrush Steppe & Shrubland; CheRud = Cheatgrass Ruderal Grassland; FouSal = Fourwing Saltbush – Rubber Rabbitbrush Desert Wash; FreCot = Great Basin Fremont Cottonwood Riparian Forest; IntGre = Intermountain Greasewood Wet Shrubland; MojSea = Mojave Seablite – Red Swampfire Alkaline Wet Scrub; MojSon = Mojave-Sonoran Burrobush – Sweetbush Desert Wash Scrub; RubRab = Rubber Rabbitbrush – Sand Buckwheat – Four-part Horsebrush Sparse Scrub; RudTam = Ruderal Tamarisk Riparian Scrub; ShaSal = Shadscale Saltbush Scrub; SinPin = Singleleaf Pinyon-Utah Juniper/Shrub Understory Woodland; UtaJun = Utah Juniper/Shrub Understory Woodland; WesBal = Western Baltic Rush – Mexican Rush Wet Meadow; WyoBig = Wyoming Big Sagebrush Dry Steppe & Shrubland; YelSta = Yellow Star-thistle – Dyer's Woad – Prickly Russian-thistle Ruderal Annual Forb; MicPla = Microphytic Playa. The Shannon-Weiner diversity index incorporates the number of individuals of each species into diversity metrics and represents a more robust index compared to merely measuring species richness. This index acknowledges that the presence of a single individual of a species is different from the presence of many individuals of a species, thereby providing additional information about the relative importance of each habitat to the bird community as a whole.

Importantly, the Shannon-Weiner diversity index did not follow the order of habitats based on species richness. In contrast, they showed a higher diversity within habitats that had fewer species such as Black Sagebrush Steppe & Shrubland, Intermountain Greasewood Wet Shrubland, and Basin Big Sagebrush – Foothill Big Sagebrush Dry Steppe & Shrubland alliances (Figure 4-7). The Shannon-Weiner diversity index elevated these three alliances relative to Bailey's Greasewood Shrubland and Utah Juniper/Shrub Understory Woodland, which had more species, suggesting that sagebrush shrubland habitats have a more consistent bird community whereas Bailey's Greasewood Shrubland and Utah Juniper/Shrub Understory Woodland had more species that were encountered very few times.

Most species were encountered within the proposed DVTA expansion area (Figure 4-7). Although sampling effort was uneven across the proposed expansion areas, sampling effort generally reflected the amount and diversity of habitat. Similar to patterns of species diversity, species richness was highest within the proposed DVTA expansion area and lowest within the proposed B-20 expansion area. Interestingly, despite low diversity within the proposed B-16 expansion area, species richness was high. This is because although only 10 species were detected within the proposed B-16 expansion area, their frequency was variable with only 1 canyon wren (*Catherpes mexicanus*) and 1 rock wren detections yet 31 horned lark (*Eremophila alpestris*) and 18 Brewer's blackbird (*Euphagus cyanocephalus*) detections. This area also had 3 burrowing owl detections and 11 common nighthawk (*Chordeiles minor*) and 11 sagebrush sparrow (*Artemisiospiza nevadensis*) detections (Table 4-7).

4.3 Special-status Species

A total of 16 special-status avian species were detected within the proposed FRTC expansion areas (Table 4-8; Figure 4-8 through Figure 4-11). Of these 16 special-status species, 15 were detected within the proposed DVTA expansion area, 12 were detected within the proposed B-17 expansion area, 3 within the proposed B-16 expansion area, and only 1 within the proposed B-20 expansion area. These results correspond with the diversity of habitats within each proposed expansion area, with the DVTA having the greatest diversity and B-20, dominated by a playa, having the least diversity.

