3.5 BIOLOGICAL RESOURCES

3.5.1 INTRODUCTION

3.5.1.1 Overview

This section addresses biological resources, including vegetation, mammals, birds, fish, reptiles, and amphibians. The Study Area for biological resources includes all lands that lie beneath the existing Fallon Range Training Complex (FRTC) special use airspace (SUA) (see Figure 1-1) as well at the airspace itself. With the exception of noise, potential direct and indirect effects of the Proposed Action to biological resources would be limited to certain areas within ground ranges of the FRTC. Accordingly, the analysis focuses on these ranges, but also considers the effects of noise on wildlife (fish, birds, mammals, and reptiles/amphibians) beneath the existing SUA.

The Affected Environment section is organized by major groups (vegetation, mammals, birds, fish, and amphibians/reptiles). General descriptions are provided for each group, followed by detailed descriptions of any "special status species" in that group. For the purposes of this Environmental Impact Statement (EIS), special status species include:

- Species listed as threatened or endangered under the Endangered Species Act of 1973 (ESA) and species proposed for listing.
- Species considered by the United States (U.S.) Fish and Wildlife Service (USFWS) as a candidate for ESA listing.
- Species of concern identified by USFWS. As an informal category not defined by the ESA, the term commonly refers to species that are declining or appear to be in need of conservation. The USFWS Nevada Ecological Services Field Office maintains a list of species of concern (U.S. Fish and Wildlife Service 2013a) for the region.
- Birds of conservation concern identified by USFWS for Bird Conservation Region 9 (U.S. Fish and Wildlife Service 2008). The overall goal of this category is to accurately identify those species (beyond those already federally listed as threatened or endangered) in greatest need of conservation action at three different geographic scales (Bird Conservation Regions, USFWS Regions, and national).
- Species classified as threatened, endangered, protected, or sensitive under the Nevada Natural Heritage Program.

The Environmental Consequences section presents an analysis of the potential impacts of the No Action Alternative, Alternative 1, and Alternative 2. For each alternative, the analysis is organized by potential stressors (noise, physical disturbance and strikes, electromagnetic radiation and lasers, and secondary stressors). The analysis for each stressor begins with an overview of the potential effects on wildlife in general, and then provides more detailed analysis for specific groups of wildlife and special status species, as appropriate.

3.5.1.2 Regulatory Framework and Management Practices

3.5.1.2.1 Endangered Species Act

The ESA of 1973 (16 U.S. Code [U.S.C.] 1531–1543) established protection over and conservation of threatened and endangered species and the ecosystems on which they depend. An "endangered" species is a species that is in danger of extinction throughout all or a significant portion of its range, while a "threatened" species is one that is likely to become endangered within the foreseeable future throughout all or in a significant portion of its range. The USFWS and National Marine Fisheries Service

(NMFS) administer the ESA. The USFWS has primary responsibility for terrestrial and freshwater species, while the NMFS has primary responsibility for marine species and anadromous fish species (species that migrate from saltwater to freshwater to spawn). No species under NMFS jurisdiction are found on lands of the FRTC. The ESA allows the designation of geographic areas as critical habitat for threatened or endangered species.

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Section 7(a)(2) requires each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action "is likely to adversely affect" a listed species, that agency is required to consult formally with USFWS or the NMFS, depending upon the species or designated critical habitat that may be affected by the action (50 Code of Federal Regulations [C.F.R.] 402.14(a)). Under the terms of Section 7(b)(4) and Section 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act, provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement. For species that are proposed for listing as endangered or threatened, Section 7(a)(4) of the ESA requires agencies to confer with the USFWS on any agency action that is likely to jeopardize the continued existence of the species. Three species of fish (Cui-ui [*Chasmistes cujus*], Lahontan cutthroat trout [*Onchoryhncus clarkia henshawi*], and Railroad Valley Springfish [*Crenichtys nevadae*]) and one amphibian (Columbian spotted frog [*Rana luteiventris*]) are currently either listed or proposed for listing under ESA. Since the publication of the Draft EIS, the USFWS has determined that the Bi-State population of greater sage-grouse (*Centrocercus urophasianus*) does not require the protection of the ESA (80 FR 22827) and has removed the Bi-State greater sage-grouse from the list of candidate species. Further, an unprecedented, landscape-scale conservation effort across the western United States has significantly reduced threats to the greater sage-grouse across 90 percent of the species' breeding habitat and enabled the USFWS to conclude that the greater sage grouse does not warrant protection under ESA (Docket Number FWS–R6–ES–2015–0146). This collaborative, science-based greater sage-grouse strategy is the largest land conservation effort in U.S. history.

3.5.1.2.2 Federal Noxious Weed Act

The Federal Noxious Weed Act of 1974 was enacted in 1975 with the purpose of managing and controlling the spread of noxious weeds. Pursuant to the Act, the U.S. Secretary of Agriculture was given the authority to declare plants "noxious weeds," and limit the interstate spread of such plants without a permit. The Federal Noxious Weed Act was amended by the Farm Bill on November 28, 1990. The amendment requires all federal land managing agencies to (1) designate an office or person trained in managing undesirable plant species to develop and coordinate a program to control such plants on the agency's land, (2) ensure that the agency's budget process adequately funds the plant management program, (3) develop and implement cooperative agreements with the States regarding undesirable plants on agency land, and (4) establish integrated management systems to control or contain undesirable plants targeted under the cooperative agreements.

3.5.1.2.3 Executive Order 13112, *Invasive Species*

Executive Order (EO) 13112, *Invasive Species*, directs federal agencies whose actions may affect the status of invasive species to use relevant programs and authorities to:

- Prevent the introduction of invasive species.
- Detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner.
- Monitor invasive species populations accurately and reliably.

In addition, agencies may not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species unless the agency has determined that the benefits of such actions clearly outweigh the potential harm. All feasible and prudent measures to minimize risk of harm must also be taken in conjunction with the actions.

3.5.1.2.4 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 (16 U.S.C. 703 *et seq.*) and the Migratory Bird Conservation Act (16 U.S.C. 715–715d, 715e, 715f–715r) of February 18, 1929 (45 Stat. 1222) are the primary legislation in the United States established to conserve migratory birds. The MBTA prohibits the taking, killing, or possessing of migratory birds or the parts, nests, or eggs of such birds, unless permitted by regulation. The list of species protected by the MBTA appears in 50 C.F.R. 10.13 and represents almost all avian families found in North America. With the exception of the following non-migratory species, California quail (*Callipepla californica*), European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), rock pigeon (*Columba livia*), and ring-necked pheasant (*Phasianus colchicus*), all bird species recorded at the FRTC are protected by the MBTA.

Pursuant to EO 13186 (January 21, 2001), *Responsibilities of Federal Agencies to Protect Migratory Birds*, the Department of Defense (DoD) and USFWS developed a Memorandum of Understanding to Promote the Conservation of Migratory Birds. The original Memorandum of Understanding was signed in July 2006, and the replacement was signed in September 2014. The Memorandum of Understanding describes specific actions that should be taken by the Department of Defense (DoD) to advance migratory bird conservation, avoid or minimize the take of migratory birds, and ensure DoD activities (other than military readiness activities) are consistent with the MBTA. The Memorandum of Understanding also describes how DoD and USFWS will work together cooperatively to achieve these ends. The *Integrated Natural Resource Management Plan and Environmental Assessment for Naval Air Station Fallon, Nevada* (U.S. Department of the Navy 2006) and *Integrated Natural Resource Management Plan* (U.S. Department of the Navy 2014) are designed to be in compliance with the requirements of the DoD and USFWS Memorandum of Understanding.

On December 2, 2003, the President signed the 2003 National Defense Authorization Act. The Act provides that the Secretary of the Interior shall exercise his/her authority under the MBTA to prescribe regulations to allow the incidental taking of migratory birds by the Armed Forces during military readiness activities authorized by the Secretary of Defense. Congress defined military readiness activities as all training and operations of the Armed Forces that relate to combat and the adequate and realistic testing of military equipment, vehicles, weapons, and sensors for proper operation and suitability for combat use. Congress further provided that military readiness activities do not include the following:

- The routine operation of installation operating support functions, such as administrative offices, military exchanges, commissaries, water treatment facilities, storage facilities, schools, housing, motor pools, laundries, morale, welfare, recreation activities, shops, and mess halls
- The operation of industrial activities

- The construction or demolition of facilities used for a purpose described in the previous two bullets

The Final Rule authorizing the DoD to take migratory birds during military readiness activities was published in the Federal Register (FR) on February 28, 2007 (50 C.F.R. Part 21.15). The regulation provides that the Armed Forces must confer and cooperate with USFWS on the development and implementation of conservation measures to minimize or mitigate adverse effects of a military readiness activity if it determines that such activity may have a "significant adverse effect" on a population of a migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem. As used here, population means a group of distinct, coexisting, conspecific individuals (i.e., organisms of the same species), whose breeding site fidelity, migration routes, and wintering areas are temporally and spatially stable, sufficiently distinct geographically (at some time of the year), and adequately described so that the population can be effectively monitored to discern changes in its status.

3.5.1.2.5 Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (Eagle Act) prohibits killing, selling, or otherwise harming eagles, their nests, or eggs. Specifically, the Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald or golden eagles, including their parts, nests, or eggs. The Act defines "take" as pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb. "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle; (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

3.5.1.2.6 Sikes Act

The Sikes Act (16 U.S.C. 670) of 1960 ensures cooperation by the Department of the Interior and DoD with State agencies in planning, development, and maintenance of fish and wildlife resources on military reservations throughout the U.S. Chief of Naval Operations Instruction (OPNAVINST) 5090.1D and the Office of the Chief of Naval Operations (OPNAV) Manual (M) (OPNAV M-5090.1), Environmental Readiness Program Manual discuss requirements, delineate responsibilities, and issue policy for the management of the environment and natural resources for all U.S. Department of the Navy (Navy) shore activities. In order to comply with the Sikes Act, the Navy developed an Integrated Natural Resource Management Plan (INRMP) in July 2014 to ensure that natural resources conservation measures and military operations on Naval Air Station (NAS) Fallon and NAS Fallon-administered lands are integrated and consistent with stewardship and legal requirements. The INRMP ensures consistency with the use of NAS Fallon and NAS Fallon-administered lands to support the preparedness of the Armed Forces, while providing for the following: (1) the conservation and rehabilitation of natural resources on NAS Fallon-administered lands; (2) the sustainable multipurpose use of the resources, including hunting, fishing, trapping, and non-consumptive uses; and (3) public access to NAS Fallon-administered lands within safety and military security requirements.

3.5.1.2.7 Wild Free-Roaming Horse and Burro Act

The Wild Free-Roaming Horse and Burro Act (Public Law 92-195), signed December 15, 1971, and amended in 1976 by the Federal Land Policy and Management Act (Public Law 94-579), provides the

parameters by which these species are to be managed. These guidelines stipulate the determined control of these species based on their importance as a cultural icon and the possible damages they may impose on native flora and fauna. Their habitats, as well as daily and seasonal movements, are typically determined by water availability (U.S. Department of the Navy 2008). The Bureau of Land Management (BLM) Stillwater Field Office manages wild horse and burros in this area in accordance with the Wild Free-Roaming Horses and Burro Act (U.S. Department of the Navy 2014).

3.5.1.2.8 Nevada Endangered and Sensitive Species Laws and Regulations

For purposes of National Environmental Policy Act analysis, this EIS considers potential effects on species that are classified by the state as endangered, threatened, protected, or sensitive. As discussed in Section 3.5.1.1 (Overview), these species are collectively referred to as special status species in this EIS, along with species that are federally listed, proposed for listing, or classified as candidates for listing under ESA.

Under state law the Fish and Wildlife Commission through the Nevada Department of Conservation and Natural Resources maintains the list of native wildlife species and plants in Nevada that have been determined to be either threatened, endangered, protected, or sensitive according to criteria set forth by rule (Nevada Revised Statues 501.105, 501.181). The classification of sensitive species helps focus wildlife management and research activities to prevent species from further decline. The state uses the following classification terms:

- Endangered – A species or subspecies of wildlife may be classified as endangered when a species or subspecies is in danger of extinction throughout all or a significant portion of its range.
- Threatened – A species or subspecies of wildlife may be classified as threatened when a species or subspecies is likely to become an endangered species in the near future throughout all or a significant portion of its range.
- Protected – A species or subspecies of wildlife may be classified as protected if one of the following criteria exists: the wildlife is found only in this State and its population; distribution or habitat is limited; the wildlife has a limited population or distribution within this State that is likely to decline as a result of human or natural causes; the population of the wildlife is threatened as a result of the deterioration or loss of its habitat; the wildlife have ecological, scientific, educational, or other value that justifies its classification as protected; the available data is not adequate to determine the exact status of the population of the wildlife, but does indicate a limited population, distribution or habitat; the wildlife is listed by the USFWS in the FR as a candidate species, or it is classified as threatened or endangered in the federal ESA; or other evidence exists to justify classifying the wildlife as protected.
- Sensitive – A species or subspecies of wildlife may be classified as sensitive if one of the following criteria exists: the population or distribution of the wildlife is in a significant decline; the population of wildlife is threatened as a result of disease, predation, or ecological or human causes; the primary habitat of the wildlife is deteriorating; the wildlife is listed by the USFWS in the FR as a candidate species or is classified as threatened or endangered in the federal ESA.

3.5.1.3 Approach to Analysis

3.5.1.3.1 Vegetation

The impact analysis for vegetation considered effects of the Proposed Action on plant communities and populations. Potential changes in plant communities arising from invasive species and wildfire were also

considered. The significance of impacts on vegetation was considered in the context of local plant communities and populations of special status plant species. Factors used in determining the significance of impacts on vegetation included the amount of habitat permanently lost, in relationship to the abundance of that habitat and the extent to which proposed activities would contribute to existing invasive plant management issues.

3.5.1.3.2 Wildlife

The impact analysis for wildlife (fish, birds, mammals, and reptiles/amphibians) considered effects of the Proposed Action on individual animals and populations. The analysis first looked at how individuals would respond to a stressor or combination of stressors and whether the response would affect the fitness of an individual. Fitness refers to changes in an individual's growth, survival, annual reproductive success, or lifetime reproductive success. If individual fitness is not affected, then no impacts on populations would be expected. The potential for impacts to occur at the population level depends on several things, including whether individual fitness has been reduced, the number of individuals affected, the size of the affected population, and numerous life history and ecological factors.

The significance of impacts on wildlife was considered in the context of populations. A population is broadly defined as a group of animals of one species that interbreed and live in the same place at the same time. The geographic scale used to define a particular wildlife population is influenced by species-specific life history characteristics such as migratory and breeding behavior, as well as ecological factors such as habitat availability and barriers to migration or dispersal. These species-specific characteristics and ecological factors are discussed in more detail in Section 3.5.2 (Affected Environment). In particular, impacts on special status wildlife species were considered because populations of these species have declined historically or are currently declining on a regional or national level.

Impacts on wildlife would be determined significant if the fitness of individual animals were affected directly or indirectly to the extent that populations would decline or become unstable. For an outcome to be biologically significant to a population, it must have a measurable impact on the population and/or its habitat that could reasonably be expected to affect its stability, and as a result influence a population's viability. The scientific limitations associated with predicting the responses of individuals and populations to stressors create a relatively high degree of uncertainty. Accordingly, a conservative approach was used in making significance determinations when the level of uncertainty was considered high.

3.5.2 AFFECTED ENVIRONMENT

3.5.2.1 Vegetation

In this document, only vegetative communities are discussed for areas where ground disturbing activities may occur. The majority of the area in and around the FRTC Study Area is desert habitat. Elevation ranges from mountains of nearly 8,000 feet (ft.) (2,438.4 meters [m]) to playas around 3,300 ft. (1,005.8 m). Most of the habitats are new alluvial fans or old fans transformed into desert mounds. There are some hillside and mountain habitats as well. The dominant shrub over much of this land is Bailey's greasewood (*Sarcobatus baileyi*). In the sections below, unless otherwise noted, all species are considered native to the area.

3.5.2.1.1 Naval Air Station Fallon Main Station

NAS Fallon (Figure 3.5-1) is in the Lahontan Valley of the Carson Desert. The air station itself is situated in a large closed drainage basin (basin floor habitat), where the soils are predominantly clay, have a

large content of salts and other minerals, and are low in nutrients. Industrial facilities and residential areas have been developed within the base property boundaries. Most of the lands surrounding the developed central portions of NAS Fallon are managed as part of the greenbelt and are currently in agricultural production, are fallow, or are disturbed. Native upland habitats that are still present within the base boundaries include relatively small isolated areas of playa and sandy habitats, with more extensive occurrences of basin floor habitats in the southwestern and southeastern portions of the property. The native habitats within the base boundaries have sodic or strongly alkaline soils with greasewood (*Sarcobatus vermiculatus*) as the dominant or co-dominant shrub.

3.5.2.1.2 Bravo-16

The central portion of Bravo-16 (B-16) (Figure 3.5-1) is occupied primarily by piedmont slope habitats surrounded by, and sometimes interspersed with, sandy habitats on the eastern and western portions of the training range. The piedmont slope habitats include a narrow band of badlands bordered on the east by a wide band of gravelly loam slopes vegetated with desert shrub habitat that is dominated by Bailey greasewood. Bailey greasewood, fourwing saltbush (*Atriplex canescens*), and Indian ricegrass (*Achnatherum hymenoides*) are the dominant plant species in the sandy habitats on the western portion of B-16. Sodic sands and stable dunes dominated by greasewood are the prevalent sandy habitats in the eastern portion of B-16.

The northern part of B-16 is comprised primarily of two distinct vegetation types, rabbitbrush (*Chrysothamnus* spp.) and Bailey's greasewood. The southern part of B-16 is predominantly covered by unvegetated playas. The dominant vegetation type away from the playas is a mixture of greasewood-Bailey's greasewood-seepweed (*Suaeda moquinii*).

3.5.2.1.3 Bravo-17

Bravo 17 (B-17) (Figure 3.5-1) has a high diversity of distinct plant communities, with 52 vegetation types. More than half of the range is covered by Bailey's greasewood either as the sole dominant or in combination with as many as 14 other species, including 3 perennial grasses. The most widely distributed vegetation consists of Bailey's greasewood-spiny hopsage (*Grayia spinosa*)-shadscale (*Atriplex conterfolia*).

The predominant habitats on B-17 are classified as piedmont slope habitats. There is a large playa in the northwestern portion of the range bordered on the east side by a small area of basin floor habitat. The basin floor habitat at this site is a sodic flat characterized by greasewood and alkali seepweed. Sandy habitat that supports fourwing saltbush and Indian ricegrass is intermixed with piedmont slope habitats on the western half of B-17. The piedmont slope habitats are lower in elevation on the western side of the training range and gradually increase in elevation toward the east, where B-17 is bordered by Fairview Peak. The piedmont slope habitats are vegetated with a mosaic of desert shrub communities that may be dominated by Bailey greasewood, shadscale, seepweed, or a combination of these (U.S. Department of Navy 2014). Indian ricegrass is common in the grass and forb layer of the lower piedmont slopes on B-17. Sagebrush dominated habitats are present in higher elevations along the eastern portion of B-17. These habitats are dominated by black sagebrush (*Artemisia nova*) or Wyoming big sagebrush (*Artemisia tridentata var. wyomingensis*).

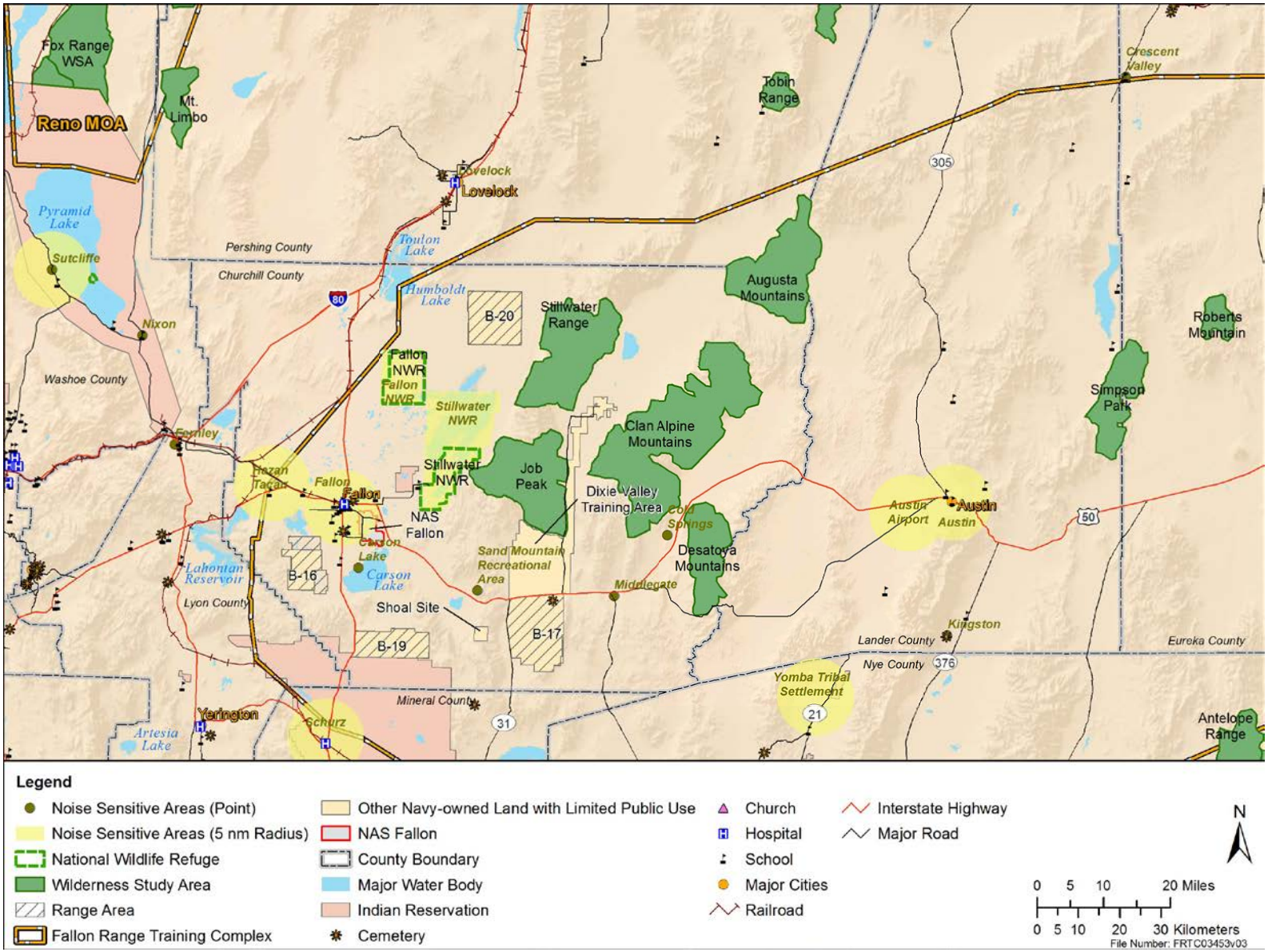

Figure 3.5-1: FRTC Study Area

3.5.2.1.4 Bravo-19

Sandy habitats, including large areas of unvegetated dunes, are prevalent on this site. There is a large playa surrounded by a moist saline flat area in the southwestern portion of Bravo-19 (B-19) (Figure 3.5-1). Within the moist saline flat area, iodinebush (*Allenrolfea occidentalis*), seepweed, and greasewood are the dominant shrubs, with inland saltgrass present in the understory. The sandy habitats include sodic sands, sodic dunes, stable dunes, and sandy range sites, all of which have fourwing saltbush as dominant or co-dominant in the shrub layer. Bailey greasewood, greasewood, seepweed, and horsebrush (*Tetradymia tetrameres*) are also present in varying amounts. Indian ricegrass is prevalent in most of the sandy habitats. Small localized piedmont slope habitats are interspersed with the sandy habitats throughout B-19. These are low elevation slopes with rocky or gravelly soils, and Bailey greasewood is the dominant shrub. One area classified as badlands is present in the south-southeast portion of B-19.

3.5.2.1.5 Bravo-20

B-20 (Figure 3.5-1) is situated in a large playa. Near the center of the training range is Lone Rock, a volcanic outcrop surrounded by a zone of dune habitat in the center of the range. The dune habitat on B-20 is vegetated with desert shrubs, primarily greasewood and seepweed.

3.5.2.1.6 Dixie Valley Training Area

Dixie Valley (Figure 3.5-1) is composed of a mosaic of vegetation communities. A significant portion of the valley is composed of remnant livestock and agricultural farmland with abandoned outbuildings. Basin habitats within the valley floor are characterized by greasewood, Torrey quail bush (*Atriplex lentiformis*), Great Basin wild rye (*Leymus cinereus*), and seepweed. South Dixie Valley includes numerous wetlands associated with flowing wells, and isolated areas of sandy habitats (U.S. Department of Navy 2008). These wetlands are typically streams and washes that supports vegetation such as cottonwoods, willows, cattails, and bulrushes.

There are several invasive plant species in Dixie Valley, such as tamarisk (*Tamarix* spp.), whitetop (*Lepidium latifolium*), cheatgrass (*Bromus tectorum*), knapweeds, and Russian olives (*Elaeagnus angustifolius*). The Navy has implemented a control program for the invasive plants in Dixie Valley and has removed hundreds of tamarisk and Russian olives. Approximately 500 acres (ac.) of Russian knapweed (*Acroptilon repens*) and whitetop are being treated with herbicides and monitored for continued treatment.

Horse Creek Ranch

Piedmont slope habitats are present on the western side of the parcel and grade into sagebrush-dominated habitats on the east side. Horse Creek flows from the Clan Alpine Mountains to Dixie Valley and is the only perennial stream on Navy lands. At least half of the western portion of the property was historically used for agriculture and abandoned when the Navy took ownership in 1986. The remaining piedmont slope habitat is vegetated with desert shrubs dominated by Bailey greasewood. An area classified as sagebush-dominated habitat occurs on the alluvial terrace bordering Horse Creek and is actually dominated by light-gray rabbitbrush and other shrub species indicative of past disturbance. Environmental conditions are such that a return to sagebrush dominance would be expected eventually, hence the classification. The vegetation grades into Wyoming big sagebrush and Bailey greasewood on the upper slopes. Riparian woodland and wetlands communities are associated with Horse Creek itself. The wetlands habitats include vegetation such as yellow willow (*Salix lutea*), coyote willow (*Salix exigua*), and salt cedar (*Tamarix ramosissima*) (U.S. Department of Navy 2008).

South Dixie Valley, Kyle Lane (Dearing) Property

The northern half of this property is piedmont slope habitat dominated by winterfat (*Krascheninnikovia lanata*) and Indian ricegrass, with Bailey greasewood scattered in the shrub layer. The southern half of this property is classified as inactive agricultural, which is land that was previously used for agricultural purposes but is not currently in use.

South Dixie Valley, Cattle Road

The majority of this property is classified as inactive agricultural. Natural habitats that remain include sandy habitats and a small area of basin floor habitat in the southwest corner of the site. The sandy habitats support desert shrubs such as greasewood, alkali seepweed, and fourwing saltbush. The basin floor habitat is characterized by greasewood, Torrey quailbush, and seepweed.

South Dixie Valley, Settlement Road

All of the properties included in this area are primarily basin floor habitats interspersed with numerous wetlands associated with flowing wells, and isolated areas of sandy habitats. The wetlands habitats include vegetation such as southern cattail (*Typha dominguensis),* common three-square bulrush (*Scirpus pungens*)*,* and red willow (*Salix laevigata*) (U.S. Department of Navy 2008).The basin floor habitats are dominated by greasewood. The sandy habitats are sodic dunes with high shrub cover dominated by greasewood.

Dixie Meadows

Large portions of these properties are occupied by wetlands fed by springs flowing hot water at some locations and cold water at other locations. The wetlands are seasonally flooded and have a dense cover of bulrushes (*Scirpus spp.*), cattails (*Typha spp.*), and Baltic rush (*Juncus balticus*). Interspersed with the wetlands are areas of basin floor and piedmont slope habitats. The basin floor habitats in the central parcel are sodic fans vegetated with greasewood, Torrey quailbush, and basin wildrye. The basin floor habitats on the northern and southern parcels are sodic flats with greasewood as the dominant shrub and saltgrass present in the understory. The piedmont slope habitats are similar, with Bailey greasewood as the dominant shrub and grasses and forbs sparse in the understory.

North Dixie Valley, Bar A-3 Ranch (Boneck Property)

The majority of this property is classified inactive agricultural, with basin floor and piedmont slope habitats present at the eastern portion. The basin floor habitat is a sodic fan vegetated with greasewood, Torrey quailbush, and Great Basin wildrye. The small area of piedmont slope habitat is dominated by Bailey greasewood, with shadscale and Indian ricegrass also common.

North Dixie Valley (Boyer, Goeringer, Brinkerhoff)

This site includes inactive agricultural, disturbed, piedmont slope, sandy, and wetland habitats. The sandy habitats are sodic sands dominated by greasewood with alkali seepweed, fourwing saltbush, and Indian ricegrass sometimes present. The piedmont slope habitats on the eastern and western parcels are vegetated with Bailey greasewood, shadscale, and Indian ricegrass. The piedmont slope habitat in the central parcel is valley wash, in which the vegetation is affected by frequent flooding. Species that occur in the valley wash habitat include both successional species and species commonly found in adjacent, more stable, habitats and may include littleleaf horsebrush (*Tetradymia glabrata*), rubber rabbitbrush (*Chrysothamnus nauseosus*), hopsage, Indian ricegrass, bottlebrush squirreltail (*Elymus elymoides*), greasewood, and Bailey greasewood. The vegetation varies spatially within the area designated as valley wash due to the presence of channels and intervening, less recently flooded areas.

3.5.2.1.7 Special Status Plant Species

Per the USFWS Information, Planning, and Conservation System, and the Integrated Natural Resources Management Plan for FTRC, there are no Federally listed plant species known to exist on Navy-administered lands of the FRTC (U.S. Department of the Navy 2014). However, there are four species of plants (Nevada oryctes [*Oryctes nevadensis*], Sand cholla [*Grusonia pulchella*], Lahontan indigo bush [*Psorothamnus kingii*], and Lahontan beardtongue [*Penstemon palmeri*]) that are State-listed that could occur on NAS Fallon-administered lands (none greater than an S2S3 status, between Imperiled and Vulnerable).

3.5.2.2 Mammals

3.5.2.2.1 Overview

Common mammals observed on NAS Fallon or within habitats nearby include desert woodrat (*Neotoma lepida*), deer mouse (*Peromyscus maniculatus*), pocket gophers (*Thomomys* spp.), cottontail rabbits (Sylvilagus spp.), jackrabbits (*Lepus* spp.), coyote (*Canis latrans*), and mule deer (*Odocoileus hemionus*). Common bats include the California myotis (*Myotis californicus*), small-footed myotis (*Myotis leibii*), long-eared myotis (*Myotis evotis*), Brazillian free-tailed bat (*Tadarida brasiliensis*), and the big brown bat (*Eptesicus fuscus*) (U.S. Department of the Navy 2013a). Table 3.5-1 shows mammal species that are known to occur or potentially occur at FRTC based on ecological surveys of the complex (U.S. Department of the Navy 2008, 2014).

Table 3.5-1: Mammal Species Known to Occur or Potentially Occurring at Fallon Range Training Complex

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
badger	*Taxidea taxus*		X		X		X	X		
beaver	*Castor canadensis*	FM						X	X	
big brown bat	*Eptesicus fuscus*							X	X	X
bighorn sheep	*Ovis canadensis*	GM			X			X		
black-tailed hare	*Lepus californicus*		X		X		X		X	
bobcat	*Lynx rufus*	FM	X		X					
Brazillian free-tailed bat	*Tadarida basilliensis*	PM	X		X			X	X	
burro	*Equus asinus*				X		X	X		
bushytail woodrat	*Neotoma cinerea*				X		X		X	X
California myotis	*Myotis californicus*							X	X	X
canyon mouse	*Peromyscus crinitus*				X		X		X	
cattle	*Bos taurus*		X		X		X	X	X	
cave myotis	*Myotis velifer*				X					
coyote	*Canis latrans*		X		X			X	X	X
dark kangaroo mouse	*Microdipodops megacephalus*	PM	X			X				
deer mouse	*Peromyscus maniculatus*				X		X		X	X
desert cottontail	*Sylvilagus audubonii*	GM	X					X	X	
desert kit fox	*Vulpes macrotis*	FM	X				X			X

Table 3.5-1: Mammal Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
desert woodrat	*Neotoma lepida*						X		X	
fringed myotis	*Myotis thysanodes*	PM			X		X			
golden-mantled squirrel	*Cittelus lateralis*				X					
gopher	*Thomomys talpoides*		X						X	
Great Basin kangaroo rat	*Dipodomys microps*		X			X	X			
Great Basin pocket mouse	*Perognathus parvus*		X						X	
Hairy-winged myotis	*Myotis volans*							X		
hoary bat	*Lasiurus cinereus*							X	X	
horse	*Equus caballus*		X		X		X	X	X	
least chipmunk	*Eutamius minimus*				X					
little brown bat (myotis)	*Myotis lucifugus*							X	X	
long-eared myotis	*Myotis evotis*		X				X			
longtail vole	*Microtus longicaudus*						X		X	X
longtail weasel	*Mustela frenata*						X	X	X	
long-tailed pocket mouse	*Perognathus formosus*				X		X			
Merriam shrew	*Sorex merriami*							X	X	
Merriam's kangaroo rat	*Dipodomys merriami*				X	X	X		X	X
mountain cottontail	*Sylvilagus nuttalli*				X			X		
mountain lion	*Felis concolor*	GM			X					
mule deer	*Odocoileus hemionus*	GM	X		X			X		
muskrat	*Ondatra zibethica*	FM						X	X	
northern grasshopper mouse	*Onychomys leucogaster*				X		X		X	
Ord kangaroo rat	*Dipodomys ordi*				X					X
pale kangaroo mouse	*Microdipodops pallidus*	PM				X				
pallid bat	*Antrozous pallidus*	PM			X					
panamint kangaroo rat	*Dipodomys panamintinus*		X			X			X	
pinyon mouse	*Peromyscus truei*				X		X			
porcupine	*Erethizon dorsatum*				X					
pronghorn antelope	*Antilocapra americana*	GM	X				X			
pygmy rabbit	*Brachylagus idahoensis*	GM			X		X			

Table 3.5-1: Mammal Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
raccoon	*Procyon lotor*							X	X	
red bat	*Lasiurus blossevillii*	SM						X	X	
red fox	*Vulpes fulva*	FM	X		X		X	X	X	
sagebrush vole	*Lagurus curtatus*						X		X	X
shorttail weasel	*Mustela erminea*						X	X	X	
silver-haired bat	*Lasionycteris noctivagans*							X	X	
southern grasshopper mouse	*Onychomys torridus*						X		X	
spotted bat	*Euderma maculatum*	TM			X					
spotted skunk	*Spilogale putorius*		X			X	X		X	
striped skunk	*Mephitis mephitis*		X					X	X	X
Townsend big eared bat	*Corynorhinus townsendii townsendii*	SM	X		X					
Townsend's ground squirrel	*Cittelus townsendi*				X				X	
vagrant shrew	*Sorex vagrans*							X	X	
valley pocket gopher	*Thomomys bottae*		X						X	
western harvest mouse	*Reithrodontomys megalotis*								X	X
western pipistrelle	*Pipistrellus hesperus*				X					
Western small-footed myotis	*Myotis cilioabrum*				X					
white-tailed antelope ground squirrel	*Ammospermophilus leucurus*		X		X	X	X		X	
yellowbelly marmot	*Marmota flaviventris*				X					
Yuma myotis	*Myotis yumanensis*							X		

Notes: AG = Agricultural, BF = Basin Floor Habitat, FM = Nevada State Fur-Bearing Mammal, GM = Nevada State Game Mammal, LS = Landscaped, PL = Playa Habitat, PM = Nevada State Protected Mammal, PS = Piedmont Slope habitat, SG = Sagebrush Habitat, SM = Nevada State Sensitive Mammal, SN = Sandy Habitat, TM = Nevada State Threatened Mammal, WT = Wetland

Source: U.S. Department of the Navy 2008, U.S. Department of the Navy 2014, U.C. Davis 2011

3.5.2.2.2 Special Status Mammal Species

Table 3.5-1 provides a list of special status mammal species that potentially occur at FRTC, as well as information about habitat use and occurrence. The State of Nevada identifies mammal species as threatened, endangered, protected, sensitive, or game/fur-bearing. Game and fur-bearing mammals are identified in Table 3.5-1 but are not described further, as these species are part of active harvesting activities. Descriptions of special status mammal species are provided in the following sections.

Pallid Bat

The pallid bat (*Antrozous pallidus*) is listed as a protected mammal under the Nevada Species of Conservation Priority. It is found year round in a variety of habitats, such as the low desert, brushy terrain, pinyon-juniper, blackbrush, creosote, sagebrush, salt desert scrub habitats, coniferous forest,

and non-coniferous woodlands. The pallid bat hibernates during the winter but periodically arouses to forage and drink water. Threats to the pallid bat include recreational caving, closure of mines for reclamation, renewed mining, and water impoundments. Its range is throughout western North America, from British Columbia's southern interior, south to Queretaro and Jalisco, and east to Texas (Bradley et al. 2006). The pallid bat is found throughout the state of Nevada, primarily in the low and middle elevations (1,800 m), but has been found to occur at over 3,100 m. Population trend data is lacking for pallid bats; however, roosting and habitat requirements are limiting factors for populations (Western Bat Working Group 2005).

Townsend's big-eared bat

The Townsend's big-eared bat (*Corynorhinus townsendii*) is listed as a sensitive mammal under the Nevada Species of Conservation Priority. It is found throughout Nevada from the low desert to high mountain habitats and is concentrated in areas with caves or mines as roosting sites. It ranges from Western Canada and the western United States, to southern Mexico, and there are a few populations in the eastern United States. It is not known to migrate long distances. The Townsend's big-eared bat has had large population declines in the past 40 years in parts of the western states, and roost size reductions have been documented in Nevada (Nevada Department of Wildlife 2012a). Primary threats to Townsend's big-eared bat include disturbance and destruction of roost sites, recreational caving, closure of mines for reclamation, renewed mining, frequent or repeated surveys during hibernation and maternity seasons, water impoundments, loss of building roost, and bridge replacement (Bradley et al. 2006).

Spotted Bat

The spotted bat (*Euderma maculatum*) is listed as a threatened mammal under the Nevada Species of Conservation Priority. Its habitats include low elevation desert scrub to high elevation coniferous forests including pinyon-juniper, sagebrush, riparian, and urban high-rises. Range extends from British Colombia south through the western United States and Mexico. The spotted bat is scattered in distribution throughout Nevada. The patchy distribution is linked to availability of cliff roosting-habitat. As little is known about the population sizes and needs of spotted bats, their rare and patchy distribution, along with habitat loss, collection, recreational rock climbing, water impoundments, grazing, mining operations, and pesticide use are all reasons for the listing of spotted bats as Nevada Species of Conservation Priority (Nevada Department of Wildlife 2012b).

Western Red Bat

The western red bat (*Lasiurus blossevillii*) is listed as a sensitive mammal under the Nevada Species of Conservation Priority. It is found primarily in wooded habitats, including mesquite bosque, cottonwood, and willow riparian areas. The western red bat occurs from southern British Columbia, through the western United States, Mexico, Central Mexico, and possibly to South America (Dudek 2012). Threats to the western red bat include loss and degradation of riparian habitats, agricultural spraying, water impoundments, fire, predation, and collection by humans to be pets. The western red bat is extremely rare in Nevada and has been found in only two locations, one of which was in the Fallon area, another in Dyer (Bradley et al. 2006).

Dark Kangaroo Mouse

The dark kangaroo mouse (*Microdipodops megacephalus*) is listed as a protected mammal under the Species of Conservation Priority in Nevada. The dark kangaroo mouse is a bipedal rodent that moves around by hopping along on its hind legs, much like a kangaroo. It is restricted to the Great Basin Desert, and its distribution is centered in Nevada, although populations extend into neighbor states of

California, Oregon, and Utah. The dark kangaroo mouse inhabits stabilized dunes, sandy soils, fine gravelly soils, valley bottoms, and alluvial fans that are dominated by big sagebrush (*Artemesia tridentata*), rabbitbrush, and horsebrush (*Tetradymia*). There are currently 13 known subspecies of the dark kangaroo mouse, 2 of which are of conservation concern, the Owyhee River kangaroo mouse (*M. m. atrirelictus*) and the Izenhood kangaroo mouse (*M. m. nexus*). The Owyhee River kangaroo mouse is highly distinctive and an isolated population in southern Idaho. The Izenhood kangaroo mouse has an extremely limited distribution in north-central Nevada. There are no current threats to the dark kangaroo mouse; however, their habitat-restricted populations and isolated distributions leave the species vulnerable to habitat alteration. Possible threats to the dark kangaroo mouse populations include the introduction of weedy grasses, cultivation of dry sinks by irrigation, and other human-related habitat changes (Hafner et al. 1998).

Pale Kangaroo Mouse

The pale kangaroo mouse (*Microdipodops pallidus*) is listed as a protected mammal under the Nevada Species of Conservation Priority list. It has a narrower range than the dark kangaroo mouse, lower elevations of Nevada and California in the immediate rain-shadow of the Sierra Nevada, and is mostly confined to the Great Basin of Nevada and parts of surrounding California, Oregon, Idaho, and Utah. The distribution in Nevada is concentrated in the west-central portion of the state. The pale kangaroo mouse prefers valley bottoms containing stabilized dunes with fine wind-blown sand. It ranges from elevations of 1,188 to 1,737 m and in zones dominated by big sagebrush, saltbush, and greasewood. There are five subspecies known and one of conservation concern, *M. p. restrictus*. Like the dark kangaroo mouse, threats to the pale kangaroo mouse population include human-related habitat change, and natural shifts in vegetative zones (Hafner et al. 1998).

Fringed myotis

The fringed myotis (*Myotis thysanodes*) is a bat that is listed as a protected mammal under the Nevada Species of Conservation Priority list. The fringed myotis ranges through much of western North America, from southern British Columbia, Canada; to Chiapas, Mexico; Santa Cruz Island, California; and east to the South Dakota Black Hills. The distribution of the species is patchy, and is more commonly found in drier woodlands, as well as desert scrub, mesic coniferous forest, grassland, and sage-grass steppe (Weller et al. 2005). It is known to occur in central and southern Nevada and may also occur in northern Nevada. The species is state protected in Nevada, and is widely distributed but rare in the state. There have been reports of an increase in numbers or area occupied in southern Nevada. Threats to the fringed myotis include recreational caving, mine reclamation, renewed mining, water impoundments, building demolition, pest control, timber harvest, bridge replacement, and other causes of roost disturbance (Bradley et al. 2006).

Brazilian free-tailed bat

The Brazilian free-tailed bat is listed as a protected mammal under the Nevada Species of Conservation Priority list. The species was added to the list in 2012 because of its habit of roosting in large colonies and its vulnerability to decline due to alternative energy development. The species is found in a wide variety of habitats, from the low desert to high mountains. The bats migrate out of Nevada in the winter but may be year-round residents in warmer parts of southern Nevada. The species is found throughout Nevada; however, two large colonies make up the majority of the population. The species is threatened by human disturbance and habitat destruction. As the Brazilian free-tailed bat tends to roost in large colonies, a single disturbance can have very significant impacts to the whole species. The species appears to be stable statewide in Nevada; however, localized population declines have been observed (Nevada Wildlife Action Plan Team 2012).

3.5.2.2.3 Horses and Burros

The BLM Carson City District Clan Alpine Herd Management Area overlaps with the eastern portion of the Dixie Valley Training Area (DVTA). The 1993 Clan Alpine Herd Management Area Plan and Capture Plan and Environmental Assessment (EA) set management objectives for the Herd Management Area. The Summary calls for a periodic census of the wild horse population and for additional monitoring to determine areas of use, seasonal movement patterns, sex ratios, and other facets of population dynamics to determine if management objectives are being met. Management objectives also include maintaining and enhancing habitat to provide forage for a specified number of horses. The plan for each Herd Management Area calls for maintaining the wild horses in good or excellent physical condition, maintain the free-roaming nature of the wild horses, maintaining the wild horses within the Herd Management Area, and minimizing adverse effects on individual wild horses and on the population as a whole that could be caused by round-ups.

Per the Wild Free-Roaming Horse and Burro Act, there are several horse and burro Herd Management Areas in the vicinity of FTRC Study Area. However, only the Clan Alpine Herd Management Area (Figure 3.5-1) overlaps with DVTA. During the 2007 surveys many free roaming horses were observed in Dixie Valley settlement, and in the 2013 BLM survey count, 503 horses were observed in the Clan Alpine HMA. No free roaming burros were observed (U.S. Department of Navy 2008).

3.5.2.3 Birds

3.5.2.3.1 Overview

NAS Fallon is in the Lahontan Valley of the Great Basin Region. The Stillwater National Wildlife Refuge is 8 miles (mi.) northeast of NAS Fallon, and the Carson Lake Wetlands are 3 mi. south of NAS Fallon. This area is located on the Pacific Flyaway, which extends from the coast to western Utah, and each year 250,000 shorebirds migrate through this valley. The diverse wetlands attract more than a million waterfowl, as well as over 20,000 other water birds, including pelicans, egrets, herons, ibis, gulls, and terns. The irrigated agricultural lands provide important songbird habitat for migrants and breeding birds. There is a great diversity of habitats in the valley, such as freshwater marshes, riparian areas, alkali playas, desert shrublands, and irrigated farmlands. There are over 250 species of birds that have been observed on NAS Fallon-administered lands. An ecological survey conducted by the Navy in 1997 of NAS Fallon and its environs recorded 126 species (U.S. Department of the Navy 2008). Lahontan Valley wetlands are recognized as some of the most significant in the western United States by the Western Hemispheric Shorebird Reserve Network and were named a Globally Important Bird Area by the American Bird Conservancy. Moreover, Carson Lake has been designated as a site of international importance and is part of the Western Hemispheric Shorebird Reserve Network. Avian species typically known to occur within the FRTC Study Area are presented in Table 3.5-2.

Waterfowl begin arriving in this area in February with shorebirds following in March. By April, there are thousands of avocets, stilts, sandpipers, dowitchers, and other shorebird species. Songbirds begin arriving in April and peak in early May, when wrens, blackbirds, buntings, swallows, grosbeaks, and orioles begin breeding. By early May herons and egrets have returned to the area. By late summer large numbers of American white pelicans (*Pelecanus erythrorhynchos*) are feeding on the fish in the irrigation reservoirs and drains.