The most frequently encountered special-status species was the pinyon jay (*Gymnorhinus cyanocephalus*) with 544 detections within the proposed B-17 and DVTA expansion areas and primarily within four vegetation alliances: Utah Juniper/Shrub Understory Woodland (194 detections), Wyoming Big Sagebrush Dry Steppe & Shrubland (101), Singleleaf Pinyon-Utah Juniper/Shrub Understory Woodland (75), and Black Sagebrush Steppe & Shrubland (19) (Table 4-8 and Appendix D). The next most frequently encountered special-status species was the sagebrush sparrow with 252 detections across all proposed FRTC expansion areas followed by Brewer's sparrow (*Spizella breweri*) with 107 detections within the proposed B-17 and DVTA expansion areas. The remaining special-status species were detected fewer than 20 times each (Table 4-8).

					Detections within						
		State	us*			Propose	d Expans	ion Area			
Species	USFWS	BLM	State	NNHP	B-16	B-17	B-20	DVTA	Total		
American avocet	MBTA	-	WAP	s4B	0	4	0	0	4		
Brewer's sparrow	MBTA, BCC	S	S, WAP	S4B	0	49	0	58	107		
Burrowing owl	MBTA	S	WAP	S3B	3	15	0	1	19		
Cassin's finch	MBTA	-	WAP	S5	0	2	0	6	8		
Common nighthawk	MBTA	-	WAP	S5B	11	1	0	2	14		
Golden eagle	BCC, BGEPA	S	WAP	S4	0	3	0	5	8		
Greater sage-grouse	BCC	S	WAP	S3	0	0	0	1	1		
Loggerhead shrike	MBTA, BCC	S	S, WAP	S4	0	9	0	9	18		
Mountain quail	MBTA	S	PB, WAP	S3	0	0	0	4	4		
Olive-sided flycatcher	MBTA	-	WAP	S2B	0	0	0	1	1		
Peregrine falcon	MBTA, BCC	S	E, WAP	S2	0	0	0	1	1		
Pinyon jay	MBTA, BCC	S	WAP	S3S4	0	193	0	351	544		
Prairie falcon	MBTA	-	WAP	S4	0	2	0	9	11		
Sagebrush sparrow	MBTA, BCC	-	WAP	-	11	131	1	109	252		
Sage thrasher	MBTA, BCC	S	S, WAP	S5B	0	8	0	6	14		
Short-eared owl	MBTA	S	WAP	S4	0	3	0	6	9		
			Number of	f Species	3	12	1	15	16		

Table 4-8. Detections of Special-status Avian Species within the Proposed FRTC Expansion Areas

Notes: *BCC = Bird of Conservation Concern; E = endangered; S = sensitive; WAP = Nevada Wildlife Action Plan. See Table 2-1 for the definitions of NNHP ranks.

Sources: USFWS 2008; GBBO 2010; Nevada WAP Team 2013; BLM 2017; NNHP 2018.



Figure 4-8. Detections of Special-status Avian Species within the Proposed B-16 Expansion Area (2016-2017)



Figure 4-9. Detections of Special-status Avian Species within the Proposed B-17 and Southern DVTA Expansion Areas (2016-2017 and 2018-2019)







Figure 4-11. Detections of Special-status Avian Species within the Proposed Northern DVTA Expansion Area (2016-2017 and 2018-2019)

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APPENDIX A. DIURNAL GRID SURVEY DATA FORM

					Aonth				Start Time	and Time			
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ntroid P	hotos			Habi	itat Type						mete	ers walke	٠d
Specie	es	# of I	nd.	Bel	navior C	bservatio	n	Breed. Obs.		Note	•		
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THER NO	OTE:					2	5 5		#	 			

Behavioral Codes (record initial detection cue): S = song, V = visual, C = call, D = drumming, H = humming, W = wing whir, FO = flyover.

Breeding Observation Codes: CO=copulation, MC=material carry, FC=food carry, NF=nest found, FL=fledglings, FS=fecal sac carry, DD=distraction display, PA=pair, DI=display. Biologist/Observer: Christopher Porterfield, ManTech, Inc. Falicon Ecological Inventory Avian Area Search Surveys, Additionally: [This page intentionally left blank.]