In August the fall migration gets underway. Landbird migrants including warblers, flycatchers, and vireos, start departing mid-August through late September. In September thousands of waterfowl will stopover in the valley on their migration south. October brings large numbers of white-crowned

sparrows (*Zonotrichia leucophris*), nuthatches, and chickadees into the valley. The first winter freeze pushes all but the hardiest migrants out of the area and winter residents including bald eagles (*Haliaeetus leucocephalus*), rough-legged hawks (*Buteo lagopus*), and northern shrikes (*Lanius excubitor*) arrive. During mild winters, fair numbers of ibis, egrets, herons, and shorebirds may stay in the valley.

Several bird species that are found in this region are not native to the Great Basin and are associated with developed areas. These species can displace native bird species and harm other native wildlife by monopolizing food sources or breeding sites. These include the house sparrow and European starling.

Game bird species include chukars (*Alectoris chukar*), mourning doves (*Zenaida macroura*), and waterfowl. Small game guzzlers have been installed for chukars and mourning doves in the Sand Springs Range, Cocoon Mountains, Clan Alpine Mountains, and Lauderback Hills. Many waterfowl game species are found at Sheckler Reservoir north of B-16. These include species such as the mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), and Canada goose (*Branta canadensis*).

While the analysis in this EIS addresses all birds in a broad context, additional emphasis is placed on species of concern or special status species in accordance with the DoD and USFWS Memorandum of Understanding to Promote the Conservation of Migratory Birds.

Table 3.5-2: Avian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
American avocet	*Recurvirostra americana*			X				X	X	
American coot	*Fulica americana*							X	X	
American crow	*Corvus brachyrhynchos*	GB	X						X	
American goldfinch	*Carduelis tristis*		X						X	X
American green-winged teal	*Anas crecca*		X					X	X	
American kestrel	*Falco sparverius*		X		X			X	X	
American pipit	*Anthus rubescens*							X	X	
American robin	*Turdus migratorius*		X						X	X
American white pelican	*Pelecanus erythrorhynchos*							X	X	
American widgeon	*Anas americana*		X					X	X	
ash-throated flycatcher	*Myiarchus cinerascens*						X		X	
Audubon's warbler	*Dendroica coronata*								X	X
bald eagle	*Haliaeetus leucocephalus*	BCC	X		X			X	X	
barn swallow	*Hirundo rustica*							X	X	X
belted kingfisher	*Ceryle alcyon*							X	X	
Bewick's wren	*Troglodytes bewickii*		X				X		X	X
black tern	*Chlidonias niger*							X		
black-billed magpie	*Pica pica*		X				X		X	X
black-chinned hummingbird	*Archilochus alexandri*		X		X				X	X
black-crowned night heron	*Nycticorax nycticorax*							X	X	
black-throated sparrow	*Amphispiza bilineata*		X		X					
black-necked stilt	*Himantopus mexicanus*			X				X		
Blue-gray gnatcatcher	*Polioptila caerulea*						X	X		

Table 3.5-2: Avian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
Blue-winged teal	*Anas discors*							X		
Brewer's blackbird	*Euphagus cyanocephalus*								X	X
brewer's sparrow	*Spizella breweri*	BCC					X		X	
broad-tailed hummingbird	*Selasphorous platycercus*								X	X
brown-headed cowbird	*Molothrus ater*								X	
bufflehead	*Brucephala albeola*							X	X	
Bullock's oriole	*Icterus bullockii*						X	X	X	X
Burrowing owl	*Athene cunicularia*		X		X	X	X		X	
Bushtit	*Psaltriparus minimus*							X		
California gull	*Larus californicus*			X				X	X	
California quail	*Callipepla californica*	GB	X				X		X	X
Calliope hummingbird	*Stellyl calliope*	BCC			X			X		X
Canada goose	*Branta canadensis*		X					X	X	
Cassin's finch	*Carpodacus cassinii*		X				X			
Canvasback	*Aythya valisineria*							X		
cedar waxwing	*Bombycilla cedrorum*		X					X	X	
Chukar	*Alectoris chukar*	GB			X		X			
cinnamon teal	*Anas cyanoptera*		X					X	X	
cliff swallow	*Hirundo pyrrhonota*							X	X	X
common barn owl	*Tyto alba*		X					X	X	
common moorhen	*Gallinula chloropu*							X	X	
common nighthawk	*Chordeiles minor*		X					X	X	X
common raven	*Corvus corax*		X		X		X		X	
common snipe	*Gallinago gallinago*			X				X	X	
common yellowthroat	*Geothlypis trichas*							X	X	X
cooper hawk	*Accipiter cooperii*				X		X		X	
Dark-eyed junco	*Junco hyemalis*		X		X				X	X
double-crested cormorant	*Phalacrocorax auritus*							X	X	
downy woodpecker	*Picoides pubescens*				X				X	X
eared grebe	*Podiceps nigricollis*	BCC						X		
European starling	*Sturnus vulgaris*		X						X	X
ferruginous hawk	*Buteo regalis*	BCC			X		X		X	
Forster's tern	*Sterna forsteri*							X	X	
fox sparrow	*Passerella iliaca*				X		X	X	X	
Gadwall	*Anas strepera*							X		
Gamble's white-crowned sparrow	*Zonotrichia leucophrys gamheli*		X						X	
golden eagle	*Aquila chrysaetos*	BCC	X		X	X	X		X	
Gray flycatcher	*Empidomax wrightii*				X		X			
great blue heron	*Ardea herodias*		X					X	X	
great egret	*Casmerodius albus*		X					X	X	
great horned owl	*Bubo virginianus*		X						X	

Table 3.5-2: Avian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
great-tailed grackle	*Quiscalus mexicanus*								X	X
Greater sage grouse	*Centrocercus urophasianus*	BCC, GB					X			
green-backed heron	*Butorides striatus*		X					X	X	
Green-tailed towhee	*Pipilo chlorurus*	BCC			X		X			
hermit thrush	*Catharus guttatus*				X				X	
Hooded merganser	*Lophodytes cucullatus*							X		
horned lark	*Eremophila alpestris*		X	X	X				X	X
house finch	*Carpodacus mexicanus*		X						X	X
house sparrow	*Passer domesticus*								X	X
house wren	*Troglodytes aedon*						X		X	X
Juniper titmouse	*Baeolophus ridgwayi*				X			X		
killdeer	*Charadrius vociferus*			X				X	X	X
lark bunting	*Calamospiza melanocorys*		X		X					
lark sparrow	*Chondestes grammacus*								X	X
lazuli bunting	*Passerina amoena*		X		X			X	X	
lesser goldfinch	*Carduelis psaltria*				X				X	X
lesser scaup	*Aythya affinis*		X					X	X	
Lewis' woodpecker	*Melanerpes lewis*	BCC			X				X	X
Lincoln sparrow	*Melospiza lincolnii*							X	X	X
loggerhead shrike	*Lanius ludovicianus*	BCC	X		X		X		X	X
long-billed curlew	*Numenius americanus*	BCC	X					X		
Long-eared owl	*Asio otus*		X		X			X	X	
MacGillivray's warbler	*Oporornis tolmiei*				X		X			
mallard	*Anas platyrhynchos*		X					X	X	
marsh wren	*Cistothorus palustris*							X	X	
merlin	*Falco columbarius*				X				X	
mountain bluebird	*Sialia currucoides*		X		X				X	
mountain chickadee	*Parus gambeli*		X		X				X	
mourning dove	*Zenaida macroura*		X					X	X	X
Nashville warbler	*Vermivora ruficapilla*		X					X	X	
Northern flicker	*Colaptes auratus*		X					X	X	
northern harrier	*Circus cyaneus*		X						X	
northern mockingbird	*Mimus polyglottos*		X						X	X
Northern pintail	*Anas acuta*							X		
Northern shoveler	*Anas clypeata*		X					X		
northern rough-winged swallow	*Stelgidopteryx serripennis*							X	X	X
northern shrike	*Lanius excubitor*		X						X	X
Oregon junco	*Junco hyemalis spp.*		X		X				X	X
Orange-crowned warbler	*Vermivora celata*		X						X	X
osprey	*Pandion haliaetus*							X		
Phainopepla	*Phainopepla nitens*		X					X		
pied-billed grebe	*Podilymbus podiceps*							X		
pine siskin	*Carduelis pinus*				X					

Table 3.5-2: Avian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
pinyon jay	*Gymnorhinus cyanocephalus*	BCC	X		X					
Plumbeous vireo	*Vireo plumbeus*				X				X	
prairie falcon	*Falco mexicanus*				X				X	
red-breasted nuthatch	*Sitta canadensis*				X					
redhead	*Aythya americana*							X	X	
red-naped sapsucker	*Sphyrapicus nuchalis*				X		X			
red-shafted flicker	*Colaptes auratus*				X				X	X
red-tailed hawk	*Buteo jamaicensis*				X		X	X	X	
red-winged blackbird	*Agelaius phoeniceus*							X	X	X
ring-billed gull	*Larus delawarensis*							X	X	
ring-necked pheasant	*Phasianus colchicus*	GB							X	
rock pigeon	*Columba livia*								X	X
rock wren	*Salpinctes obsoletus*				X		X			
Rough-legged hawk	*Buteo lagopus*				X			X	X	
ruby-crowned kinglet	*Regulus calendula*				X		X			
ruddy duck	*Oxyura jamaicensis*		X					X	X	
sage sparrow	*Amphispiza belli*	BCC		X	X		X			
sage thrasher	*Oreoscoptes montanus*	BCC	X				X			
savannah sparrow	*Passerculus sandwichensis*								X	X
Say's pheobe	*Sayornis saya*							X	X	
sharp-shinned hawk	*Accipiter striatus*				X		X		X	
short-eared owl	*Asio flammeus*		X					X	X	
Snow bunting	*Plectrophenax nivalis*				X				X	
snowy egret	*Egrretta thula*							X	X	
song sparrow	*Melospiza melodia*						X	X		
sora	*Porzana carolina*							X	X	
spotted towhee	*Pipilo maculatus*						X	X		
Swainson's hawk	*Buteo swainsoni*				X		X		X	
tree swallow	*Tachycineta bicolor*							X	X	X
turkey vulture	*Cathartes aura*		X		X		X		X	
Vesper sparrow	*Pooeceteds gramineus*		X						X	
violet-green swallow	*Tachycineta thalassina*				X			X	X	
Virginia rail	*Rallus limicola*							X	X	
Virginia's warbler	*Vermivora virginiae*	BCC			X				X	X
Warbling vireo	*Vireo gilvus*		X		X			X		
western grebe	*Aechmophorus occidentalis*							X	X	
western kingbird	*Tyrannus verticalis*		X					X	X	X
western meadowlark	*Sternella neglecta*		X						X	
Western scrub-jay	*Aphelocoma californica*		X		X			X	X	
western tanager	*Piranga ludoviciana*				X					
western wood-pewee	*Contopus sordidulus*				X			X	X	
White-crowned sparrow	*Zonotrichia leucophris*		X						X	X
white-faced ibis	*Plegadis chihi*							X	X	

Table 3.5-2: Avian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
white-throated swift	*Aeronautes saxatalis*							X	X	X
wild turkey	*Meleagris gallopavo*	GB							X	
willow flycatcher	*Empidonax trallii*							X	X	
Wilson's snipe	*Gallinago delicate*			X				X		
Wilson's warbler	*Wilsonia pusilla*		X						X	X
winter wren	*Troglodytes troglodytes*				X			X		
wood duck	*Aix sponsa*							X	X	
yellow warbler	*Dendroica petechia*		X					X	X	X
Yellow-breasted chat	*Icteria virens*		X					X		
yellow-headed blackbird	*Xanthocephalus xanthocephalus*							X	X	
Yellowlegs	*Tringa sp.*							X		
Yellow-rumped warbler	*Dendroica coronate*		X		X			X	X	

Notes: AG = Agricultural, BCC = bird of conservation concern in Bird Conservation Region 9, BF = Basin Floor Habitat, GB = Nevada State Game Bird, LS = Landscaped, PL = Playa Habitat, PS = Piedmont Slope habitat, SG = Sagebrush Habitat, SN = Sandy Habitat, sp. =species, WT = Wetland
Source: U.S. Department of the Navy 2008, U.S. Department of the Navy 2014, U.C. Davis 2011

3.5.2.3.2 Special Status Bird Species

Table 3.5-2 provides a list of special status bird species that potentially occur at FRTC, as well as information about habitat use, occurrence, breeding status, and regional population information. The USFWS identifies species of migratory non-game birds that are likely to become candidates for listing under the ESA as Birds of Conservation Concern. Of the 28 Birds of Conservation Concern (U.S. Fish and Wildlife Service 2008), 14 have been recorded on Navy-administered lands of FRTC. Descriptions of special status bird species are provided in the following sections.

Bald Eagle

The bald eagle is a Bird of Conservation Concern in Bird Conservation Region 9 and is also a Nevada Species of Conservation Priority. The bald eagle is most associated with open water areas with forested shorelines. The breeding population of bald eagles in Nevada consists of three to five nesting pairs, and the winter population is estimated at 120 birds. Their population trend has been increasing, with the population scattered throughout the state. There has been a recent increase in winter numbers of bald eagles in Carson Valley (Nevada Wildlife Action Plan Team 2012). Bald eagles have been observed during the winter as they briefly use or transit the NAS Fallon-administered lands (U.S. Department of the Navy 2008) and have been observed both on NAS-Fallon and in the Dixie Valley Training Area. Bald eagles are vulnerable to habitat loss, disturbance by humans, a decreasing food supply, illegal shooting, and poisoning (Nevada Wildlife Action Plan Team 2012).

Brewers Sparrow

The Brewer's sparrow (*Spizella breweri*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is also a Nevada Species of Conservation Priority. The Partners in Flight population estimate for the Brewer's Sparrow in the Bird Conservation Region 9 is 5,000,000 individuals. The Brewer's sparrow is a sagebrush obligate that is often the most abundant songbird in sagebrush shrub steppe habitats in some regions. It prefers to nest in large, living sagebrush and primarily forages on the ground for insects during the summer and seeds in the winter. Brewer's sparrow is concentrated in the Great Basin,

breeding across portions of western Canada and southwestern North Dakota, south to southern California, southern Nevada, central Arizona, and northwestern New Mexico. The Brewer's sparrow is expected to occur at the FRTC Study Area from April through September and has been observed at Settlement and Horse Creek areas of Dixie Valley (U.S. Department of the Navy 2008). The Brewer's sparrow breeds throughout northern Nevada, and there is a year-round population in southwest Nevada, with a winter resident in the extreme southeast portion of the state. They have experienced a significant Nevada and range-wide decline in population. The Brewer's sparrow is threatened by habitat loss, degradation, fragmentation of high-quality sagebrush and montane sagebrush shrubland due to fire, invasive plants, expansion of pinyon-juniper woodland into sagebrush, unsustainable livestock grazing, and excessive off-highway vehicle use (Nevada Wildlife Action Plan Team 2012).

Calliope Hummingbird

The calliope hummingbird (*Stellula calliope*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is also a Nevada Species of Conservation Priority. Calliope hummingbirds are most associated with a montane mosaic of deciduous woodland, blooming understory, and forest edges and openings. They are fairly common in mixed forests of the Carson Range and Jarbidge Mountains and also occur in smaller numbers throughout the state. During ecological surveys in 2007, calliope hummingbirds were observed in the Horse Creek portion of Dixie Valley (U.S. Department of the Navy 2008). Population trends and size are unknown for the calliope hummingbird in Nevada, and threats to their population include climate change altering blooming and loss of specific habitat needs, but threats are not well understood (Great Basin Bird Observatory 2010).

Eared Grebe

The eared grebe (*Podiceps nigricollis*) is a bird on the Nevada Species of Conservation Priority list. Eared grebes are colonial breeders that are numerous in large marshes in northern Nevada, although present in smaller ones as well. These birds feed primarily on invertebrates and are strongly associated with saline/alkaline wetlands in the non-breeding season. After breeding season, most eared grebes from Nevada and the surrounding areas will congregate in large numbers in Mono Lake or Great Salt Lake to feed on brine shrimp prior to their fall migration. Many of the birds are year-round residents of Nevada and do not migrate. Historically there have been recorded 600 breeding birds at Ruby Lake in 1983 and several hundred nests annually at both Carson Lake and Stillwater National Wildlife Refuge during wet years in the mid-1990s. The migrant population in Nevada is much larger than the breeding population; however, it has not been quantified (Great Basin Bird Observatory 2010). During ecological surveys of 2007, eared grebes were observed in the Settlement Area of Dixie Valley (U.S. Department of the Navy 2008). Recent population trends are stable or increasing. Threats to the eared grebe include loss or degradation of marshes (especially alkaline marshes) due to water diversion, declines in water quality, or development (Great Basin Bird Observatory 2010).

Ferruginous Hawk

The ferruginous hawk (*Buteo regalis*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is a Nevada Conservation Priority Species. The Partners in Flight population estimate for the ferruginous hawk in the Bird Conservation Region 9 is 5,000 individuals. The ferruginous hawk occupies arid and open grassland, shrub steppe, and desert in the western half of North America. Breeding occurs from Alberta, Manitoba, and Saskatchewan south to New Mexico and Arizona, west to eastern California and Oregon, and east into the Dakotas, Nebraska, and Kansas. Primary wintering grounds are in the southwestern United States and northern Mexico. Ferruginous hawks in Nevada are found in highest densities in relatively remote valleys where native vegetation is mostly intact and where human activities are minimal. There were declines in the bird's population in the 1980s, and research shows

that the current population may be declining as well. The ferruginous hawk is sensitive to factors that negatively affect their prey populations, including invasive plants, habitat fragmentation, fire, and development. Threats to the ferruginous hawk include nest site disturbances, loss of nesting trees at the shrubland-woodland interface, and illegal taking of eggs or nestlings (Great Basin Bird Observatory 2010). Ferruginous hawks are expected to forage throughout the FRTC Study Area in canyons, foothills, and high mountain areas beneath the SUA.

Golden Eagle

The golden eagle (*Aquila chrysaetos*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is a Nevada Conservation Priority Species. The Partners in Flight population estimate for the golden eagle in the Bird Conservation Region 9 is 12,000 individuals. The golden eagle typically occupies open canyon land, desert, grassland, and shrub habitat where their preferred prey, small mammals, can be found. Nest sites are most often on cliffs or bluffs, less often in trees, and occasionally on the ground. The species is most numerous in winter in the Rocky Mountain states, Great Basin, and western edge of the Great Plains (NatureServe 2012). The highest density of golden eagles in Nevada has been observed in long stretches of cliff located along river systems. Recent population trend data suggests that the population is declining regionally and in Nevada. Threats to the golden eagle include reduction in prey populations due to degradation or loss of rangelands, large-scale wind/solar energy developments in rangelands that reduce prey densities and hunting opportunities, electrocution, vehicle strikes, human-caused nest disturbance, nest abandonment, shooting, and poisoning (Great Basin Bird Observatory 2010). Golden eagles are expected to forage throughout the FRTC Study Area in canyons, foothills, and high mountain areas beneath the SUA. During ecological surveys in 2007, golden eagles were observed in the Horse Creek and Settlement Area portions of Dixie Valley, and B-17 (U.S. Department of the Navy 2008).

Greater Sage-Grouse

The greater sage-grouse is a bird of conservation concern in Bird Conservation Region 9, and a Nevada State Game Bird. The Bi-State Distinct Population Segment (DPS) was proposed to be listed as threatened under the ESA. This DPS includes only greater sage-grouse in Carson City, Douglas, Lyon, Mineral, and Esmeralda Counties in Nevada; and in Alpine, Mono, and Inyo Counties in California. Since the time of the Draft EIS publication, the USFWS has determined that the Bi-State population of greater sage-grouse does not require the protection of the ESA (80 FR 22827) and has removed the Bi-State population of greater sage-grouse from the list of candidate species. Further, an unprecedented, landscape-scale conservation effort across the western United States has significantly reduced threats to the greater sage-grouse across 90 percent of the species' breeding habitat and enabled the USFWS to conclude that the greater sage-grouse does not warrant protection under ESA (Docket Number FWS–R6–ES–2015–0146). This collaborative, science-based greater sage-grouse strategy is the largest land conservation effort in U.S. history.

The greater sage-grouse is an omnivore that eats mainly sagebrush, other soft plants, and insects. This species cannot exist in habitats that do not contain sagebrush. They are found at elevations ranging from 4,000 to over 9,000 ft. (1,219.2 to over 2,743.2 m) (U.S. Fish and Wildlife Service 2013b). The primary threats to greater sage-grouse are urbanization and habitat conversion, infrastructure, mining, renewable energy development and associated infrastructure, non-native and native invasive species (e.g., cheatgrass, pinyon-juniper encroachment), wildfires and altered fire regime, and small population size and population structure. Other threats include climate change (including drought), recreation, disease and predation, and inadequacy of existing regulatory mechanisms (U.S. Fish and Wildlife Service 2013b). Greater sage-grouse may occur in the southwest portions of the Study Area that overlap with

Lyon and Mineral County, Nevada. The only activities that may overlap with the greater sage-grouse DPS would be aircraft overflights.

Green-tailed towhee

The green-tailed towhee (*Pipilo chlorurus*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is a Nevada Conservation Priority Species. The Partners in Flight population estimate for the green-tailed towhee in the Bird Conservation Region 9 is 500,000 individuals. The species is widespread and relatively common in Nevada. About one-fifth of the global breeding population is in Nevada. Although historically the population was in decline, more recent population trends have been stable. The Green-tailed Towhee is nearly always found within dense shrub cover in montane settings, especially in transitional zones that feature high shrub species diversity, interspersed trees, and a high proportion of edge habitat. Current threats to the towhee are not well studied. However, historically they have been threatened by the loss of shrublands, and current threats may include fire return interval changes or heavy grazing and browsing that reduces shrub cover or diversity (Great Basin Bird Observatory 2010). During ecological surveys in 2007, green-tailed towhees were observed in the Horse Creek and Settlement Area portions of Dixie Valley, and B-17 (U.S. Department of the Navy 2008). The towhee is expected to occur within the FRTC Study Area in the spring and summer, and occasionally during the winter in appropriate habitats.

Lewis's Woodpecker

The Lewis's woodpecker (*Melanerpes lewis*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is also a Nevada Species of Conservation Priority. The Partners in Flight population estimate for the Lewis's woodpecker in the Bird Conservation Region 9 is 6,000 individuals. Key factors for the Lewis's woodpecker habitat include the presence of large, partly decayed snags, an open forest for aerial foraging, and a well-developed shrub or native herbaceous layer that would promote populations of flying insects. The woodpecker is no longer known to breed in the valley-bottom riparian woodlands such as the Lahontan Valley where they are thought to historically have bred. The majority of observations occur during migration windows, in May and September–October. The Lewis's woodpecker was observed in Horse Creek, Dixie Valley (U.S. Department of the Navy 2008). There is annual variation in the Lewis's woodpecker numbers in Nevada and patchy breeding distribution within the state that make it difficult to account for population trends there. However, historically the population was declining range wide and may still be in decline. Threats to the Lewis's woodpecker include loss or degradation of aspen stands and associated understory due to livestock grazing, conifer invasion, aspen decline (due to pathogens, drought, stream flow reductions, climate change, etc.), and degradation of deciduous montane riparian habitat and associated understory from improper livestock grazing (Great Basin Bird Observatory 2010).