APPENDIX B. DIURNAL RIPARIAN SURVEY DATA FORM

											N. ALARA	35 (c)6000		
	PS			N	ew₽						HRS	HRS		m
Itended Rip	ID	Actu	al Rip I	D		Month	Day	Ye	ear	Start Ti	me	End Time	Total Tin	ne
•	•		I	V	•	W		•		•	N	٠	w	
tart GPS De	əcimal Dəş	grees (NA	D 83)				Er	nd GPS	Decimal D	egrees (NAD 8	3		Me	eters Wall
Species	# o	i Ind.		Beh	avior C	Observatio	on	Breed	. Obs.			Note		
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CIRCLED: If the same bird is heard singing after initial detection. SQUARED: Bird outside riparian survey habitat.

Behavioral Codes (record initial detection cue): S = song, V = visual, C = call, D = drumming, H = humming, W = wing whir, FO = flyover.

Breeding Observation Codes: CO=copulation, MC=material carry, FC=food carry, NF=nest found, FL=fledglings, FS=fecal sac carry, DD=distraction display, PA=pair, DI=display. Biologist/Observer: Christopher Parterfield, ManTech, Inc. Fallon Ecological Inventory Avian Area Search Surveys, Additionally: [This page intentionally left blank.]

APPENDIX C. NOCTURNAL SURVEY DATA FORM

NAS Fallo	on Owl Surv	vey Dat	a Form – H	Road-based	Point Count Sta	ations			Pg of
							HRS	HRS	min
Route ID			Month	Day	Year	Start Time		End Time	Total Time
Alkaline	Scrub l	Jpland	Scrub	Woodland	Grassland				
Habitat Ty	pe	CITAL	many.			Note			
5 minute pass	ive survey – 5 r	ninute act	ive cycled plo	yback survey – 3	minutes data				
Station		# of	Behavi	or Distan	ce Passive/				
ID	Species	Ind.	Observa	tion (m)	Active?		N	lote/Breeding C	ode
					P or A				
					P or A				
					P or A				
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WEATHER NOTE							·
° F	%	mph	Noise Issues?:_				
Temperature	Cloud Cover	Wind Speed		DATE ENTERED	Initial	DATE PROOFED	Initial_
Behavioral Codes (record initial detection	cue): V = visual, C = call,	, B = Beg Call, W = wir	ng sound, FO = flyover. Pi	refix with M (Male)	or F (Female)	
Breeding Observati	ion Codes: CO=copula	ation, FC=food carry, NF=r	nest found, FL=fledglir	ngs, FS=fecal sac carry, P.	A=pair, DI=display.		
Biologist/Observer		ManTech Inc. Eallon Ec	ological Inventory Av	ian Area Search Surveys	Additionally:		

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APPENDIX D. SPECIES DETECTIONS BY HABITAT TYPE FOR DIURNAL GRID CELL, NOCTURNAL ROAD-BASED, AND NOCTURNAL GRID CELL SURVEYS AND INCIDENTALS

	Habitat																				
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	Fourwing Saltbush - Rubber Rabbitbrush Desert Wash	Great Basin Fremont Cottonwood Riparian Forest*	Intermountain Greasewood Wet Shrubland	Microphytic Playa	Mojave Seablite - Red Swampfire Alkaline Wet Scrub	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	Ruderal Tamarisk Riparian Scrub*	Shadscale Saltbush Scrub	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland	Utah Juniper/Shrub Understory Woodland	Western Baltic Rush - Mexican Rush Wet Meadow*	Wyoming Big Sagebrush Dry Steppe & Shrubland	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	Total
American Avocet	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
American Cliff Swallow	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
American Coot	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
American Kestrel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
American Pipit	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	4
American Robin	2	0	0	0	1	0	0	0	0	0	0	0	0	2	0	7	1	0	1	0	14
Ash-throated Flycatcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Barn Owl	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
Barn Swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Bewick's Wren	0	0	0	0	0	0	0	0	2	0	0	0	0	2	0	16	0	0	0	0	20
Black-billed Magpie	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	22
Black-necked Stilt	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Black-throated Gray Warbler	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	15
Black-throated Sparrow	0	147	15	0	18	0	0	0	4	0	0	1	0	0	0	1	5	0	4	0	195
Blue-gray Gnatcatcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	2	0	0	0	18
Brewer's Blackbird	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	24
Brewer's Sparrow	0	50	0	0	9	0	0	0	1	0	0	3	0	0	0	10	3	3	20	0	99
Broad-tailed Hummingbird	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4
Brown-headed Cowbird	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Burrowing Owl	0	16	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	19