Loggerhead Shrike

The loggerhead shrike (*Lanius ludovicianus*) is a Bird of Conservation Concern in Bird Conservation Region 9 and is also a Nevada Species of Conservation Priority. The Partners in Flight population estimate for the loggerhead shrike in the Bird Conservation Region 9 is 300,000 individuals. The loggerhead shrike occurs in desert shrubland, juniper or pinyon-juniper woodland, mountain mahogany stand, and around the outskirts of ranches and towns. Loggerhead shrikes occur throughout North America and are widely distributed from Alberta, Canada, south to the Isthmus of Tehuantepec in southern Mexico. The species migrates from northern areas in the winter; however, some individuals remain as far north as northern Nevada. Population trends are not well documented, but past data suggests that there was a negative trend in much of the western population with seasonal increases in the south during winter. Threats to the loggerhead shrike population include changes in human land-use

practices, the spraying of biocides, and competition with species that are more tolerant of human-induced changes (Campbell 1998). Within the FRTC, the loggerhead shrike is a common summer resident, and present, though less common, in the winter. During ecological surveys of 2007, loggerhead shrikes were observed or heard around the Dixie Valley Settlement area, Dixie Meadows, and on the dunes of Bravo-19.

Long-billed Curlew

The long-billed curlew (*Numenius americanus*) is a Bird of Conservation Concern in Bird Conservation Region 9 and a Nevada Species of Conservation Priority. The long-billed curlew is considered a Priority species in Nevada by Partners In Flight. The Atlas of the Breeding Birds of Nevada recorded breeding in the Lahontan Valley. Curlews were found in wetlands, grasslands, and agricultural areas. Current population trends show that the population has been stable or increasing. Curlews breed in northern Nevada, but concentrate in the northeast quadrant. Curlews breed and forage in open habitats with moderate grass or other ground cover, and they generally avoid areas with trees, high shrub densities, and tall dense grass. Threats to long-billed curlews include loss of wet meadows to water diversions, groundwater pumping, or development; the loss of flood-irrigated agricultural fields to habitat conversion; and heavy livestock grazing, haying, or dragging that causes nest losses (Great Basin Bird Observatory 2010). The long-billed curlew is expected to be seen in the agricultural fields around the Station and possibly in the wet fields around the ponds in the Dixie Valley Settlement Area.

Pinyon Jay

The pinyon jay (*Gymnorhinus cyanocephalus*) is a Bird of Conservation Concern in Bird Conservation Region 9 and a Nevada Species of Conservation Priority. The Partners in Flight population estimate for the pinyon jay in the Bird Conservation Region 9 is 200,000 individuals. Although what researchers thought was the preferred habitat for pinyon jays, a pinyon-juniper woodland, has been expanding in Nevada, the population of pinyon jays has been on the decline. Another study found that pinyon jays prefer a habitat that is a mixed-age mosaic of woodland transitioning into, or interspersed with, sagebrush shrubland. The pinyon jay is also dependent on the pinyon pine nut, and another possible factor in their decline may be pinyon nut production. Threats to the pinyon jay may include the substantial increases in closed-canopy woodland with poor shrub understories, along with a loss of the mixed-age woodland mosaics that have openings and a complex shrubland edge. The changes to habitat have been largely the result of altered fire regimes, but may also be caused by grazing pressure, and invasive plants (Great Basin Bird Observatory 2010). The pinyon jay is considered a permanent resident within the FRTC, breeds within the Stillwater mountain range and is most often associated with pine-juniper habitats. During ecological survey of 2007, the pinyon jay was observed flying off NAS Fallon, Horse Creek, and B-17 (U.S. Department of the Navy 2008).

Sage Sparrow

The sage sparrow (*Amphispiza belli*) is a Bird of Conservation Concern in Bird Conservation Region 9 and a Nevada Species of Conservation Priority. The Partners in Flight population estimate for the sage sparrow in the Bird Conservation Region 9 is 2,000,000 individuals. Sage sparrows are restricted to open shrublands and grasslands. They can be found foraging in small flocks starting in late June. Most of their foraging takes place on the ground. Nevada has one of the highest known breeding densities for the sage sparrow and has approximately one-half of the species' global breeding population. Individuals spend the winter in southern Nevada instead of migrating, usually in sagebrush or Mojave scrub shrublands, or honey mesquite stands. Recent population trends are close to stable or stable for the sage sparrow. Because sage sparrows preferentially inhabit large expanses of intact shrubland, they are negatively affected by factors that fragment their habitat such as fire, cheatgrass invasion, heavy

livestock use, expansion of pinyon-juniper woodland into shrubland, and heavy off-highway vehicle use (Great Basin Bird Observatory 2010). The sage sparrow is a common summer resident and an uncommon winter resident in the Lahontan Valley (Chisholm and Neel 2002). During ecological surveys of 2007, sage sparrows were observed in appropriate habitats throughout the FRTC Study Area (U.S. Department of the Navy 2008).

Sage Thrasher

The sage thrasher (*Oreoscoptes montanus*) is a Bird of Conservation Concern in Bird Conservation Region 9. The Partners in Flight population estimate for the sage thrasher in the Bird Conservation Region 9 is 2,000,000 individuals. The sage thrasher is a sagebrush steppe obligate that relies on large expanses of sagebrush steppe for successful breeding. It prefers sagebrush habitats on flat to gently rolling hills and has been observed on B-16 and Settlement Area during 2007 ecological surveys. Its summer breeding range includes isolated areas in Canada and large portions of most western states. This species winters primarily in the southwestern United States and Mexico (Buseck et al. 2004). Approximately one-fifth of the global population of sage thrashers is located in Nevada. In Nevada sage thrashers prefer to inhabit sagebrush valleys, but they can also be found breeding in salt desert and montane shrubland. The trend for the population of sage thrashers in Nevada is a slight decline; however, they are not declining to the same degree as other sagebrush-associated songbirds. Threats to sage thrasher populations include loss, degradation, or fragmentation of high-quality sagebrush shrubland due to fire, invasive plants (such as cheatgrass), the expansion of pinyon-juniper woodland into sagebrush, heavy livestock grazing, and heavy off-highway vehicle use (Great Basin Bird Observatory 2010).

Virginia's warbler

The Virginia's warbler (*Oreothlypis virginiae*) is a Bird of Conservation Concern in Bird Conservation Region 9 and a Nevada Species of Conservation Priority. The Partners in Flight population estimate for the Virginia's warbler in the Bird Conservation Region 9 is 14,000 individuals. Virginia's Warbler is most often described as a breeder in pinyon-juniper and oak woodlands. The warbler tends to occur at the interface of basins and foothills, but not in valley bottoms. In Nevada, the Virginia's warbler also has an affinity for mountain mahogany stands. These warblers occur in breeding grounds through late April and early May, and are patchily distributed throughout most of their range. Due to their patchy distribution, population trends are not well documented. However, limited information suggests that there is a stable trend rangewide, but is less certain for the population in Nevada. Threats to the Virginia's warbler may include impacts to their habitats such as grazing by livestock or wild horses and burros, fire, invasive plants, and residential development especially in southern Nevada (Great Basin Bird Observatory 2010). Virginia's warbler is expected in the southern reaches of Churchill County in the spring and summer to breed. The Virginia's warbler was observed on agricultural and landscaped areas of the FRTC Study Area during ecological surveys in 1997 but not during 2007 survey efforts (U.S. Department of the Navy 2008, 2014).

3.5.2.4 Fish

3.5.2.4.1 Overview

Three species of fish in the Study Area are listed under Federal ESA protection. One is listed as Endangered (Cui-ui]), and the other two are threatened (Lahontan cutthroat trout and Railroad Valley Springfish); all three are discussed below. Other fish that may occur in the area are presented in Table 3.5-3 (U.S. Department of the Navy 2014). A reproducing population of brook trout (introduced species) is present on Horse Creek Ranch in Dixie Valley (U.S. Department of the Navy 2014).

Table 3.5-3: Fish Species Known to Occur or Potentially Occurring at Fallon Range Training Complex

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
Sacramento perch	*Archoplides interruptus*	GF						X		
green sunfish	*Lepomis cyanellus*							X		
bluegill	*Lepomis macrochirus*	GF						X		
smallmouth bass	*Micropterus dolomieui*	GF						X		
largemouth bass	*Micropterus salmoides*	GF						X		
white crappie	*Pomoxis annularis*	GF						X		
black crappie	*Pomoxis nigromaculatus*	GF						X		
goldfish	*Carassius auratus*							X	X	
common carp	*Cyprinus carpio*							X	X	
Cui-ui	*Chasmistes cujus*	E, EF						X		
Dixie Valley tui chub	*Gila bicolor spp.*							X		
Sacramento blackfish	*Orthodon microlepidotus*							X		
fathead minnow	*Pimephales promelas*							X		
Lahontan cutthroat trout	*Onchoryhncus clarkia henshawi*	T, GF						X		
Lahontan speckled dace	*Rhinichthys osculusrobustusrobustus*							X		
Lahontan red shiner	*Richarsonius egregius*							X		
white catfish	*Ictalurus catus*							X		
black bullhead	*Ictalurus melas*							X	X	
brown bullhead	*Ictalurus nebulosus*							X	X	
channel catfish	*Ictalurus punctatus*	GF						X		
white bass	*Morone chrysops*	GF						X		
Railroad Valley Springfish	*Crenichtys nevadae*	T, TF						X		
striped bass	*Morone saxitalis*							X		
yellow perch	*Perca flavescens*	GF						X		
walleye	*Stizostedion vitreum*							X		
mosquitofish	*Gambusia affinis*							X	X	
brook trout	*Salvelinus fortinalis*	GF						X		

Notes: AG = Agricultural, BF = Basin Floor Habitat, E = Endangered, EF = Nevada State Endangered Fish, GF= Nevada State Game Fish, LS = Landscaped, PL = Playa Habitat, PS = Piedmont Slope habitat, SG = Sagebrush Habitat, SN = Sandy Habitat, spp = sub-species, T = Threatened, TF = Nevada State Threatened Fish, WT = Wetland
Source: U.S. Department of the Navy 2008, U.S. Department of the Navy 2014. U.C. Davis 2011

Ponds at NAS Fallon are located in Dixie Valley and vary in size, shape and shoreline condition. Marshes and meadows from groundwater eruptions are present year-around in several Dixie Valley locations. Prior to settlement in the area, it is unlikely fish existed in these shallow bodies of water; however, early settlers built holding ponds to use water resources, and stocked fish.

3.5.2.4.2 Endangered Species Act-Listed Fish Species

Lahontan Cutthroat Trout

Status, Population Trends, and Threats. Lahontan cutthroat trout was listed as endangered on October 13, 1970 and reclassified as threatened in 1975. In 2008 there was a petition to remove the Lahontan

cutthroat trout from the Federal List of Threatened and Endangered Wildlife under ESA; however, the petition was found lacking in enough information to warrant their removal. No critical habitat has been designated for the Lahontan cutthroat trout. Threats to the population of Lahontan cutthroat trout include isolation of subpopulations because of physical and biological fragmentation, which decreases migration rates, causes local extirpation that may become permanent, and moves the entire population closer to extinction. Maintaining a connected network of populations is critical to providing the Lahontan cutthroat trout the ability to recover. Although the presence of nonnative species has also dramatically altered aquatic ecosystems, hybridization and competitive interaction between lake dwelling Lahontan cutthroat trout and nonnative species is not well known (Nevada Fish and Wildlife Office 2012).

General Description and Habitat. The Lahontan cutthroat trout feeds on terrestrial and aquatic insects, as well as smaller fish. This species contains two varieties, stream dwellers and lake dwellers. Stream dwellers on average are 10 in. (25.4 cm) in length and live for less than 5 years, while lake dwellers grow to 50 in. (127 cm) and on average live between 5 and 14 years. Sexual maturity for females is reached between the ages of 3 and 4, while males mature at 2–3 years of age. Similar to other cutthroat trout species, Lahontan cutthroat trout are stream spawners, and spawn between February and July. Spawning timing depends upon other external factors such as stream flow, elevation, and water temperature (Nevada Fish and Wildlife Office 2012). Cutthroat trout have the most extensive range of any inland trout species of western North America, and occur in anadromous, non-anadromous, fluvial, and lacustrine populations.

Distribution. The Lahontan cutthroat trout is found in a wide variety of cold-water habitats, including large terminal alkaline lakes, such as Pyramid Lake, alpine lakes like Lake Tahoe, slow meandering rivers such as Humboldt River, mountain rivers such as Carson, Truckee, Walker, and Mary's Rivers, and in small headwater tributary streams such as the Donner and Prosser Creeks. In general, Lahontan cutthroat trout occur in cool flowing water with available cover of vegetated stream banks, in areas where there are stream velocity breaks, and in relatively silt free rocky riffle-run areas. The trout is endemic or native, to the Lahontan basin of northern Nevada, eastern California, and southern Oregon. Currently, Lahontan cutthroat trout occupy between 123 to 129 streams within the Lahontan basin, and 32 to 34 streams outside of the basin, which totals about 482 mi. (775.5 km) of occupied habitat. The species is also found in five lakes, including two small populations in Summit and Independence Lakes (Nevada Fish and Wildlife Office 2012).

Occurrence in the Study Area. The Lahontan cutthroat trout may occur in the Study Area, in rivers such as Truckee, streams, tributaries, and lakes such as Pyramid Lake. They would be more likely to be found in the northwestern portion of the Study Area (underneath the Reno Military Operating Area [MOA]). Activities utilizing the Reno MOA (as indicated in Table 2-4 of Chapter 2) are limited to Air Combat Maneuvers.

Cui-ui

Status, Population Trends, and Threats. The cui-ui is listed as endangered under the ESA wherever it is found. No critical habitat has been designated for this species. Threats to the cui-ui include habitat modification and degradation induced by extreme reduction of river flow and lake volume; loss of riparian habitat, which degraded the water quality in the Truckee River; and reduction of river flows due to substantial diversions on the river, which degraded the river's channel morphology and function (U.S. Fish and Wildlife Service 2009a). Migrating adults require deep pools and other cover, which are

generally not available in the lower Truckee River below Marble Bluff Dam. These conditions can promote stress during spawning runs (U.S. Fish and Wildlife Service 2013c).

General Description and Habitat. Cui-ui are robust suckers with large heads and small eyes. Both sexes have grayish dorsal bodies that fade to white on their ventral or belly side. Their scales are coarse, and females live longer and grow larger than males of the species. Their lifespan can be over 40 years, and they grow up to 27.5 in. (69.9 cm). The cui-ui feed on zooplankton, filamentous algae, and aquatic insects. They migrate up the lower Truckee River to spawn between March and June each year, and return to Pyramid Lake after spawning. Migrating for spawning depends on the river water temperature and flow characteristics. Spawning occurs over gravel, no nests are built, and the eggs hatch 1–2 weeks after spawning. Then the larval cui-ui drifts downstream to Pyramid Lake shortly after hatching. Cui-ui typically is adults who enter the spawning run at 8–10 years of age, but may enter as early as 5 years of age (U.S. Fish and Wildlife Service 2013c).

Distribution. The cui-ui have a very restricted distribution, and occur only in Pyramid Lake, western Nevada. They were extirpated in nearby Lake Winnemucca, which dried up in the late 1930s after the diversions of the Truckee River. The Cui-ui also occupy the lower Truckee River during spawning season. Historical spawning runs went as far upriver as Reno, Nevada; however, currently most cui-ui migrate only as far as 9.3–12.4 mi. (15–20 km) upriver. The cui-ui are benthic fish and occupy habitat near the bottom of the lake (Pyramid Lake). Although some have been captured deeper, most are found at depths of less than 75 ft. (23 m) (U.S. Fish and Wildlife Service 2013c).

Occurrence in the Study Area. Pyramid Lake is located in the northwest portion of the Study Area. Because cui-ui are only found in Pyramid Lake and Truckee River, they may be found in the portions of the Study Area that overlap aircraft overflights.

Railroad Valley Springfish

Status, Population Trends, and Threats. The Railroad Valley springfish is listed as threatened wherever it is found under ESA. An initiation of a 5-Year Review of the fish species was begun on April 1, 2013 (78 FR 19510–19514). Threats to the Railroad Valley springfish include nonnative species, potential groundwater withdrawal, water diversions, oil pumping, and isolated livestock impacts (U.S. Fish and Wildlife Service 2009c). Critical habitat was designated for this species at the time of its listing on March 31, 1986 (51 FR 10857, Service 1986). Six historical spring habitats are designated as critical habitat: the Big Warm Spring, Little Warm Spring, Hay Corral Spring, Big Spring, Reynolds Spring, and North Spring. The Railroad Valley springfish is not listed as a DPS, nor is there relevant information that suggests it should be listed as a DPS. There are no recent population estimates for the species by occupied spring system or range-wide systems (U.S. Fish and Wildlife Service 2009b).

General Description and Habitat. Endemic to Nevada, the Railroad Valley springfish has distinct coloration from other species of springfish, because of a single row of lateral dark spots along its sides. The average length of the Railroad Valley springfish varies from 0.9 and 1.5 in. (22.9 and 38.1 millimeters [mm]). Depending on the population, individuals may attain a total length that exceeds 2.8 in. (71.1 mm). Historically this species is from six spring systems in two areas of Nye County, Nevada. As indiscriminant and opportunistic feeders, Railroad Valley springfish change food sources from season to season. In the spring, they primarily are herbivorous, consuming filamentous algae, and in the summer, they have animal-based foods. They are also uniquely adapted to survive in an environment of high water temperatures and low dissolved oxygen content. They typically spawn from spring through summer and into early fall, and because they can tolerate a wide range of water temperatures and are

omnivorous, they can inhabit a range of habitats within spring pools and outflow channels (U.S. Fish and Wildlife Service 2009b).

Distribution. Railroad valley springfish were historically found in six spring systems distributed in two areas of Nye County, Nevada. Big Warm Spring and Little Warm Spring are located on the Duckwater Shoshone Indian Reservation in Nye County; south of the Reservation, Big Spring, Hay Corral Spring, North Spring, and Reynolds Spring originate on Lockes Ranch. The Railroad Valley springfish was extirpated from Big Warm Spring by 2003 due to the introduction of the red-bellied tilapia (*Oreochromis zillii*). They were later restored to the Big Warm Spring in 2007 after a Safe Harbor Agreement between the USFWS and Tribe. Railroad valley springfish persist at Little Warm Spring. However, the population is fragmented due to in-stream barriers. Four populations of springfish at Lockes Ranch persist as well, but the abundance in Hay Corral Spring declined significantly due to habitat manipulation in 2001. North Spring, Big Spring, and Reynolds Spring have relatively stable habitat conditions, and distributions of springfish in these systems seem to be relatively stable (U.S. Fish and Wildlife Service 2009b).

Occurrence in the Study Area. The Railroad Valley springfish occurs within specific springs located in Nye County. This includes Big Warm Spring, Little Warm Spring, Big Spring, Hay Corral Spring, North Spring, and Reynolds Spring. The springfish would be found exclusively in the water that occurs in these springs, and possible their outlets. These locations are outside of the FRTC Study Area.

3.5.2.5 Amphibians and Reptiles

3.5.2.5.1 Overview

These desert habitats on NAS Fallon usually have a wide variety of lizards and snakes adapted to the hot, dry conditions (Table 3.5-4). The 1997 ecological survey recorded 23 reptile and 4 amphibian species (U.S. Department of the Navy 2014). Amphibian and reptile species common in the region include bull frogs (*Lithobates catesbeiana*), western fence lizard (*Sceloporus occidentalis*), gopher snake (*Pituophis melanoleucus deserticola*), and Great Basin rattlesnake (*Crotalus oreganos lutosus*). Reptiles were not surveyed for the ecological inventory, but the following species are likely to occur in sandy habitats: red coachwhip (*Coluber flagellum piceus*), gopher snake, and western patch-nosed snake (*Salvadora hexalepis*). Amphibians expected in riparian and wetland habitats within the NAS Fallon-administered lands include western toad (*Bufo boreas boreas*), Great Basin spadefoot (*Spea intermontana*), and bullfrog. Indeed, a 2007 survey of Dixie Valley sites confirmed the presence of these expected species (U.S. Department of the Navy 2008). There are also isolated populations of western toads in Dixie Meadows, which are currently being studied by the University of Nevada and may represent a newly described species known as the western (Dixie Valley) toad (proposed new name, *Anaxyrus williamsi*) (University of California-Davis 2011). Breeding habitat was commonly identified within Dixie Valley meadow habitats. In addition to this research, the USFWS and Nevada Department of Wildlife are currently conducting studies of toad populations in order to provide background information to propose the species for listing.

Table 3.5-4: Reptile and Amphibian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
American bullfrog	*Lithobates catesbeiana*							X	X	
California king snake	*Lampropeltis getulus californiae*					X			X	X
Columbia spotted frog	*Rana luteiventris*	C, PA						X		
common zebra-tailed lizard	*Callisaurus draconoides draconoides*		X		X	X	X		X	
desert spiny lizard	*Sceloporus magister*		X		X	X	X		X	
Great Basin collared lizard	*Crotaphytus bicinctores*		X		X	X	X		X	
Great Basin gopher snake	*Pituophis melanoleucus deserticola*					X			X	X
Great Basin rattlesnake	*Crotalus oreganos lutosus*		X		X	X	X		X	X
Great Basin spadefoot	*Spea intermontana*							X	X	
Great Basin whiptail	*Aspidoscelis tigris tigris*		X		X	X	X		X	
large-spotted leopard lizard	*Gambelia wislizenii wislizenii*		X		X	X	X		X	
long-nosed leopard lizard	*Gambelia wislizenii*		X		X	X	X		X	
long-nosed snake	*Rhinocheilus lecontei*		X			X			X	
Nevada side-blotched lizard	*Uta stansburiana nevadensis*		X		X	X	X		X	

Table 3.5-4: Reptile and Amphibian Species Known to Occur or Potentially Occurring at Fallon Range Training Complex (continued)

Species Name		Conservation Status	Habitat and Occurrence							
Common	Scientific		BF	PL	PS	SN	SG	WT	AG	LS
night snake	*Hypsiglena torquata*					X			X	X
northern desert horned lizard	*Phrynosoma platyrhinos platyrhinos*		X		X	X	X		X	
northern leopard frog	*Rana pipens*	PA						X	X	
red coachwhip	*Coluber flagellum piceus*				X					
rubber boa	*Charina bottae*							X	X	
sagebrush lizard	*Sceloporus graciosus*		X		X	X	X		X	
striped whipsnake	*Masticophis taeniatus*					X			X	
western fence lizard	*Sceloporus occidentalis*		X		X	X	X		X	
western patch-nosed snake	*Salvadora hexalepis*					X			X	
western terrestrial garter snake	*Thamnophis elegans*							X	X	X
western toad	*Bufo boreas boreas*							X	X	
yellow-backed spiny lizard	*Sceloporus magister uniformis*		X		X	X	X		X	

Notes: AG = Agricultural, BF = Basin Floor Habitat, C = Candidate, LS = Landscaped, PA = Nevada State Protected Amphibian, PL = Playa Habitat, PS = Piedmont Slope Habitat, SG = Sagebrush Habitat, SN = Sandy Habitat, WT = Wetland
Source: U.S. Department of the Navy 2008, U.S. Department of the Navy 2014, U.C. Davis 2011

3.5.2.5.2 Special Status Amphibian and Reptilian Species

Columbia Spotted Frog

Status, Population Trends, and Threats. The Columbia spotted frog is a Candidate Species for listing under ESA and as a Protected Amphibian under the Nevada Species of Conservation Priority. As stated previously, the Great Basin population of Columbia spotted frogs in Nevada is geographically separated into three subpopulations: Jarbidge-Independence Range, Ruby Mountains, and Toiyabe Mountains. The largest of Nevada's three subpopulation areas is the Jarbidge-Independence Range in Elko and Eureka Counties (U.S. Fish and Wildlife Service 2014). This subpopulation area is formed by the headwaters of streams in two major hydrographic basins. Threats that affect this species include degradation and loss of breeding and overwintering habitats, disease (e.g., Chytridiomycosis), predation by introduced aquatic animals, and limited habitat connectivity due to loss of quality riparian and wetland habitats. Causes of these threats include environmental factors such as climate change and drought, current and historical land uses, and the introduction of nonnative plant or animal species (U.S. Fish and Wildlife Service 2009d). Declines of Columbia spotted frog populations in Nevada have been recorded since 1962, when it was observed that in many Elko County localities where Columbia spotted frogs were once numerous, the species was nearly extirpated. The lack of standardized and extensive monitoring and routine surveying has prevented dependable determinations of frog population numbers or trends across Nevada. However, since the signing of the Candidate Conservation Agreements in 2003, long-term monitoring plans aimed at standardizing monitoring locations and protocols have been developed and implemented for both the Toiyabe Mountains and Northeast subpopulations (U.S. Fish and Wildlife Service 2012).

General Description and Habitat. Adult Columbia spotted frogs grow to between 2 and 4 in. (5 and 10 cm) from snout to vent, with the females being larger than males. The dorsal or top part of their bodies are colored and patterned with light brown, dark brown, or gray, and small spots. The belly or ventral coloration can differ among geographic populations units and may range from yellow to a pinkish salmon. However, young Columbia spotted frogs are very pale, almost white on their ventral belly surfaces. The head of the frog may have a dark mask with a light stripe on the upper jaw, and the eyes turned upward. The adult male frogs have swollen thumbs with darkened bases. Columbia spotted frogs are found closely associated with clear, slow-moving, or ponded surface waters, with little shade, and a relatively constant water temperature. Other reproducing populations have been found by springs, floating vegetation, and larger bodies of pooled water. A deep silt or muck substrate may be required for hibernation and torpor that usually occurs during colder months. They can overwinter underneath ice-covered ponds; however, they also will use areas where water does not freeze such as spring heads and undercut stream banks with overhanging vegetation (U.S. Fish and Wildlife Service 2014).

Distribution. In Nevada, Columbia spotted frogs are found in the central (Nye County) and northeastern (Elko and Eureka Counties) parts of the State and at elevations between 5,600 and 8,700 ft. (1,700 and 2,650 m). They have been recorded historically to cover a broader range that includes Lander County in central Nevada and Humboldt County in Northwest Nevada. The Great Basin population of the Columbia spotted frogs in Nevada is geographically separated into three subpopulations: Jarbidge-Independence Range, Ruby Mountains, and Toiyabe Mountains. In the Toiyabe Mountains, Columbia spotted frogs are found in seven drainages in Nye County, Nevada. The Reese River (Upper and Lower), Cow and Ledbetter Canyons, and Cloverdale, Stewart, Illinois, and Indian Valley Creeks are the drainages that the Toiyabe Mountains Columbia spotted frogs occur in. The Toiyabe Mountains subpopulation is geographically isolated from the Ruby Mountains and Jarbidge-Independence Range subpopulations by a large gap in suitable habitat and represents the southern-most extremity of the species' range. The Columbia spotted frog also occurs in Idaho and Oregon (U.S. Fish and Wildlife Service 2012). While the Columbia spotted frogs show strong site fidelity, individuals are capable of traveling distances of 3.1 mi. (5 km) or even further if adequate habitat is available (U.S. Fish and Wildlife Service 2014).

Occurrence in the Study Area. Columbia spotted frogs may be found in the Study Area, especially around pools of standing water, in the Eureka and Nye County; however, their occurrence in this area is rare (U.S. Department of the Navy 2008). Columbia spotted frogs are more likely to be found in the eastern portion of the Study Area (underneath the Smokie, Duckwater, Diamond, and Zircon Air Traffic Control Assigned Airspace [ATCAAs]).

Northern Leopard Frog

The northern leopard frog (*Rana pipiens*) is listed as a Protected Amphibian under the Species of Conservation Priority for the Nevada Wildlife Action Plan (WAP) Revision (2012). Many habitats are required for all of the northern leopard frog's life stages and it breeds in a variety of aquatic habitats. These habitats include both slow-moving or still water, as well as human-constructed habitats. Subadult northern leopard frogs migrate to feeding sites along the borders of more permanent bodies of water. The northern leopard frog is considered uncommon in a large portion of its range in the western United States, where declines of the species have been documented. The western population extends into Canadian provinces and 19 western U.S. states. Threats to the northern leopard frog include habitat loss, disease, non-native species, and pollution and climate change (Nevada Fish and Wildlife Office 2014).

3.5.2.6 Current Requirements and Management Practices

Following is a summary of current requirements and practices applicable to vegetation and wildlife at FRTC.

- Current requirements and management practices (MPs) applicable to wildlife and vegetation at the FRTC are described in the *Integrated Natural Resource Management Plan and Environmental Assessment for Naval Air Station Fallon, Nevada* (U.S. Department of the Navy 2014) Actions focus on minimizing disturbance, controlling invasive plants, and restoring native habitats.
- As part of its Bird/Aircraft Strike Hazard (BASH)-oriented wildlife management program to reduce or eliminate wildlife attractants near runways and taxiways, NAS Fallon implements various habitat management and modification techniques including, but not limited to removing food sources, mowing tall grasses, relocating perching and nesting structures, controlling weeds to minimize seeds and bird attractants, and preventing standing water in areas near the flightline. The BASH program manages risk by addressing specific aviation safety hazards associated with wildlife near airfields through coordination among all the entities supporting the aviation mission (U.S. Department of Defense 2010).

3.5.3 Environmental Consequences

This section evaluates how and to what degree the activities described in Chapter 2 (Description of Proposed Action and Alternatives) could impact biological resources (vegetation, mammals, birds, fish, amphibians/reptiles) within the Study Area. The analysis focuses on potential impacts and overall changes as they relate to biological resources associated with implementation of all current and proposed military readiness activities and proposed range enhancements at the FRTC. Table 2-4 presents the baseline and proposed training activities for each alternative. Each stressor is introduced and analyzed by alternative. Table 3.0-1 shows the warfare areas and associated stressors that were considered for analysis. The stressors vary in intensity, frequency, duration, and location within the Study Area. The following primary stressors are applicable to biological resources in the Study Area and are analyzed:

- Noise (Aircraft Noise [including sonic booms], Munitions Noise, Weapons Firing and Explosion/Impact Noise)
- Energy (Electromagnetic Radiation, Lasers)
- Physical Disturbance (Aircraft and Aerial Target Strike, Military Expended Material Strike, Other Ground-Disturbing Activities [Training Activities and Range Enhancements])
- Secondary Stressors (Soil Quality, Water Quality, Air Quality)

With respect to ESA-listed species, three species of fish (Cui-ui [*Chasmistes cujus*], Lahontan cutthroat trout [*Onchoryhncus clarkia henshawi*], and Railroad Valley Springfish [*Crenichtys nevadae*]) and one amphibian (Columbian spotted frog [*Rana luteiventris*]) are currently either listed or proposed for listing under ESA. However, the locations where these species occur are in areas where there is no ground disturbing activities that would directly impact the species.

The Lahontan cutthroat trout may occur in the Study Area, in rivers such as Truckee, streams, tributaries, and lakes such as Pyramid Lake. The cui-ui have a very restricted distribution, and occur only in Pyramid Lake, western Nevada. The Cui-ui also occupy the lower Truckee River during spawning season. They would be more likely to be found in the northwestern portion of the Study Area (underneath the Reno Military Operating Area [MOA]). The Railroad Valley springfish occurs within specific springs located in Nye County. The springfish would be found exclusively in the water that

occurs in these springs, and possibly their outlets, which are outside of the FRTC Study Area and would not be subjected to aircraft overflight noise or other activities in the Study Area. However, undocumented populations of the Railroad Valley Springfish may occur in portions of the FRTC Study Area subject to aircraft overflights.

Aircraft overflights have the potential to affect surface waters and, therefore, to expose fish occupying those upper portions of the water column to noise. Activities utilizing the Reno MOA (as indicated in Table 2-4 of Chapter 2) are limited to Air Combat Maneuvers. It is important to note that the lower altitude of the Reno MOA is 13,000 ft. (3,962.4 m) above ground level (AGL) and the ceiling is 18,000 ft. (5,486.4 m) AGL. At these altitudes, very little of the noise produced by the aircraft would propagate to the water surface, and even less would be transmitted through the air-water interface due to reflection off the water surface. Because of the minimal energy being transmitted into the water from air combat maneuvers above 13,000 ft. AGL, it is unlikely that fish would even detect the noise of the aircraft overflight. Therefore, the three ESA-listed species are not anticipated to be affected by activities in the FRTC, and are not carried forward for detailed analysis.

Columbia spotted frogs may be found in the Study Area, especially around pools of standing water, in the Eureka and Nye County; however, their occurrence in this area is rare (U.S. Department of the Navy 2008). Columbia spotted frogs are more likely to be found in the eastern portion of the Study Area (underneath the Smokie, Duckwater, Diamond, and Zircon Air Traffic Control Assigned Airspace [ATCAAs]). There are no ground ranges in these regions, and therefore the frogs may only be exposed to intermittent aircraft overflight noise. Training activities that could occur in the region of overlap are restricted to aircraft activities at altitudes above 18,000 ft. AGL. Similar to the Reno MOA discussed above for ESA-listed fish species, minimal acoustic energy will reach the ground location. Because of the vertical separation between training activities and the ground, the Navy believes no direct or indirect stressor would overlap with the Columbian spotted frog, are not anticipated to be affected by activities in the FRTC, and are not carried forward for detailed analysis in this EIS.

3.5.3.1 Noise

Section 3.4 (Noise [Airborne]) describes baseline noise conditions for the Study Area, noise levels associated with training and testing activities, and the potential effects of noise on human receptors. In addition, Section 3.4 (Noise [Airborne]) provides a general introduction to sound and noise, including the various noise descriptors (noise metrics) and methods used to predict noise levels in this EIS. This section analyzes the potential effects of noise on wildlife.

Wildlife in the FRTC Study Area would continue to be exposed to noise associated with the following:

- Fixed-wing aircraft overflights (including sonic booms)
- Helicopter overflights
- Unmanned Aircraft System (UAS) overflights
- Small and large arms firing
- Live and non-explosive practice munitions striking a target or the ground
- Vehicle and equipment operations
- Occasional explosive munitions disposal

The training activities that have the greatest impact on vegetation within the impact areas of the FRTC Study Area are those that result in habitat alteration associated with ground disturbance from explosive

munitions or ground-based training. Therefore, an analysis on vegetation is not provided for acoustic stressors.

3.5.3.1.1 Overview of Wildlife Responses to Noise

Numerous studies have documented that wild animals respond to human-made noise (National Park Service 1994, Bowles et al. 1995, Larkin 1996, Palmer et al. 2003, Pepper et al. 2003, Goldstein et al. 2005, U.S. Navy 2012). The manner in which animals respond to noise depends on several factors including life history characteristics of the species, characteristics of the noise source, loudness, onset rate, distance from the noise source, presence/absence of associated visual stimuli, and previous exposure. Noise may cause physiological or behavioral responses that reduce the animals' fitness or ability to grow, survive, and reproduce successfully. The potential effects of noise on wildlife can take many forms, including changing habitat use and activity patterns, increasing stress response, decreasing immune response, reducing reproductive success, increasing predation risk, degrading communication, and damaging hearing if the sound is sufficiently loud (Larkin 1996).

Behavioral responses are the most commonly used endpoints when studying the effects of noise on wildlife. This is largely based on practical considerations and the difficulty in measuring animal fitness or physiological and ecological endpoints. Researchers have documented a range of behavioral responses to noise, ranging from indifference to extreme panic. Common behavioral responses include alert behavior, startle response, flying or running away, and increased vocalizations (National Park Service 1994, Bowles et al. 1995, Larkin 1996). In some instances, behavioral responses could interfere with breeding, raising young, foraging, habitat use, and physiological energy budgets, particularly when an animal continues to respond to repeated exposures.

While difficult to measure in the field, all behavioral responses are accompanied by some form of physiological response such as increased heart rate or a startle response. A startle is a rapid, primitive reflex that is characterized by rapid increase in heart rate, shutdown of nonessential functions, and mobilization of glucose reserves. Animals can learn to control the behavioral reactions associated with a startle response and often become habituated to noise (National Park Service 1994, Bowles et al. 1995, Larkin 1996). Habituation keeps animals from expending energy and attention on harmless stimuli, but the physiological component might not habituate completely (Bowles et al. 1995). Therefore, animal fitness could still be affected when an animal has habituated to noise (Barber et al. 2009). Gill et al. (2001) described theoretical circumstances when habituation to or tolerance of a stressor could be more detrimental to a population than a strong avoidance reaction. Nonetheless, what appears to be habituation has been observed in many studies and is well-demonstrated in studies evaluating bird control devices (e.g., noise cannons, pyrotechnics, and recorded sounds), which are used to scare birds away from airfields and agricultural areas (Larkin 1996). Larkin (1996) describes one example where red-winged blackbirds began resting on the noise cannon that was intended to scare them away. The birds learned to fly a short distance away when they heard the click of the mechanism that released the gas and signaled an impending explosion.

Likewise, a strong and consistent behavioral or physiological response is not necessarily indicative of negative consequences to individuals or to populations (National Park Service 1994, Bowles et al. 1995, Larkin 1996). For example, many of the reported behavioral and physiological responses to noise are within the range of normal adaptive responses to external stimuli, such as predation, that wild animals face on a regular basis. In many cases, individuals would return to homeostasis or a stable equilibrium almost immediately after exposure. The individual's overall metabolism and energy budgets would not be affected assuming it had time to recover before being exposed again. If the individual does not

recover before being exposed again, physiological responses could be cumulative and lead to reduced fitness. However, it is also possible that an individual would have an avoidance reaction (i.e., move away from the noise source) to repeated exposure or habituate to the noise when repeatedly exposed.

While the effects of noise on wildlife have been addressed in numerous studies, research is hampered by a preponderance of small, disconnected, anecdotal or correlational studies as opposed to coherent programs of controlled experiments (Larkin 1996). These factors, coupled with differences between species, individuals of the same species, and other factors such as habitat, make it difficult to definitively predict how wildlife populations will respond to noise under a specific exposure scenario. Though the literature is sparse, studies on effects of noise on wildlife have been reviewed and, as noted in detail in the sections below, are used to inform the impact analysis.

3.5.3.1.2 Hearing Loss

A familiar effect of exposure to high intensity sound is hearing loss, meaning an increase in the hearing threshold. This phenomenon is called a noise-induced threshold shift, or simply a threshold shift (Miller 1974). The distinction between permanent threshold shift (PTS) and temporary threshold shift (TTS) is based on whether there is complete recovery of a threshold shift following a sound exposure. If the threshold shift eventually returns to zero (the threshold returns to the pre-exposure value), TTS has occurred. The recovery time is related to the exposure duration, sound exposure level (SEL), and the magnitude of the threshold shift, with larger threshold shifts and longer exposure durations requiring longer recovery times (Finneran et al. 2005; Mooney et al. 2009). If the threshold shift does not return to zero but leaves some finite amount of threshold shift, then that remaining threshold shift is a PTS. In general, a threshold shift is more likely when repeated exposures occur over a short duration.

Long-term effects on wildlife that might experience a threshold shift would depend on whether the shift was temporary or permanent, the severity of the shift, the hearing frequencies affected by the shift, and the time required to recover from a TTS. Individual animals with impaired hearing could be more susceptible to predation and would be expected to expend more time and energy trying to detect predators via visual cues rather than auditory cues (e.g., listening for sounds made by an approaching predator or alarm calls of other animals). This could lead to decreased foraging success and decreased fitness. Recovery from a TTS can take a few minutes to a few days depending on the severity of the initial shift. Threshold shifts do not necessarily affect all hearing frequencies equally, so some threshold shifts may not interfere with an animal hearing biologically relevant sound. Consequently, a threshold shift would not necessarily result in long-term effects on the individual.

Continuous or repetitive loud noise appears to cause stress and vascular alteration (including structural damage) in the ear and could be harmful when animals are already under metabolic stress such as starvation. Sound levels over 85 A-weighted decibels (dBA) are considered harmful to inner ear hair cells; 95 dBA is considered unsafe for prolonged periods; and extreme damage occurs as a result of brief exposure to 140 dBA (Hamby 2004). Hearing loss in birds is difficult to characterize because birds, unlike mammals, regenerate inner ear hair cells, even after substantial loss (Corwin and Cotanche 1988; Stone and Rubel 2000). Recovery from metabolic ear stress can often occur after 10 hours (mammals) post loud impulse noise, even before ear structures are fully recovered. Repeated trauma may prolong the course of hearing sensitivity recovery; however, longer-term recovery from hearing loss is generally expected in birds due to cell regeneration. Lifelong hearing loss (threshold shifts) can occur in birds; about half the duration of noise is needed to produce a threshold shift in birds as opposed to mammals.

Severe noise, even if the noise is short in duration, can result in tympanum rupture, bone fracture, other damage to the ear, and deterioration of brain cells. These impulse noises can cause physical damage at lower intensity than continuous or rapidly repeating noises due to the ear reflex mechanism. For example, common canaries (*Serinus canaria*) exposed to continuous loud noises experienced changes in hearing thresholds, especially at high frequencies (Larkin 1996). While a study with parakeets (*Melopsittacus undulates*) indicated that a PTS (lifelong hearing loss) was experienced at low frequencies only and nearly absent at higher frequencies (Larkin 1996). Many birds appear to tolerate noise that can cause pain in humans; for example, seabirds at airports, wild turkeys (*Meleagris gallopavo*) near a rocket testing plant in Florida, and ospreys (*Pandion haliaetus*) at the Naval Surface Warfare Center, Dahlgren (Larkin 1996). Hamernik et al. (1987) observed varying degrees of TTS and PTS in chinchillas (burrowing rodents) exposed to 1, 10, or 100 noise impulses (one every 3 seconds) having peak intensities of 131, 135, 139, or 147 unweighted decibels (dBP). Damage to the cochlear sensory epithelia was also observed for some exposures.

3.5.3.1.3 Behavioral Responses, Physiological Stress, and Habituation

Numerous studies have documented that wild animals respond to human-made noise, including low-altitude aircraft overflights (Larkin 1996, National Park Service 1994). The manner in which animals respond to overflights depends on several factors including life-history characteristics of the species, characteristics of the noise source, loudness, how suddenly the sound occurs (onset rate), distance from the noise source, the presence or absence of associated visual stimuli, and previous exposure to the sound. A primary concern is that low-altitude overflights may cause physiological or behavioral responses that reduce the animals' fitness or ability to survive. High-noise events (like a low-altitude aircraft overflight or sudden sonic boom) may cause animals to startle or engage in escape or avoidance behaviors, such as flushing or running away. These activities impose an energy cost that, over the long term, may affect survival or growth. In addition, the animals may spend less time engaged in necessary activities like feeding, foraging, or caring for their young because they spend time in noise-avoidance activity.

Researchers have documented a range of behavioral responses to overflights, ranging from indifference to avoidance. Behavioral responses could interfere with raising young, habitat use, and physiological energy budgets. While difficult to measure in the field, some behavioral responses are likely accompanied by physiological responses, such as increased heart rate, or stress. Chronic stress can compromise the general health of animals, but stress is not necessarily indicative of negative consequences to individuals or to populations (Larkin 1996, National Park Service 1994). Unless repeatedly exposed to loud noises or simultaneously exposed to synergistic stressors, it is possible that individuals would return to homeostasis almost immediately after exposure and the individual's overall metabolism and energy budgets would not be affected. However, most of the effects of noise are mild enough that they may never be detectable as changes in population size or population growth against the background of normal variation (Bowles 1995). Many other environmental variables (e.g., predators, weather, changing prey base, ground-based human disturbance) may influence reproductive success and confound the ability to identify the ultimate factor in limiting productivity of a certain nest, area, or region.

For instance, a 3-year study by Bowles et al. (1995) focused on chronic military aircraft exposure. The study was conducted in south-central Arizona characterized by creosote and mixed Sonoran Desert scrub. The sites were exposed to low-altitude flights of more than 20,000 sound events in excess of 80 dB, with 115.5 dB being the highest A-weighted single event level recorded. The control sites received noise levels at least an order of magnitude lower, with an average of 51.3 dB and none over

100 dB. The control area event rate was approximately one flight per day. Numerous kangaroo rat and pocket mouse species and the white-throated wood rat were included in the study. Populations' densities, body weight, reproductive activity, recruitment by immigration and reproduction, and survival rate month to month were measured. Overall, the outcome of the study suggested the effects of lifetime exposure to intermittent aircraft noise on animal demography are likely to be small and difficult to detect, if they exist at all.

Relatively little is known about the responses of reptiles to noise. Sound perception appears to be subordinate in importance to vision or chemoreception in the activities of most reptiles (Manci et al. 1988). Some reptiles have sound-producing mechanisms, but they are absent in the majority of species. Sensitive hearing acuity is essential to the survival of some desert reptiles because critical environmental sounds are often of relatively low intensity movement of insect prey and predators (Manci et al. 1988). Noise may elicit physiological and behavioral responses, though exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent.

Based on information presented above and literature summarized for the other species (National Park Service 1994, Bowles et al. 1995, Larkin 1996), wildlife in the FRTC Study Area could exhibit a range of behavioral and physiological responses to noise depending on distance from the noise source (strength or intensity of behavioral or physiological response decreases with increasing distance from noise source). It is also likely that wildlife would habituate to some sound levels. Several studies indicate that there is a strong tendency for species to acclimate to noise disturbances (Grubb and King 1991; Ellis et al. 1991; Manci et al. 1988; Black et al. 1984). Both field and laboratory data indicate that in mammals (e.g., pronghorn, bighorn sheep, elk, and mule deer) effects are transient and of short duration and suggest that the animals appear to habituate to noise through repeated exposure without long-term discernible negative effects (Krausman et al. 1998; Weisenberger et al. 1996).

High sound levels and any associated visual or other cues (e.g., vehicle and equipment movement, other human activity, vibration, or projectile impacting the ground nearby) would likely be perceived as a threat and species may exhibit defense behavior. With repeated exposure over a short time frame, such responses have the potential to reduce an animal's fitness by limiting foraging time, increasing energy expenditure, inducing a stress response, and interfering with breeding. Various studies have indicated that some animals respond to repeated loud noises by temporarily or permanently abandoning habitat (National Park Service 1994, Bowles et al. 1995, Larkin 1996). However, the majority of studies have reported short-term or negligible impacts on wildlife.