Table D-1. Summary of Species Detections by Habitat Type

	Habitat																				
				e ا		1		1		r	Нар	itat			r						
Species	Arroyo Willow Wet Shrubland*	Bailey's Greasewood Shrubland	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	Big Sagebrush - Mixed Shrub Dry Stepp & Shrubland	Black Sagebrush Steppe & Shrubland	Cheatgrass Ruderal Grassland	Fourwing Saltbush - Rubber Rabbitbrush Desert Wash	Great Basin Fremont Cottonwood Riparian Forest*	Intermountain Greasewood Wet Shrubland	Microphytic Playa	Mojave Seablite - Red Swampfire Alkaline Wet Scrub	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	Rubber Rabbitbrush - Sand Buckwheat Four-part Horsebrush Sparse Scrub	Ruderal Tamarisk Riparian Scrub*	Shadscale Saltbush Scrub	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland	Utah Juniper/Shrub Understory Woodland	Western Baltic Rush - Mexican Rush Wet Meadow*	Wyoming Big Sagebrush Dry Steppe & Shrubland	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	Total
Bushtit	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	64	7	0	0	0	83
California Quail	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	3
Canyon Wren	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Cassin's Finch	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	8
Chipping Sparrow	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	13
Chukar	0	8	10	0	12	2	0	0	1	0	0	0	0	0	0	12	27	0	4	0	76
Clark's Nutcracker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	1	0	0	0	40
Common Nighthawk	0	11	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	14
Common Poorwill	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	8
Common Raven	0	131	13	0	21	17	0	0	9	1	2	0	0	1	1	544	22	1	23	0	786
Common Yellowthroat	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	2
Cooper's Hawk	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Dark-eyed Junco	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	43	0	0	0	0	48
Downy Woodpecker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Dusky Flycatcher	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5
European Starling	0	0	0	0	0	0	0	0	1	0	0	0	0	66	0	14	0	3	0	0	84
Golden Eagle	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	6
Gray Flycatcher	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	4
Great Horned Owl	0	5	2	0	0	0	1	0	6	0	0	1	0	0	0	7	3	0	0	0	25
Greater Sage-grouse	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hairy Woodpecker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5
Horned Lark	0	1,186	1	0	33	243	0	0	67	3	0	33	9	0	1	0	298	0	35	5	1,914
House Finch	0	1	0	0	2	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	5

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	Habitat																				
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Species	Arroyo Willow Wet Shrubland*	Bailey's Greasewood Shrubland	Basin Big Sagebrush - Foothill Big Sagebrush Dry Steppe & Shrubland	Big Sagebrush - Mixed Shrub Dry Stepp & Shrubland	Black Sagebrush Steppe & Shrubland	Cheatgrass Ruderal Grassland	Fourwing Saltbush - Rubber Rabbitbrush Desert Wash	Great Basin Fremont Cottonwood Riparian Forest*	Intermountain Greasewood Wet Shrubland	Microphytic Playa	Mojave Seablite - Red Swampfire Alkaline Wet Scrub	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	Rubber Rabbitbrush - Sand Buckwheat Four-part Horsebrush Sparse Scrub	Ruderal Tamarisk Riparian Scrub*	Shadscale Saltbush Scrub	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland	Utah Juniper/Shrub Understory Woodland	Western Baltic Rush - Mexican Rush Wet Meadow*	Wyoming Big Sagebrush Dry Steppe & Shrubland	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	Total
Juniper Titmouse	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31	1	0	0	0	32
Killdeer	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	4
Lark Sparrow	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	5
Lazuli Bunting	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4
Lesser Goldfinch	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	3
Loggerhead Shrike	0	5	0	0	4	2	0	0	0	0	0	0	0	0	0	0	4	0	1	0	16
Long-eared Owl	0	1	2	0	1	0	0	0	12	0	0	0	0	2	0	8	0	0	2	0	28
Merlin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Mountain Bluebird	0	4	0	0	6	0	0	0	7	0	0	0	0	21	0	36	22	0	6	0	102
Mountain Chickadee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29	0	0	0	0	29
Mourning Dove	0	9	9	0	2	1	0	0	3	0	0	0	0	0	0	4	0	1	3	0	32
Northern Flicker	0	1	0	0	5	0	0	0	1	0	0	0	0	0	0	44	1	0	0	0	52
Northern Harrier	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3
Northern Pygmy-Owl	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
Northern Saw-whet Owl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2
Northern Shoveler	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	4
Peregrine Falcon	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pine Siskin	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	17	0	0	0	37
Pinyon Jay	0	7	1	0	19	0	0	0	0	0	0	0	0	0	0	75	194	0	101	0	397
Plumbeous Vireo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	8
Prairie Falcon	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
Red-breasted Nuthatch	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	105	0	0	0	0	105
Red-tailed Hawk	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	4