3.5.3.1.4 No Action Alternative

Aircraft Noise

Fixed-wing aircraft overflights take place at various altitudes and airspeeds throughout the SUA (Figure 2-1) and most occur during the daytime (Table 2-6). The number of times an individual animal could be exposed to aircraft noise during a specific time period (e.g., day, month, year) would be highly variable based on factors such as specific training schedules, flight tracks, altitudes, number of participating aircraft, and biological factors such as local animal movements and seasonal migrations. Figures 3.4-9 through 3.4-12 of Chapter 3.4 (Noise [Airborne]) show average day-night sound level (DNL) noise contours for all aircraft under the No Action Alternative. Community noise levels are generated mostly from fixed-wing operations, as the vast majority of aircraft sorties under the No Action Alternative (approximately 96 percent) are of the fixed-wing type. While the DNL metric and contours are intended to help describe potential impacts on humans, they also indicate where wildlife exposure to noise from overflights would be most frequent. The DNL contours indicate that wildlife would be exposed to aircraft

noise most frequently around the Bravo Training Ranges, ingress and egress routes, and staging areas for larger scale adversarial events.

Typically, only low-altitude flights are a concern from a wildlife exposure perspective because aircraft flying above 3,000 ft. (914.4 m) above ground level are not expected to produce a meaningful response in most wildlife based on wildlife responses described in the literature (e.g., National Park Service 1994, Bowles 1995, Larkin 1996). For discussion purposes here, low-altitude flights generally occur below 3,000 ft. (914.4 m) AGL and as low as 200 ft. (30.5 m) AGL for brief periods. Under the No Action Alternative, approximately 85 percent of flights are at altitudes above 3,000 ft. (914.4 m) and approximately 34 percent occur during nighttime hours (Table 2-6).Sound exposure levels at the surface from most air combat maneuver overflights will vary depending on the altitude of the aircraft as well as the type of the aircraft. For reference, at a distance of 200 ft. (60.9 m), the received sound exposure level from a FA-18E/F is approximately 122 dBA; at 1,000 ft. (304.8 m), the received level drops to 113 dBA; and at 5,000 ft. (1,524 m.), the received sound exposure level is approximately 102 dBA (U.S. Department of the Navy 2013b). Exposure to fixed-wing aircraft noise would be brief (seconds) as an aircraft quickly passes overhead.

Fixed-wing aircraft that are flying supersonically (faster than the speed of sound) during portions of training activities not only create overflight noise, but they also create sonic booms that may propagate to the surface. Most supersonic flights occur during adversarial training simulating air-to-air combat situations during air warfare (AW) and Large Force Exercises. An estimated 458 supersonic events would occur during the busiest month under the No Action Alternative. The response to sonic booms or other sudden disturbances is similar among many wildlife species—sudden and unfamiliar sounds usually act as an alarm and trigger a “fight or flight” startle reaction. The startling effect of a sonic boom can be stressful to an animal. This reaction to stress causes physiological changes in the neural and endocrine systems, including increased blood pressure and higher levels of available glucose and corticosteroids in the bloodstream (Blickley et al. 2012). Continued disturbances and prolonged exposure to severe stress could deplete nutrients available to the animal. However, sonic booms are not expected to cause more than a temporary startle-response because the “pursuit” would not be present. Studies suggest that the intensities and durations of a startle response decrease with the number and frequency of exposures. Several studies indicate that there is a strong tendency for species to acclimate to noise disturbances (Grubb and King 1991; Ellis et al. 1991; Manci et al. 1988; Black et al. 1984).

Although physiological habituation could occur, it is still possible that sonic booms would elicit a brief behavioral response. For example, the response of seven species of raptors of different life stages to sonic booms while nesting was investigated through the use of simulated booms in natural conditions (Ellis et al. 1991). The simulated sonic booms were equivalent to impulse noises expected by supersonic jets operating between 6,561 and 9,842.5 ft. (2,000 and 3,000 m). Response to sonic boom was fairly minimal; most responses were negligible, but adult response to the sonic boom usually resulted in flushing from the nest, although incubating or brooding adults never left the nesting area.

Helicopter overflights take place below 3,000 ft. (914.4 m) above ground level throughout the SUA, but most helicopter activity occurs directly over the Bravo ranges within the FRTC. About 1,402 annual helicopter sorties would take place under the No Action Alternative, each with a typical flight duration of 1.5 hours. Approximately 48 percent of the flight hours would occur at night (Table 2-6). Representative helicopter flight altitudes are less than 3,000 ft. (914 m) above ground level during training exercises. Sound exposure levels at the surface from most helicopter overflights will vary depending on the altitude of the aircraft, though they are typically much lower than that of fixed-wing

aircraft. For reference, at a distance of 200 ft. (60.9 m), the received sound exposure level from an H-60 is approximately 95 dBA; at 500 ft. (152.4 m), the received level drops to 89 dBA (U.S. Department of the Navy 2006). Some exercises might include hovering approximately 20 ft. (6.1 m) off the ground for several minutes. The duration of exposure to noise from a helicopter would be longer than a fixed-wing aircraft overflight because helicopters fly at slower airspeed, though most exposures would still be brief (seconds to minutes).

Most helicopter activity that takes place within the FRTC Study Area airspace is less dispersed compared to fixed-wing aircraft overflights. Therefore, repeated exposure of an individual animal to helicopter noise during a given exercise is more likely than that of a fixed-wing aircraft overflight. However, the onset rate for helicopter noise is lower than that of a fixed-wing aircraft, reducing the occurrence of a sudden-onset stimulus.

UAS overflights take place at various altitudes and airspeeds throughout the SUA. About 80 percent occur during the daytime and typically fly below 3,000 ft. (914.4 m) above ground level (Table 2-6). UAS are estimated to be significantly quieter than the manned fighter jets, and their noise contribution to the overall aircraft noise is negligible. For reference, at a distance of 28 ft. (8.5 m), the received level from a Shadow UAS is approximately 108 dBA; at 204 ft. (62.2 m), the received level drops to 85 dBA. Once the UAS reaches approximately 3,000 ft. (914.4 m) AGL, the Shadow would no longer be heard on the ground (Army National Guard 2008).

Given the historical use of the airspace, and the persistence of aircraft operations and wildlife populations, wildlife within the MOAs are likely habituated to aircraft overflights and associated noise (e.g., sonic booms). Many of the above-listed behavioral and physiological responses to noise are within the range of normal adaptive responses to external stimuli, such as predation, that wild animals face on a regular basis. In many cases, individuals would return to homeostasis or a stable equilibrium almost immediately after exposure. The individual's overall metabolism and energy budgets would not be affected, assuming it had time to recover before being exposed again.

Wildlife exposed to low-altitude aircraft overflights under the No Action Alternative could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Aircraft overflights are not expected to result in chronic stress based on the short duration and infrequency of exposure.

Weapons Firing and Explosive / Impact Noise

Weapons Firing

Small and medium caliber arms firing is currently conducted on all Bravo training ranges at FRTC. Therefore, wildlife in the vicinity of these activities could be exposed to intermittent small and medium caliber arms noise. At a distance of 50 ft. (15.2 m), the measured sound level of a 0.50-caliber machine gun is approximately 98 dBA. Sound level intensity decreases with increased distance from the firing location and increased angle from the line of fire (Pater & Shea 1981). Multiple, rapid gun firings would occur from a single firing point toward a target area. Acoustic impacts from weapons firing would often be concentrated in space and duration, as presented in Table 2-5. When the firing sources are airborne (such as during gunnery exercises [GUNEX], Close Air Support [CAS], or Large Force Exercises), the amount of noise that would reach the ground would depend on how high the noise source is above the ground. For example, the approximate sound level of a 0.50-caliber machine gun at 400 ft. from the source would be 18 dB less than the sound level at 50 ft. from the source. This attenuation would occur for ground-based firing positions as well.

The potential for animals to be exposed to noise from weapons firing or explosions depends on several factors, including the presence of animals near the detonation, location of the detonation, size of the explosive, and distance from the detonation. Detonations create blast waves and acoustic waves in air and are also transmitted through the ground. Some of the sound could be attenuated by surrounding vegetation. Noise can result from direct munitions impacts (one object striking another), blasts (explosions that result in shock waves), bow shock waves (pressure waves from projectiles flying through the air), and substrate vibrations (combinations of explosion, recoil, or vehicle motion with the ground). Noise may be continuous (i.e., lasting for a long time without interruption) or impulse (i.e., short duration). Continuous impulses (e.g., bursts from rapid-fire weapons) represent an intermediate type of sound and, when repeated rapidly, may resemble continuous noise. These types of sound are distinguished here as they differ in their effects. Continuous sounds can result in hearing damage while impulses typically elicit physiological or behavioral responses.

High-frequency sounds (or ultrasound) diminish very rapidly in air with distance from the source, and terrestrial animals close enough to be adversely affected by the ultrasound produced by military training are likely close enough to be adversely affected by shrapnel, flying rock, or direct strikes. Therefore, ultrasound receives little attention in the terrestrial environment and it should be assumed that if an animal (e.g., a bat) was close enough to experience impacts from ultrasound, the animal would also likely be impacted directly by the actual munitions (U.S. Fish and Wildlife Service 2010). Infrasound (present in blast and helicopter noise, but not heard by humans) attenuates less in air than audible sound, which means these noises can affect wildlife at longer distances. Birds may use infrasound for communication; however, the extent to which birds are affected by infrasound is speculative. Infrasound can result in damage to the ears, which may affect the species' ability to hear and may also mask biologically meaningful infrasonic communication between individuals.

Wildlife in close proximity of ground based firing positions would likely exhibit behavioral responses. The behavioral effects of military-related noise to wildlife have been investigated numerous times with mixed results (VanderWerf 2000); noise can produce a variety of physiological impacts and behavioral responses in wildlife. The response to noise not only affects an individual but can affect the overall population. Hearing impairment, both temporary and permanent, can decrease viability or reproductive success, particularly when mate attraction and territory protection depend on calling or singing normally. Hearing impairment can also decrease the ability to detect and warn others of predators. Behavioral responses (startle response, alert or alarm response, and flushing) to noise are often examined as these response actions result in: expending excess energy that is not directed toward reproduction; nest/young exposure increasing the risk of predation; nest cooling or nest heating, which can result in egg and juvenile mortality; or accidently kicking eggs or juveniles out of the nest. Wildlife response to noise may also be more intense at night, if the species rely more on auditory cues than visual cues at night. Additionally, young animals may be more susceptible to hearing loss from noise exposure than adults; however, an experiment with common canaries did not show a differential response with age (Larkin 1996).

These varied responses are often attributed to habituation, where after a period of exposure to a stimulus, an animal stops responding to the stimulus. In general, a species can often habituate to human-generated noise when the noise is not followed by an adverse impact. Even when a species appears to be habituated to a noise, the noise may produce a metabolic or stress response (increased heart rate results in increased energy expenditure), although the response may or may not lead to changes in overall energy balance.

However, it is important to note that it is unlikely that wildlife would remain in the immediate vicinity of personnel preparing or engaging in training activities. The natural tendency of wildlife to avoid human interaction would also serve to minimize the potential for species to be in close proximity to firing locations. Wildlife exposed to small and medium caliber firing noise under the No Action Alternative could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Small and medium caliber firing noise are not expected to result in chronic stress based on the short duration and infrequency of exposure.

Explosive/Impact Noise

Explosive detonations during training are associated with high-explosive munitions, including bombs, missiles, naval gun shells, grenades, mortar rounds, and demolition charges. Some detonations would occur in the air or at the ground surface. The estimated number of munitions proposed under each alternative is shown in Table 2-5. Air-to-Ground (A-G) Bombing Exercises (BOMBEXs) at the FRTC Study Area involve dropping various live and non-explosive practice bombs from fixed-wing aircraft within target areas of the Bravo training ranges (Table 2-4). Additionally, under the No Action Alternative, approximately 78 land demolitions or Explosive Ordnance Disposal (EOD) events would occur on the Bravo training ranges (Table 2-4). The potential for animals to be exposed to explosions depends on several factors, including the presence of animals near the detonation, location of the detonation, size of the explosive, and distance from the detonation. Detonations create blast waves and acoustic waves in air and are also transmitted through the ground. Some of the sound could be attenuated by surrounding vegetation. Noise can result from direct munitions impacts (one object striking another), blasts (explosions that result in shock waves), bow shock waves (pressure waves from projectiles flying through the air), and substrate vibrations (combinations of explosion, recoil, or vehicle motion with the ground).

Noise is associated with munitions use and a noise event often occurs prior to weapons firing. For example, pilots fly over the target area to make safety checks before dropping or firing munitions during A-G bombing and GUNEX. Some wildlife species might flee the immediate area or take cover underground in response to the fly over, reducing the likelihood of a strike. In addition, munitions training takes place in a deliberate progression, with target placement being followed by a few initial shots, after which feedback is obtained before firing the next series of shots. Again, the likelihood of a strike might be reduced by wildlife responding to the initial stages of an exercise.

Studies focusing on responses of birds on land to explosive noise show varied reactions ranging from no response to behavioral (e.g., flushing, cessation of foraging) and physiological responses (e.g., increased heart and respiration rates). Red-cockaded woodpeckers (*Picoides borealis*) successfully raised young near an active bombing range in Mississippi, while other birds at other sites did not. Oahu elepaio (*Chasiempis sandwichensis ibidis*) did not respond in statistically significant or biologically meaningful ways to noise generated by training with 155 and 105 mm howitzers, 60 and 81 mm mortars, hand grenades, and demolition of unexploded ordinance (VanderWerf 2000). Prairie falcons (*Falco mexicanus*) responded to blasts from ongoing civilian construction where the nests sites were not normally exposed to blasting; however, one northern harrier (*Circus cyaneus*) appeared to preferentially hunt near a location where 24 pound (lb.) bombing occurred. Anecdotal observations indicate the burrowing owl (*Athene cunicularia floridana*) persists at Eglin Air Force Base (AFB) on a bombing range where a variety of inert munitions (rockets, missiles, and bombs including a 21,700 lb. massive air blast bomb) has been used over the last 24 years (U.S. Fish and Wildlife Service 2010).

Behavioral responses (startle response, alert or alarm response, and flushing) to noise are often examined as these response actions result in animals expending excess energy not directed toward reproduction; nest exposure increasing the risk of predation, nest cooling or nest heating, which can result in egg and juvenile mortality; or accidently kicking eggs or juveniles out of the nest. Behavioral responses can also include lower breeding densities in suitable habitats that are subject to noise; therefore, suitable habitat may become otherwise unsuitable due to noise.

Special Status Species

Under the No Action Alternative, special status avian, amphibian, and mammal species at training ranges of the FRTC would continue to be exposed to aircraft noise (including sonic booms), munitions noise, and noise from explosions. Areas that would experience the highest noise levels are in the immediate vicinity of the Bravo training ranges. Exposure to aircraft noise could also occur in other areas of potentially suitable habitat under the SUA, as shown in Figures 3.4-9 through 3.4-12. Exposure would be intermittent, and representative SELs are expected to be less than 85 dBA for fixed-wing aircraft and less than 100 dBA for helicopters. Avian and mammal species occurring underneath the SUA could also be exposed to noise from munitions firing and other military readiness activities.

Aircraft overflights and noise from munitions are not expected to affect special status avian and mammal species hearing based on the expected noise levels. Masking is not expected to be an issue because noise would be intermittent and noise events would be brief. Based on responses of animals to noise reported in the literature (National Park Service 1994, Bowles et al. 1995, Larkin 1996), it is likely that at least some aircraft overflights and munitions noise would elicit physiological and behavioral responses (strength or intensity of behavioral and physiological response decreases with increasing distance from noise source). Given the historical usage of the FRTC Study Area, it is possible that animals have habituated to aircraft overflights and noise from munitions at FRTC. There is no evidence that suggests current levels of noise from aircraft overflights or other sources influence avian, amphibian, and mammal species dynamics at FRTC.

In summary, noise may elicit physiological and behavioral responses in avian, amphibian and mammal species under the No Action Alternative. Exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Noise under the No Action Alternative would have short-term minor effects on special status avian, amphibian, and mammal species, which would be widespread throughout the lands underneath the FRTC. Additionally, there would be no takes for bald and golden eagles from noise under the No Action Alternative.

3.5.3.1.5 Alternative 1

Aircraft Noise

As summarized in Table 2-6, the total number of aircraft sorties would increase by approximately 6 percent, from 43,186 under the No Action Alternative to 45,994 under Alternative 1. The number of fixed-wing aircraft sorties would increase from 41,615 to 44,321 per year and helicopter sorties would increase from 1,402 to 1,493 per year under Alternative 1. Wildlife would be exposed to aircraft noise more frequently based on the number of sorties, and lands beneath the proposed MOA would be exposed to noise from low-altitude overflights. Alternative 1 does not include an increase in AAW or Large Force Exercises; therefore, supersonic events are not expected to increase.

Figures 3.4-16 through 3.4-18 show average DNL noise contours for all aircraft under Alternative 1. Community noise levels are generated mostly from fixed-wing operations, as the vast majority of aircraft sorties under the No Action Alternative (approximately 96 percent) are of the fixed-wing type. While the DNL metric and contours are intended to help describe potential impacts on humans, they also indicate where wildlife exposure to noise from low-altitude overflights would be most frequent. The DNL contours indicate that wildlife would be exposed to aircraft noise most frequently around the Bravo Training Ranges, ingress and egress routes, and staging areas for larger scale adversarial events. Given the historical use of the airspace, and the persistence of aircraft operations and wildlife populations, wildlife within the MOAs are likely habituated to aircraft overflights. Wildlife exposed to low-altitude aircraft overflights under the Alternative 1 could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Aircraft overflights are not expected to result in chronic stress based on the short duration and infrequency of exposure.

Weapons Firing and Explosive/Impact Noise

Weapons Firing

Under Alternative 1, small and medium caliber arms firing would be conducted on all Bravo training ranges at FRTC. On Bravo-16, munitions use would double in comparison to the No Action Alternative (Table 2-5). At Bravo-17 and Bravo-19, munitions would also increase, by approximately 33 and 8 percent, respectively. At Bravo-20, however, munitions usage would decrease by approximately 5 percent, in comparison to the No Action Alternative. Munitions use would continue to be performed during Tactical Ground Mobility, GUNEX, CAS, Large Force Exercises, EOD, and Marksmanship activities. When the firing sources are airborne (such as during GUNEX, CAS, or Large Force Exercises), the amount of noise that would reach the ground would depend on how high the noise source is above the ground. For example, the approximate sound level of a 0.50-caliber machine gun at 400 ft. from the source would be 18 dB less than the sound level at 50 ft. from the source. This attenuation would occur for ground based firing positions as well. Wildlife in close proximity of ground based firing positions would likely exhibit behavioral responses, with the likelihood of reactions decreasing with increasing distance from the noise source. It is important to note that it is unlikely that wildlife would remain in the immediate vicinity of personnel preparing or engaging in training activities. The natural tendency of wildlife to avoid human interaction would also serve to minimize the potential for species to be in close proximity to firing locations. Wildlife exposed to small and medium caliber firing noise under Alternative 1 could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Small and medium caliber firing noise are not expected to result in chronic stress based on the short duration and small area of influence.

Explosive/Impact Noise

Explosive detonations during training are associated with high-explosive munitions, including bombs, missiles, naval gun shells, grenades, mortar rounds, and demolition charges. Some detonations would occur in the air or at the ground surface. Similar to the No Action Alternative, the highest potential for impact results from the usage of live bombs and land detonations. Under Alternative 1, A-G BOMBEXs at FRTC involve dropping various live and non-explosive practice bombs from fixed-wing aircraft within target areas of the Bravo training ranges (Table 2-4). As presented in Table 2-5, under Alternative 1, the same number of bombs would be utilized at Bravo-16. At Bravo-17, the number of bombs utilized would decrease from 14,402 to 14,131. At Bravo-19 and Bravo-20, the number of bombs utilized would also decrease, from 4,039 to 3,928 at Bravo-19 and from 4,236 to 4,076 at Bravo-20. Additionally, under

Alternative 1, approximately 78 land demolitions or EOD events would occur on the Bravo training ranges (Table 2-4), the same as under the No Action Alternative.

While the number of explosive detonations will decrease slightly under Alternative 1, the potential for animals to be exposed to explosions still exists and continues to depends on several factors, including the presence of animals near the detonation, location of the detonation, size of the explosive, and distance from the detonation. Species in the immediate vicinity of a detonation would likely be impacted by noise associated with an explosive detonation, with level of potential impact decreasing with increasing distance from the noise source.

Similar to the No Action Alternative, noise is associated with munitions use, and a noise event often occurs prior to weapons firing. For example, pilots fly over the target area to make safety checks before dropping or firing munitions during A-G bombing and GUNEX. Some wildlife species might flee the immediate area or take cover underground in response to the fly over. In addition, munitions training takes place in a deliberate progression, with target placement being followed by a few initial shots, after which feedback is obtained before firing the next series of shots. Again, the likelihood of a strike might be reduced by wildlife responding to the initial stages of an exercise.

Wildlife exposed to explosive detonations during training under Alternative 1 could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Noise from explosive detonations during training are not expected to result in chronic stress based on the short duration and small area of influence.

Special Status Species

Under Alternative 1, special status avian (Table 3.5-2), amphibian (Table 3.5-4) and mammal species (Table 3.5-2) at training ranges of the FRTC would continue to be exposed to aircraft noise, munitions noise, and noise from explosions. Areas that would experience the highest noise levels are in the immediate vicinity of the Bravo training ranges. Exposure to aircraft noise could also occur in other areas of potentially suitable habitat under the SUA, as shown in Figures 3.4-9 through 3.4-12. Exposure would be intermittent, and representative SELs are expected to be less than 85 dBA for fixed-wing aircraft and less than 100 dBA for helicopters. Special status avian, amphibian, and mammal species occurring underneath the SUA could also be exposed to noise from munitions firing and other military readiness activities.

Aircraft overflights and noise from munitions are not expected to affect special status avian and mammal species hearing based on the expected noise levels. Masking is not expected to be an issue because noise would be intermittent and noise events would be brief. Based on responses of animals to noise reported in the literature (National Park Service 1994, Bowles et al. 1995, Larkin 1996), it is likely that at least some aircraft overflights and munitions noise would elicit physiological and behavioral responses (strength or intensity of behavioral and physiological response decreases with increasing distance from noise source). In addition, it is possible that birds have habituated to aircraft overflights and noise from munitions at FRTC. There is no evidence that suggests current levels of noise from aircraft overflights or other sources influence bird population dynamics at FRTC.

In summary, noise may elicit physiological and behavioral responses in avian and mammal species under Alternative 1. Exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Noise under

Alternative 1 would have short-term minor effects on special status avian, amphibian and mammal species, which would be widespread throughout the lands underneath the FRTC. Additionally, there would be no takes for bald and golden eagles from noise under Alternative 1.

3.5.3.1.6 Alternative 2

Aircraft Noise

As summarized in Table 2-6, the total number of aircraft sorties would increase by approximately 17 percent, from 43,186 under the No Action Alternative to 50,590 under Alternative 2. The number of fixed-wing aircraft sorties would increase from 41,615 to 48,752 per year and helicopter sorties would increase from 1,402 to 1,642 per year under Alternative 2. Alternative 2 includes increases in AAW and Large Force Exercises; therefore, the annual number of supersonic events would increase proportionally. The total number of supersonic events would be expected to increase 10 percent under Alternative 2 relative to the No Action Alternative and Alternative 1.Wildlife would be exposed to aircraft noise more frequently based on the number of sorties, and lands beneath the SUA would be exposed to noise from low-altitude overflights.

Figures 3.4-16 to 3.4-18 show average DNL noise contours for all aircraft under Alternative 2. Community noise levels are generated mostly from fixed-wing operations, as the vast majority of aircraft sorties under Alternative 2 (approximately 96 percent) are of the fixed-wing type. While the DNL metric and contours are intended to help describe potential impacts on humans, they also indicate where wildlife exposure to noise from low-altitude overflights would be most frequent. The DNL contours indicate that wildlife would be exposed to aircraft noise most frequently around the Bravo Training Ranges, ingress and egress routes, and staging areas for larger scale adversarial events. Given the historical use of the airspace, and the persistence of aircraft operations and wildlife populations, wildlife within the MOAs are likely habituated to aircraft overflights. Wildlife exposed to low-altitude aircraft overflights under the Alternative 2 could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Aircraft overflights are not expected to result in chronic stress based on the short duration and infrequency of exposure.

Weapons Firing and Explosive/Impact Noise

Weapons Firing

Under Alternative 2, small and medium caliber arms firing would be conducted on all Bravo training ranges at FRTC. On Bravo-16, munitions use would increase approximately 120 percent in comparison to the No Action Alternative (Table 2-5). At Bravo-17 and Bravo-19, munitions would also increase, by approximately 46 and 19 percent, respectively. At Bravo-20, however, munitions usage would increase by approximately 4 percent, in comparison to the No Action Alternative. Munitions use would continue to be performed during Tactical Ground Mobility, GUNEX, CAS, Large Force Exercises, EOD, and Marksmanship activities. No new locations are proposed for munitions use under Alternative 2. The overall increase in munitions use at the Bravo training ranges will also increase the potential for impacts to wildlife. As discussed for the No Action Alternative, wildlife in close proximity of ground-based firing positions would likely exhibit behavioral responses, with the likelihood of reactions decreasing with increasing distance from the noise source. It is important to note that it is unlikely that wildlife would remain in the immediate vicinity of personnel preparing or engaging in training activities. The natural tendency of wildlife to avoid human interaction would also serve to minimize the potential for species to be in close proximity to firing locations. Wildlife exposed to small and medium caliber firing noise under Alternative 2 could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Small and medium

caliber firing noise are not expected to result in chronic stress based on the short duration and small area of influence.

Explosive/Impact Noise

Explosive detonations during training are associated with high-explosive munitions, including bombs, missiles, naval gun shells, grenades, mortar rounds, and demolition charges. Some detonations would occur in the air or at the ground surface. Similar to the No Action Alternative, the highest potential for impact results from the usage of live bombs and land detonations. Under Alternative 1, A-G BOMBEXs at FRTC involve dropping various live and non-explosive practice bombs from fixed-wing aircraft within target areas of the Bravo training ranges (Table 2-5). As presented in Table 2-5, under Alternative 2, the number of bombs utilized at Bravo-16 would increase from 79 to 87 bombs used annually. At Bravo-17, the number of bombs utilized would increase from 14, 402 to 15,544. At Bravo-19 and Bravo-20, the number of bombs utilized would also increase, from 4,039 to 4,320 at Bravo-19 and from 4,236 to 4,484 at Bravo-20. Additionally, under Alternative 2, approximately 78 land demolitions or EOD events would occur on the Bravo training ranges (Table 2-4), the same as under the No Action Alternative.

As number of explosive detonations will increase slightly under Alternative 2, the potential for animals to be exposed to explosions also increases slightly and continues to depends on several factors, including the presence of animals near the detonation, location of the detonation, size of the explosive, and distance from the detonation. Species in the immediate vicinity of a detonation would likely be impacted by noise associated with an explosive detonation, with level of potential impact decreasing with increasing distance from the noise source.

Similar to the No Action Alternative, noise is associated with munitions use and a noise event often occurs prior to weapons firing. For example, pilots fly over the target area to make safety checks before dropping or firing munitions during A-G bombing and GUNEX. Some wildlife species might flee the immediate area or take cover underground in response to the fly over. In addition, munitions training takes place in a deliberate progression, with target placement being followed by a few initial shots, after which feedback is obtained before firing the next series of shots. Again, the likelihood of a strike might be reduced by wildlife responding to the initial stages of an exercise.

Wildlife exposed to explosive detonations during training under Alternative 2 could exhibit short-term behavioral or physiological responses, but not to the extent where the general health of individuals or populations would be compromised. Noise from explosive detonations during training are not expected to result in chronic stress based on the short duration and small area of influence.

Special Status Species

Under Alternative 2, special status avian, amphibian, and mammal species at training ranges of the FRTC would continue to be exposed to aircraft noise, munitions noise, and noise from explosions. Areas that would experience the highest noise levels are in the immediate vicinity of the Bravo training ranges. Exposure to aircraft noise could also occur in other areas of potentially suitable habitat under the SUA, as shown in Figures 3.4-9 through 3.4-12. Exposure would be intermittent, and representative SELs are expected to be less than 85 dBA for fixed-wing aircraft and less than 100 dBA for helicopters. Animals occurring underneath the SUA could also be exposed to noise from munitions firing and other military readiness activities.

Aircraft overflights and noise from munitions are not expected to affect special status avian, amphibian, and mammal hearing based on the expected noise levels. Masking is not expected to be an issue

because noise would be intermittent and noise events would be brief. Based on responses of animals to noise reported in the literature (National Park Service 1994, Bowles et al. 1995, Larkin 1996), it is likely that at least some aircraft overflights and munitions noise would elicit physiological and behavioral responses (strength or intensity of behavioral and physiological response decreases with increasing distance from noise source). In addition, it is possible that animals have habituated to aircraft overflights and noise from munitions at FRTC.

In summary, noise may elicit physiological and behavioral responses in avian, amphibian, and mammal species under Alternative 2. Exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Noise under Alternative 2 would have short-term minor effects on special status avian, amphibian, and mammal species, which would be widespread throughout the lands underneath the FRTC. Additionally, there would be no takes for bald and golden eagles from noise under Alternative 2.

3.5.3.2 Energy Stressors

3.5.3.2.1 Electromagnetic radiation

Electromagnetic radiation is a form of environmental pollution that may impact wildlife in various ways depending on type of radiation, duration of exposure, and the species of the receiving animal. Effects on birds may include reduced nesting success (Fernie and Reynolds 2005, Balmori 2009) and various behavioral and physiological responses to electromagnetic fields (Fernie et al. 2000, Fernie and Bird 2001), such as disruption of normal sleep-wake cycles through interference with pineal gland and hormonal imbalance.

Experiments and field observations in these studies were based on continual and long-duration exposure. For instance, Balmori (2009) reports reduced bird activity (breeding and foraging) followed by extirpation within areas saturated with high microwave radiation (greater than 2 Volts/meter [V/m]). The same study reported anomalies in magpies (*Pica pica*), such as plumage deterioration, limps and deformities in limbs, and partial albinism. In another study by Balmori and Hallberg (2007), significant declines of house sparrow densities were observed in areas of high electromagnetic field strength. The study predicted that no sparrows would be expected in an electromagnetic field of greater than 4 V/m of long-term constant exposure.

Salford et al. (2003) and Marks et al. (1995) report various effects on mammals from electromagnetic exposure, including changes in alarm and aversion behavior, deterioration of health, reproductive problems, and changes in normal sleep wake patterns. Nishimura et al. (2010) reported response in lizards to low-frequency electromagnetic fields.

3.5.3.2.2 Lasers

Military uses of lasers include applications such as target designation and ranging, defensive countermeasures, communications, and directed energy weapons. Targeting and ranging lasers are the only laser applications used during training on the ground at the FRTC and within the airspace. These platforms and devices are described in Chapter 2 (Description of Proposed Action and Alternatives). Target designation and ranging laser types are relatively low-power lasers (compared to directed-energy lasers or lasers used for defensive countermeasures). A targeting laser is a low-power laser pointer used to indicate a target for a precision-guided munition, typically launched from an aircraft. The guided munition adjusts its flight-path to home in to the laser light reflected by the target, enabling great

precision in aiming. The beam of the laser target designator is set to a pulse rate that matches that set on the guided munition to ensure that munitions strike their designated targets and do not follow other laser beams that may be in use in the area (Northrop-Grumman 2010). The laser designator can be shone onto the target by an aircraft or ground-based personnel. Lasers used for this purpose are usually infrared lasers so the enemy cannot easily detect the guiding laser light. Vision damage is the primary concern for wildlife species for the lasers used at FRTC. Most studies of the effects of lasers on terrestrial animals involve birds because of the interest in developing deterrents to minimize bird-aircraft strike hazards at airports and wind developments (Baxter 2007, Burton et al. 2011). Fewer studies are available for other species groups, such as terrestrial mammals and reptiles, but the same range of responses (none to avoidance behavior) are expected.

Lustick (1973) conducted an experiment using pulsing light, which indicated that starlings and gulls were able to look directly into the laser beam and not change their behavior. A later study conducted through the National Wildlife Research Center's Mississippi Field Station demonstrated that there was no eye damage to double-crested cormorants (*Phalacrocorax auritus*) that had been exposed to a moderate-power red laser as close as 3 ft. (0.9 m) (Glahn et al. 2000). Furthermore, the bird eye is protected from thermal damage to retinal tissue associated with concentrated laser radiation (U.S. Department of Agriculture 2001).

For several decades, pulsing light has been used on aircraft, aircraft hangers, and high towers as a means of avian management or bird control. In 2001, the U.S. Department of Agriculture's National Wildlife Research Center conducted research on low- to moderate-power, long-wavelength lasers (630–650 nanometers) as an effective, environmentally safe means of dispersing specific bird species under low-light (sunset to dusk) conditions (Blackwell et al. 2002). Results of the U.S. Department of Agriculture research concluded that waterfowl species, wading birds, gulls, vultures, and American crows (*Corvus brachyrhynchos*) have all exhibited avoidance of laser beams during field trials (Blackwell et al. 2002, U.S. Department of Agriculture 2001). However, avoidance reaction times and duration are dependent upon context and species (Blackwell et al. 2002). In general, diurnal birds (active during the day and resting during the night) are not sensitive to extremely intense laser light and elicit a slow avoidance response to lasers. In contrast, nocturnal birds (active during the night and resting during the day) are more sensitive to light and react more quickly to avoid intense light (Blackwell et al. 2002). Blackwell and Bernhardt (2004) found that the avoidance response to pulsed white and wavelength-specific aircraft-mounted light was inconsistent across experiments with cowbirds (*Molothrus* spp.), and there was little or no avoidance behavior in experiments with other species. Also, some studies on the use of lasers for bird control have shown that birds may become habituated to light quickly, and there is a loss of effect as the distance increases from the bird and the laser (U.S. Department of Agriculture 2001).

3.5.3.2.3 No Action Alternative

Electromagnetic

Under the No Action Alternative, wildlife would be exposed to various forms of electromagnetic sources including radar, threat transmitters, communications equipment, and electronic detection equipment, primarily during electronic combat training events. Typically, the maximum magnetic field generated would be approximately 23 gauss (G). This level of electromagnetic density is very low compared to magnetic fields generated by other everyday items. The magnetic field generated is between the levels of a refrigerator magnet (150–200 G) and a standard household can opener (up to 4 G at 4 in.). The strength of the electromagnetic field decreases quickly away from the source. The magnetic field generated at a distance of 13.12 ft. (4 m) from the source is comparable to the earth's magnetic field,

which is approximately 0.5 G. The strength of the field at just under 26 ft. (8 m) is only 40 percent of the earth's field, and only 10 percent at 79 ft. (24 m). At a radius of 656 ft. (200 m), the magnetic field would be approximately 0.002 G (U.S. Department of the Navy 2005). Under the No Action Alternative, 4,025 electronic warfare operation events would occur. The effects of this radiation on wildlife cannot be quantified; however, the effects can be expected to be minor for the following reasons: (1) the sources of electromagnetic radiation discussed in this EIS do not expose wildlife species to constant radiation; in other words, no area under FRTC SUA is continuously saturated with electromagnetic fields; (2) the strength of the electromagnetic fields is similar or less than the electromagnetic fields generated by the earth); and (3) beams of electromagnetic radiation (e.g., from radars) may expose animals to increased levels of radiation; however, animals would typically be moving through the area (e.g., bird flight) and potentially out of the airspace of the main beam.

In summary, under the No Action Alternative animals could experience a detectable behavioral response to an electromagnetic field, but would quickly recover after the exposure. The fitness (physiological health and normal behavior) of individual animals would not be affected by electromagnetic fields generated from sources included under the No Action Alternative.

Lasers

Under the No Action Alternative, laser guided munitions are used during A-G BOMBEXs within the Bravo training ranges. There are 1,293 events of this type per year, and 3,521 laser guided bombs (both live and inert) are allocated for use (Tables 2-4 and 2-5). Lasers used in the FRTC Study Area would be similar to the moderate-powered lasers from the studies cited above, and therefore no damaging effects on vision would be anticipated. Furthermore, wildlife species may quickly and easily leave an area temporarily or avoid the visual stimulus when operations occur (e.g., when helicopters approach) and return when operations conclude. Further, because laser guided munitions would only be used within the Bravo training ranges, only wildlife species within this area would be potentially affected.

In summary, under the No Action Alternative, the intensity of effects of lasers on wildlife species may be considered minor, where the animal may experience a detectable response to a laser beam, but would recover after the exposure. The fitness (physiological health and normal behavior) of individual animals would not be affected by this temporary effect (the duration of the laser beam directly sighted on an animal's eyes) from lasers included under the No Action Alternative.

Special Status Species

Under the No Action Alternative, special status avian, amphibian, vegetative, and mammal species at training ranges of the FRTC would continue to be exposed to energy stressors. As described above, under the No Action Alternative, the intensity of effects of energy stressors on avian, amphibian, vegetative, and mammal species may be considered minor, where the species may experience a detectable response to a laser beam, but would recover after the exposure. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Energy stressors under the No Action Alternative would have short-term minor effects on special status species, which would be widespread throughout the lands underneath the FRTC. Additionally, there would be no takes for bald and golden eagles from energy stressors under the No Action Alternative.

3.5.3.2.4 Alternative 1

Electromagnetic radiation

Under Alternative 1, wildlife would be exposed to various forms of electromagnetic sources, including radar, threat transmitters, communications equipment, and electronic detection equipment, primarily during electronic combat training events. Similar to the No Action Alternative, 4,025 electronic warfare operation events would occur under Alternative 1. Similar to the No Action Alternative, the effects of this radiation on wildlife are expected to be minor for the following reasons: (1) the sources of electromagnetic radiation discussed in this EIS do not expose wildlife species to constant radiation; in other words, no area under FRTC SUA is continuously saturated with electromagnetic fields; (2) the strength of the electromagnetic fields (as described in Section 3.5.3.2, Energy Stressors) is similar or less than the electromagnetic fields generated by the earth); and (3) beams of electromagnetic radiation (e.g., from radars) may expose birds in flight to increased levels of radiation; however, the birds in flight would be moving through the area and potentially out of the airspace of the main beam.

In summary, under Alternative 1, the intensity of electromagnetic effects on wildlife species may be considered minor, where the animal would experience a detectable response to an electromagnetic field, but would recover after the exposure. The fitness (physiological health and normal behavior) of individual animals would not be affected by electromagnetic fields generated from sources included under the No Action Alternative.

Lasers

Under Alternative 1, laser guided munitions are used during A-G BOMBEXs within the Bravo training ranges. There are 1,293 events of this type per year, and 3,680 laser guided bombs (1,427 live and 2,253 inert) are allocated for use (Tables 2-4 and 2-5). Additionally, Alternative 1 introduces the use of lasers during 378 ground laser training activities. Lasers used within the FRTC Study Area and in the airspace would be similar to the moderate-powered lasers from the studies cited above, and therefore no damaging effects on vision would be anticipated. Furthermore, wildlife species may quickly and easily leave an area temporarily or avoid the visual stimulus when operations occur (e.g., when helicopters approach or ground personnel approach) and return when operations conclude. Given the amount of available habitat in the areas surrounding these activities and ranges, if wildlife was to relocate as a result of disturbance, the potential impact to their overall energy budget would be expected to be low. Further, because laser guided munitions would only be used within the Bravo training ranges, Shoal Site, and the DVTA, only wildlife species within these areas would be potentially affected.

In summary, under Alternative 1, the intensity of effects of lasers on wildlife species may be considered minor, where the animal may experience a detectable behavioral response to a laser beam, but would recover after the exposure. The fitness (physiological health and normal behavior) of individual animals would not be affected by this temporary effect (the duration of the laser beam directly sighted on an animal's eyes) from lasers included under Alternative 1.

Special Status Species

Under Alternative 1, special status avian, amphibian, and mammal species at training ranges of the FRTC would continue to be exposed to energy stressors. As described above, under the No Action Alternative, the intensity of effects of energy stressors on avian and mammal species may be considered minor, where the animal may experience a detectable response to a laser beam, but would recover after the exposure. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Energy stressors under Alternative 1 would have short-term minor effects on special status species, which would be widespread throughout the lands

underneath the FRTC. Additionally, there would be no takes for bald and golden eagles from energy stressors under Alternative 1.

3.5.3.2.5 Alternative 2

Electromagnetic Radiation

Under Alternative 2, wildlife would be exposed to various forms of electromagnetic sources including radar, threat transmitters, communications equipment, and electronic detection equipment, primarily during electronic combat training events. Under Alternative 2, 4,428 electronic warfare operation events would occur. Similar to the No Action Alternative, the effects of this radiation on wildlife are expected to be minor for the following reasons: (1) the sources of electromagnetic radiation discussed in this EIS do not expose wildlife species to constant radiation; in other words, no area under FRTC SUA is continuously saturated with electromagnetic fields; (2) the strength of the electromagnetic fields (as described in Section 3.5.3.2, Energy Stressors) is similar or less than the electromagnetic fields generated by the earth); and (3) beams of electromagnetic radiation (e.g., from radars) may expose birds in flight to increased levels of radiation; however, the birds in flight would be moving through the area and potentially out of the airspace of the main beam.

In summary, under Alternative 2, the intensity of electromagnetic effects on wildlife species may be considered minor, where the animal would experience a detectable response to an electromagnetic field, but would recover after the exposure. The fitness (physiological health and normal behavior) of individual animals would not be affected by electromagnetic fields generated from sources included under Alternative 2.

Lasers

Under Alternative 2, laser guided munitions are used during A-G BOMBEXs within the Bravo training ranges. There are 1,422 events of this type per year, and 4,049 laser guided bombs (1,569 live and 2,480 inert) are allocated for use (Tables 2-4 and 2-5). Additionally, Alternative 2 introduces the use of lasers during 416 ground laser training activities as compared none under the No Action Alternative. Lasers used within the FRTC Study Area and in the airspace would be similar to the moderate-powered lasers from the studies cited above, and therefore no damaging effects on vision would be anticipated. Furthermore, wildlife species may quickly and easily leave an area temporarily or avoid the visual stimulus when operations occur (e.g., when helicopters approach or ground personnel approach) and return when operations conclude. Given the amount of available habitat in the areas surrounding these activities and ranges, if wildlife was to relocate as a result of disturbance, the potential impact to their overall energy budget would be expected to be low. Further, because laser guided munitions would only be used within the Bravo training ranges, Shoal Site, and the DVTA, only wildlife species within these areas would be potentially affected.

In summary, under Alternative 2, animals may experience a detectable behavioral response to a laser beam, but would quickly recover after the exposure. The fitness (physiological health and normal behavior) of individual animals would not be affected by this temporary effect (the duration of the laser beam directly sighted on an animal's eyes) from lasers included under Alternative 2.

Special Status Species

Under Alternative 2, special status avian, amphibian, and mammal species at training ranges of the FRTC would continue to be exposed to energy stressors. As described above, under Alternative 2, the short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Energy stressors under Alternative 2 would have short-term effects on

special status avian, amphibian, and mammal species, which would be widespread throughout the lands underneath the FRTC. Additionally, there would be no takes for bald and golden eagles from energy stressors under Alternative 2.

3.5.3.3 Physical Disturbance and Strike Stressors

3.5.3.3.1 No Action Alternative

Aircraft and Aerial Targets

Wildlife-aircraft strikes are a major concern for the Navy because they can cause harm to aircrews, damage to equipment, and mortality to wildlife. The number of wildlife-aircraft strikes recorded Navywide ranged from 48 to 827 per year (mostly birds) from 1999 through 2009 (Naval Safety Center 2009). The number of wildlife-aircraft strikes recorded between 1999 and 2013 U.S. Air Force-wide reported ranged from 1,960 to 5,107. The majority of these strikes were birds, but approximately 5 percent of the reported strikes were bats. Bird and bat strikes may occur during any phase of flight, but are most likely during the take-off, initial climb, approach, and landing phases because of the greater numbers of animals in flight at lower levels. While all aircraft strikes are considered serious and dangerous events, the number of related mortalities is small considering Navywide aircraft activities. Although strikes can occur anywhere aircraft are operated, Navy and Air Force data indicate they occur more often over land (Naval Safety Center 2009; U.S. Department of Defense 2010). Potential for wildlife strike is greatest in foraging or resting areas, in migration corridors, and at low altitudes. For example, animals can be attracted to airports because they often provide foraging and nesting resources (U.S. Department of Defense 2010).

Approximately 95 percent of bird flight during migration occurs below 10,000 ft. (3,048 m), with the majority below 3,000 ft. (914.4 m) (Naval Safety Center 2009; U.S. Department of Defense 2010). Bird and aircraft encounters are more likely to occur during aircraft takeoffs and landings than when the aircraft is engaged in level flight. In a study that examined 38,961 bird and aircraft collisions, Dolbeer (2006) found that the majority (74 percent) of wildlife collisions occurred below 500 ft. (152.4 m). Therefore, low-altitude, fixed-wing aircraft overflights likely present the greatest risk of aircraft strikes in FRTC airspace. High-speed flight in a low-altitude environment places aircraft in airspace that may contain animals in flight. Further, animals may flush in response to approaching aircraft noise. Helicopter training also presents aircraft strike hazards, the vast majority (approximately 97 percent of sorties) occur below 3,000 ft. (914 m) above ground level.

Fixed-wing aircraft and helicopter overflights take place at various altitudes and airspeeds throughout the SUA (Figure 2-1), with most occurring during the daytime (Table 2-6). Part of aviation safety during training activities is the implementation of the BASH program. The BASH program manages risk by addressing specific aviation safety hazards associated with wildlife near airfields through coordination among all the entities supporting the aviation mission (U.S. Department of Defense 2010). The BASH program includes, identifying the bird/animal species involved and the location of the strikes to understand why the species is attracted to a particular area of the airfield or training route. By knowing the species involved, managers can understand the habitat and food habits of the species. A Wildlife Hazard Assessment identifies the areas of the airfield that are attractive to the wildlife and provides recommendations to remove or modify the attractive feature. Recommendations may include removal of unused airfield equipment to eliminate perch sites, placement of anti-perching devices, wiring of streams and ponds, removal of brush/trees, use of pyrotechnics, and modification of the grass mowing program (U.S. Department of Defense 2010). As part of its BASH-oriented wildlife management program to reduce or eliminate wildlife attractants near runways and taxiways, NAS Fallon implements various

habitat management and modification techniques including, but not limited to, removing food sources, mowing tall grasses, relocating perching and nesting structures, controlling weeds to minimize seeds and bird attractants, and preventing standing water in areas near the flightline.

The potential for incidental mortality from aircraft strikes exists in the FRTC airspace. If they occur, aircraft strikes would be infrequent and a small number of individuals would be affected. No population-level effects would be expected based on the small number of individuals potentially affected. Aircraft strikes that might occur under the No Action Alternative would have minor localized effects on birds and are not expected to affect mammals, amphibians, or reptiles.