	Habitat																				
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Red-winged Blackbird	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	1	0	29	0	0	40
Rock Wren	0	26	2	3	9	0	0	0	7	0	0	0	0	0	0	5	1	0	2	0	55
Rough-legged Hawk	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3
Sage Thrasher	0	8	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	1	0	14
Sagebrush Sparrow	0	115	25	0	28	1	0	0	14	0	0	8	0	0	0	1	5	1	30	2	230
Savannah Sparrow	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	6
Say's Phoebe	0	7	0	0	5	1	0	0	0	0	0	0	0	0	0	1	3	0	0	0	17
Short-eared Owl	0	1	3	0	0	0	0	0	2	0	0	0	0	0	0	1	1	1	0	0	9
Song Sparrow	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	3
Spotted Towhee	0	0	0	0	4	0	0	0	0	0	0	0	0	2	0	50	7	0	1	0	64
Swainson's Thrush	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3
Townsend's Solitaire	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1
Tree Swallow	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
Turkey Vulture	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Western Bluebird	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Western Kingbird	0	1	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	2	0	0	8
Western Meadowlark	0	29	13	0	8	0	0	0	4	0	0	0	0	0	0	4	31	3	2	0	94
Western Screech-Owl	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	25	3	0	0	0	31
Western Tanager	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
Western Wood-Pewee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
White-crowned Sparrow	0	5	0	0	0	0	0	0	2	0	0	0	0	23	0	0	0	0	0	0	30
White-throated Swift	0	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	4
Wilson's Snipe	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	6	0	0	8

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	Habitat																				
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	Fourwing Saltbush - Rubber Rabbitbrush Desert Wash	Great Basin Fremont Cottonwood Riparian Forest*	Intermountain Greasewood Wet Shrubland	Microphytic Playa	Mojave Seablite - Red Swampfire Alkaline Wet Scrub	Mojave-Sonoran Burrobush - Sweetbush Desert Wash Scrub	Rubber Rabbitbrush - Sand Buckwheat - Four-part Horsebrush Sparse Scrub	Ruderal Tamarisk Riparian Scrub*	Shadscale Saltbush Scrub	Singleleaf Pinyon - Utah Juniper/Shrub Understory Woodland	Utah Juniper/Shrub Understory Woodland	Western Baltic Rush - Mexican Rush Wet Meadow*	Wyoming Big Sagebrush Dry Steppe & Shrubland	Yellow Star-thistle - Dyer's Woad - Prickly Russian-thistle Ruderal Annual Forb	Total
Woodhouse's Scrub-Jay	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	43	3	0	2	0	57
Yellow Warbler	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	2
Yellow-rumped Warbler	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Total Detections	7	1,854	108	8	199	270	1	3	176	5	2	50	9	126	2	1350	670	62	242	9	5,153
Total Species	2	38	21	2	24	10	1	1	29	3	1	9	1	13	2	59	30	18	20	4	92

Table D-1. Summary of Species Detections by Habitat Type

Note: *Riparian alliance.