Military Expended Materials

Various types of munitions would continue to be fired at or dropped on targets in the Bravo training ranges (Table 2-5) under the No Action Alternative. Most projectiles would make contact with or near the designated target, with an occasional round landing within the larger surface or weapons danger zones. Wildlife species could be struck if they were at the point of physical impact at the time of projectile delivery. However, portions of the target areas are highly disturbed from decades of use. Wildlife species are less likely to use these highly disturbed areas, reducing the likelihood of a strike. Nonetheless, all wildlife groups potentially can use habitats in this area.

Noise is associated with munitions use and a noise event often occurs prior to weapons firing. For example, pilots fly over the target area to make safety checks before dropping or firing munitions during A-G bombing and GUNEX. Some wildlife species might flee the immediate area or take cover underground in response to the fly over, reducing the likelihood of a strike. In addition, munitions training takes place in a deliberate progression, with target placement being followed by a few initial shots, after which feedback is obtained before firing the next series of shots. Again, the likelihood of a strike might be reduced by wildlife responding to the initial stages of an exercise. Also, the likelihood of a relatively small projectile and an animal co-occurring in time and space within the target area is expected to be low. Based on these factors, while munitions may impact an individual, munitions are not expected to have population-level effects on wildlife species under the No Action Alternative.

Other Ground-Disturbing Activities

Under the No Action Alternative, the primary causes of ground disturbances would be target maintenance and munitions impacting the ground surface within the training ranges. Most projectiles would make contact with or near the designated target, with an occasional round landing within the larger surface or weapons danger zones. The vegetation in and around each of these targets must be maintained or removed for fire safety and to provide a viable visual cue to pilots. Additionally, the target areas have been subjected to similar maintenance and disturbance regimes for years. There are no new targets or new training ranges under the No Action Alternative, therefore ground disturbing activities under the No Action Alternative would not result in additional loss of vegetation communities or additional direct alteration of habitat over what has occurred over the historic use of the training ranges.

Ground vehicle traffic and personnel under the No Action Alternative would include Naval Special Warfare activities (convoy operations, tactical ground mobility, and ground maneuver tactics) at DVTA and B-16. With the exception of the free-maneuver areas designated in the B-16 EA, ground vehicle traffic is restricted to existing roadways. Additional ground personnel would perform land demolitions at all Bravo training ranges, and marksmanship activities at the small-arms range on B-19. Wildlife species may quickly and easily leave an area temporarily or avoid the visual stimulus when operations occur

(e.g., when vehicles approach or ground personnel approach) and return when operations conclude. As described above, wildlife species are more susceptible to avoidance behaviors when visual stimuli or encroachment is attached to other stimuli, such as the noise of approaching foot traffic or vehicles. However, given the amount of available habitat in the areas surrounding these activities, if wildlife was to relocate as a result of disturbance, the potential impact to their overall energy budget would be expected to be low and not reach population-level impacts.

All activities within the FRTC Study Area comply with the *FRTC Range Operations Manual*, which includes guidelines for the protection of natural resources (e.g., no cutting, injuring, or destruction of trees or shrubs). Given the restriction of vehicles to existing roadways and compliance with the FRTC Range Users Manual, it is unlikely that ground vehicle and personnel would cause population-level impacts to vegetation communities. The usage of the free-maneuver areas of B-16 are addressed in the B-16 EA, which concluded their use would have no significant impacts to vegetation communities or wildlife.

Vegetation communities on Navy-administered lands of the FRTC could be affected by invasive plants under the No Action Alternative. Ground-disturbing activities described above would indirectly affect native plant communities by creating favorable conditions for establishment of invasive plants and providing pathways for seed dispersal. The Navy and BLM manage lands for the control and removal of noxious weeds per their Integrated Pest Management Plans (IPMP), which are in accordance with *Invasive Species*, EO 13112 of February 3, 1999, and the Noxious Weed Act of 1974, 7 U.S.C. 7801. As part of the IPMP, the Navy and BLM evaluate the potential for noxious weed colonization prior to surface-disturbing activities. If there is a high potential for colonization, the site would be monitored post project, and weed control measures would be implemented if necessary. Further, after natural or significant human disturbance, the Navy and BLM would revegetate the area with native plants, where feasible. While training activities under the No Action Alternative would contribute to the invasive plant problems, continued implementation of the IPMP would help ensure that invasive plant issues specifically associated with training activities would have no significant impact on vegetation under the No Action Alternative.

Special Status Species

Under the No Action Alternative, special status avian, amphibian, vegetative, and mammal species at training ranges of the FRTC would continue to be exposed to physical disturbance and strike stressors. As described above, under the No Action Alternative, the intensity of effects of disturbance and strike stressors on wildlife species may be considered minor. Though individual animals may be impacted by disturbance or strike, it is not anticipated under the No Action Alternative that population-level effects would occur. Additionally, there would be no takes for bald and golden eagles from physical disturbance and strike stressors under the No Action Alternative.

3.5.3.3.2 Alternative 1

Aircraft and Aerial Targets

As summarized in Table 2-6, the total number of aircraft sorties would increase by approximately 6 percent, from 43,186 to 45,994 under Alternative 1. Wildlife-aircraft strikes are a major concern for the Navy because they can cause harm to aircrews, damage to equipment, and mortality to wildlife. As discussed for the No Action Alternative, aircraft encounters are more likely to occur during aircraft takeoffs and landings than when the aircraft is engaged in level flight. Low-altitude, fixed-wing aircraft overflights likely present the greatest risk of aircraft strikes in FRTC airspace. High-speed flight in a low-altitude environment places aircraft in airspace that may contain animals in flight. Further, birds may flush in response to approaching aircraft noise and increase the strike potential. Helicopter training

also presents aircraft strike hazards, as the vast majority (approximately 97 percent of sorties) occur below 3,000 ft. (914 m) above ground level.

The potential for incidental mortality from aircraft strikes exists in the FRTC airspace. Given the implementation of the BASH program, along with the majority of aircraft operation above 3,000 ft. (914 m), aircraft strikes would be infrequent and a small number of individuals would be affected. No population-level effects would be expected based on the small number of individuals potentially affected.

Military Expended Materials

Various types of munitions would continue to be fired at or dropped on targets in the Bravo training ranges (Table 2-5) under Alternative 1. Alternative 1 increases the total amount of munitions by approximately 62 percent in comparison with the No Action Alternative. However, this increase is comprised primarily of small arms munitions increases at B-16 and the DVTA (blanks only), both of which approximately double in their usage as compared to the No Action Alternative. Missile use increases at B-17 (752 under Alternative 1 compared to 240 under the No Action Alternative), B-19 (318 under Alternative 1 compared to 145 under the No Action Alternative), and B-20 (237 under Alternative 1 compared to 54 under the No Action Alternative). All other munitions remain similar to that used under the No Action Alternative.

Though the number of missiles increase under Alternative 1, most projectiles would make contact with or near the designated target, with an occasional round landing within the larger surface or weapons danger zones. The target areas are highly disturbed from decades of use; while the amount of munitions increase, the same disturbed areas will continue to be targeted and used. As described for the No Action Alternative, wildlife species are less likely to use these highly disturbed areas, reducing the likelihood of a strike. Nonetheless, all wildlife groups potentially can use habitats in this area, and wildlife species could be struck if they were at the point of physical impact at the time of projectile delivery.

Noise is associated with munitions use and a noise event often occurs prior to weapons firing. For example, pilots fly over the target area to make safety checks before dropping or firing munitions during A-G bombing and GUNEX. Some wildlife species might flee the immediate area or take cover underground in response to the fly over, reducing the likelihood of a strike. In addition, munitions training takes place in a deliberate progression, with target placement being followed by a few initial shots, after which feedback is obtained before firing the next series of shots. Again, the likelihood of a strike might be reduced by wildlife responding (avoidance or burrowing) to the initial stages of an exercise. Also, the likelihood of a relatively small projectile and an animal co-occurring in time and space within the target area is expected to be low. Based on these factors, while munitions may impact individuals, they are not expected to have population-level effects on wildlife species under Alternative 1.

Other Ground-Disturbing Activities

Under Alternative 1, the primary causes of ground disturbances would be target maintenance and munitions impacting the ground surface within the training ranges. Most projectiles would make contact with or near the designated target, with an occasional round landing within the larger surface or weapons danger zones. As indicated above, missile use increases at B-17 (318 under Alternative 1 compared to 145 under the No Action Alternative) and B-19 (752 under Alternative 1 compared to 240 under the No Action Alternative). All other munitions remain similar to that used under the No Action Alternative. While the number of munitions increases, there are no new targets or new training ranges

under Alternative 1. Additionally, the target areas and danger zones have been subjected to maintenance and disturbance regimes for years. Therefore, ground-disturbing activities from missiles under Alternative 1 would not result in additional loss of vegetation communities or additional direct alteration of habitat over what has occurred over the historic use of the training ranges.

Ground vehicle traffic and personnel under Alternative 1 would continue to include Naval Special Warfare activities (convoy operations, tactical ground mobility, and ground maneuver tactics) at DVTA and B-16 at the same levels as the No Action Alternative. Alternative 1 would introduce two new activities, dismounted fire and maneuver training, and ground laser targeting training. Dismounted Fire and Maneuver Training consists of limited vehicle travel on existing roads to position personnel for dismounted maneuvers at B-17. Ground laser targeting training is conducted using lasers as aiming devices for small arms, as target scoring systems in lieu of live rounds, for range finding, to illuminate targets at night, and to mark targets for identification by aircraft. Under Alternative 1, this training activity could occur on Training Ranges B-16, B-17, and B-19 at the FRTC. Ground laser targeting training would be linked to Ground Maneuver Tactics Training classes. Ground personnel would perform the same number of land demolitions at all Bravo training ranges, and marksmanship activities would increase from 185 to 210 annual activities at the small-arms range on B-19.

With the exception of the free-maneuver areas designated in the B-16 EA, ground vehicle traffic is restricted to existing roadways. The usage of the free-maneuver areas of B-16 are addressed in the B-16 EA, which concluded their use would have no significant impacts to vegetation communities or wildlife. While dismounted ground maneuvers will increase, operations must still comply with standard operating procedures as listed in the *FRTC Range Operations Manual*, which include guidelines for the protection of natural resources (e.g., no cutting, injuring, or destruction of trees or shrubs). Given the restriction of vehicles to existing roadways and compliance with the *FRTC Range Operations Manual*, it is unlikely that ground vehicle and personnel would cause population-level impacts to vegetation communities.

Similar to the No Action Alternative, vegetation communities on Navy-administered lands of the FRTC could be affected by invasive plants under Alternative 1. Ground-disturbing activities described above would indirectly affect native plant communities by creating favorable conditions for establishment of invasive plants and providing pathways for seed dispersal. However, as part of the IPMP, the Navy and BLM evaluate the potential for noxious weed colonization prior to surface-disturbing activities. If there is a high potential for colonization, the site would be monitored post project, and weed control measures would be implemented if necessary. Further, after natural or significant human disturbance, the Navy and BLM would revegetate the area with native plants, where feasible. While training activities under Alternative 1 would contribute to the invasive plant problems, continued implementation of the IPMP would help ensure that invasive plant issues specifically associated with training activities would have no significant impact on vegetation under Alternative 1.

The additional ground activities have the potential to disturb wildlife species as animals may quickly and easily leave an area temporarily or avoid the visual stimulus when operations occur (e.g., when vehicles or aircraft approach or ground personnel approach) and return when operations conclude. As described above, wildlife species are more susceptible to avoidance behaviors when visual stimuli or encroachment is attached to other stimuli, such as the noise of approaching foot traffic or vehicles. However, given the amount of available habitat in the areas surrounding these activities, if wildlife was to relocate as a result of disturbance, the potential impact to their overall energy budget would be expected to be low and not reach population-level impacts.

Special Status Species

Under Alternative 1, special status avian, amphibian, vegetative, and mammal species at training ranges of the FRTC would continue to be exposed to physical disturbance and strike stressors. As described above, under Alternative 1, though individual animals may be impacted by disturbance or strike, it is not anticipated that population-level effects would occur. Additionally, there would be no takes for bald and golden eagles from physical disturbance and strike stressors under Alternative 1.

3.5.3.3.3 Alternative 2

Aircraft and Aerial Targets

As summarized in Table 2-6, the total number of aircraft sorties would increase by approximately 17 percent, from 43,186 to 50,590 under Alternative 2. Wildlife-aircraft strikes are a major concern for the Navy because they can cause harm to aircrews, damage to equipment, and mortality to wildlife. As discussed for the No Action Alternative, aircraft encounters are more likely to occur during aircraft takeoffs and landings than when the aircraft is engaged in level flight. Low-altitude, fixed-wing aircraft overflights likely present the greatest risk of aircraft strikes in FRTC airspace. High-speed flight in a low-altitude environment places aircraft in airspace that may contain animals in flight. Further, birds or bats may flush in response to approaching aircraft noise and increase the strike potential. Helicopter training also presents aircraft strike hazards, as the vast majority (approximately 97 percent of sorties) occur below 3,000 ft. (914 m) above ground level.

The potential for incidental mortality from aircraft strikes exists in the FRTC airspace. Given the implementation of the BASH program, along with the majority of aircraft operation above 3,000 ft. (914 m), bird-aircraft strikes would be infrequent and a small number of individuals would be affected. No population-level effects would be expected based on the small number of individuals potentially affected.

Military Expended Materials

Various types of munitions would continue to be fired at or dropped on targets in the Bravo training ranges (Table 2-5) under Alternative 2. Alternative 2 increases the total amount of munitions by approximately 74 percent in comparison with the No Action Alternative. This increase is comprised primarily of small arms munitions increases at B-16 and the DVTA (blanks only), both of which more than double in their usage as compared to the No Action Alternative. Missile use increases at B-17 (827 under Alternative 2 compared to 240 under the No Action Alternative), B-19 (351 under Alternative 2 compared to 145 under the No Action Alternative), and B-20 (260 under Alternative 2 compared to 54 under the No Action Alternative). All other munitions increase approximately 10 percent to those used under the No Action Alternative.

Though the number of munitions increases, most projectiles would make contact with or near the designated target, with an occasional round landing within the larger surface or weapons danger zones. The target areas are highly disturbed from decades of use; while the amount of munitions increase, the same disturbed areas will continue to be targeted and used. As described for the No Action Alternative, wildlife species are less likely to use these highly disturbed areas, reducing the likelihood of a strike. Nonetheless, all wildlife groups potentially can use habitats in this area, and wildlife species could be struck if they were at the point of physical impact at the time of projectile delivery.

Noise is associated with munitions use, and a noise event often occurs prior to weapons firing. For example, pilots fly over the target area to make safety checks before dropping or firing munitions during A-G bombing and GUNEXs. Some wildlife species might flee the immediate area or take cover

underground in response to the fly over, reducing the likelihood of a strike. In addition, munitions training takes place in a deliberate progression, with target placement being followed by a few initial shots, after which feedback is obtained before firing the next series of shots. Again, the likelihood of a strike might be reduced by wildlife responding (avoidance or burrowing) to the initial stages of an exercise. Also, the likelihood of a relatively small projectile and an animal co-occurring in time and space within the target area is expected to be low. Based on these factors, while munitions may impact individuals, they are not expected to have population-level effects on wildlife species under Alternative 2.

Other Ground-Disturbing Activities

Under Alternative 2, the primary causes of ground disturbances include munitions impacting the ground surface within the training ranges and training by ground personnel and vehicles. Most projectiles would make contact with or near the designated target, with an occasional round landing within the larger surface or weapons danger zones. As detailed above, Alternative 2 increases the total amount of munitions by approximately 74 percent in comparison with the No Action Alternative. While the number of munitions increases, there are no new targets or new training ranges under Alternative 2. Additionally, the target areas and danger zones have been subjected to maintenance and disturbance regimes for years. Therefore, ground-disturbing activities from munitions impacting the ground on targets under Alternative 2 would not result in additional loss of vegetation communities or additional direct alteration of habitat over what has occurred over the historic use of the training ranges.

Ground vehicle traffic and personnel under Alternative 2 would continue to include Naval Special Warfare activities (convoy operations, tactical ground mobility, and ground maneuver tactics) at DVTA and B-16 at the same levels as the No Action Alternative. Alternative 2 would introduce two new activities, dismounted fire and maneuver training, and ground laser targeting training. Dismounted Fire and Maneuver Training consists of limited vehicle travel on existing roads to position personnel for dismounted maneuvers at B-17. Ground laser targeting training is conducted using lasers as aiming devices for small arms, as target scoring systems in lieu of live rounds, for range finding, to illuminate targets at night, and to mark targets for identification by aircraft. Under Alternative 2, this training activity could occur on Training Ranges B-16, B-17, and B-19 at the FRTC. Ground laser targeting training would be linked to Ground Maneuver Tactics Training classes. Ground personnel would perform the same number of land demolitions at all Bravo training ranges, and marksmanship activities would increase from 185 to 231 annual activities at the small-arms range on B-19.

With the exception of the free-maneuver areas designated in the B-16 EA, ground vehicle traffic is restricted to existing roadways. The usage of the free-maneuver areas of B-16 are addressed in the B-16 EA, which concluded their use would have no significant impacts to vegetation communities or wildlife. While dismounted ground maneuvers will increase, operations must still comply with standard operating procedures as listed in the *FRTC Range Operations Manual*, which include guidelines for the protection of natural resources (e.g., no cutting, injuring, or destruction of trees or shrubs). Given the restriction of vehicles to existing roadways and compliance with the *FRTC Range Operations Manual*, it is unlikely that ground vehicle and personnel would cause population-level impacts to vegetation communities.

Similar to the No Action Alternative, vegetation communities on Navy-administered lands of the FRTC could be affected by invasive plants under Alternative 2. Ground-disturbing activities described above would indirectly affect native plant communities by creating favorable conditions for establishment of invasive plants and providing pathways for seed dispersal. However, as part of the IPMP, the Navy and

BLM evaluate the potential for noxious weed colonization prior to surface-disturbing activities. If there is a high potential for colonization, the site would be monitored post project, and weed control measures would be implemented if necessary. Further, after natural or significant human disturbance, the Navy and BLM would revegetate the area with native plants, where feasible. While training activities under Alternative 1 would contribute to the invasive plant problems, continued implementation of the IPMP would help ensure that invasive plant issues specifically associated with training activities would have no significant impact on vegetation under Alternative 2.

The additional ground activities have the potential to disturb wildlife species as animals may quickly and easily leave an area temporarily or avoid the visual stimulus when operations occur (e.g., when vehicles or aircraft approach or ground personnel approach) and return when operations conclude. As described above, wildlife species are more susceptible to avoidance behaviors when visual stimuli or encroachment is attached to other stimuli, such as the noise of approaching foot traffic or vehicles. However, given the amount of available habitat in the areas surrounding these activities, if wildlife was to relocate as a result of disturbance, the potential impact to their overall energy budget would be expected to be low and not reach population-level impacts.

Special Status Species

Under Alternative 2, special status avian, amphibian, vegetative, and mammal species at training ranges of the FRTC would continue to be exposed to physical disturbance and strike stressors. As described above, though individual animals may be impacted by disturbance or strike, it is not anticipated that population-level effects would occur from disturbance and strike stressors. Additionally, there would be no takes for bald and golden eagles from physical disturbance and strike stressors under Alternative 2.

3.5.3.4 Secondary Stressors

This section summarizes how secondary stressors (stressors that are not directly part of activities) can potentially impact terrestrial habitats and species. Specifically, this section addresses the potential of water quality stressors, soil stressors, and air quality stressors, to impact habitats and prey availability.

3.5.3.4.1 No Action Alternative

As described in Section 3.1.3.1.2 (Physical Disturbance), the effects of ground-disturbing activities on soils under the No Action Alternative would be long term and minor in the form of increased potential for soil erosion, compaction, and displacement. The direct effects would occur in previously disturbed areas along dirt roads and within the training ranges. Ground-disturbing activities would not result in significant impacts on soils under the No Action Alternative. Additionally, in no instance would military expended materials have a significant impact on surface or groundwater quality on the FRTC ranges.

As described in Section 3.2.3.1 (No Action Alternative), under the No Action Alternative, training activities and associated criteria or hazardous air pollutant emissions would not change. Air quality in air quality control regions would not change as a result of the No Action Alternative and would still be generally characterized as good. Criteria or hazardous air pollutant emissions associated with training activities would have a negligible effect on air quality under the No Action Alternative because changes to air quality would not be detectable and would be below or within historical or desired air quality conditions. Criteria and hazardous air pollutant emissions associated with the No Action Alternative would have no significant impact on air quality.

Therefore, implementation of the No Action Alternative would not adversely affect sediments, water, or air quality and, therefore, would not indirectly impact terrestrial species or habitats. Additionally, there would be no takes for bald and golden eagles from secondary stressors under the No Action Alternative.

3.5.3.4.2 Alternative 1

As described in Section 3.1.3.2.2 (Physical Disturbance), the effects of ground-disturbing activities on soils under Alternative 1 would be long term and minor in the form of increased potential for soil erosion, compaction, and displacement. The direct effects would occur in previously disturbed areas along dirt roads and within the training ranges. Ground-disturbing activities would not result in significant impacts on soils under Alternative 1. Additionally, in no instance would military expended materials have a significant impact on surface or groundwater quality on the FRTC ranges.

As described in Section 3.2.3.2 (Alternative 1), under Alternative 1, training activities and associated criteria or hazardous air pollutant emissions would not change. Air quality in air quality control regions would not change as a result of Alternative 1 and would still be generally characterized as good. Criteria or hazardous air pollutant emissions associated with training activities would have a negligible effect on air quality under Alternative 1 because changes to air quality would not be detectable and would be below or within historical or desired air quality conditions. Criteria and hazardous air pollutant emissions associated with Alternative 1 would have no significant impact on air quality.

Therefore, implementation of Alternative 1 would not adversely affect sediments, water, or air quality and, therefore, would not indirectly impact terrestrial species or habitats. Additionally, there would be no takes for bald and golden eagles from secondary stressors under Alternative 1.

3.5.3.4.3 Alternative 2

As described in Section 3.1.3.3.2 (Physical Disturbance), the effects of ground-disturbing activities on soils under Alternative 2 would be long term and minor in the form of increased potential for soil erosion, compaction, and displacement. The direct effects would occur in previously disturbed areas along dirt roads and within the training ranges. Ground-disturbing activities would not result in significant impacts on soils under Alternative 2. Additionally, in no instance would military expended materials have a significant impact on surface or groundwater quality on the FRTC ranges.

As described in Section 3.2.3.3 (Alternative 2), under Alternative 2, training activities and associated criteria or hazardous air pollutant emissions would not change. Air quality in air quality control regions would not change as a result of Alternative 2 and would still be generally characterized as good. Criteria or hazardous air pollutant emissions associated with training activities would have a negligible effect on air quality under Alternative 2 because changes to air quality would not be detectable and would be below or within historical or desired air quality conditions. Criteria and hazardous air pollutant emissions associated with Alternative 2 would have no significant impact on air quality.

Therefore, implementation of Alternative 2 would not adversely affect sediments, water, or air quality and, therefore, would not indirectly impact terrestrial species or habitats. Additionally, there would be no takes for bald and golden eagles from secondary stressors under Alternative 2.

3.5.3.5 Proposed Management Practices, Monitoring, and Mitigation Measures

The current MPs listed in Section 3.5.2.6 (Current Requirements and Management Practices) would continue to be implemented under Alternatives 1 and 2, and existing programs and plans would be updated to reflect new conditions.

3.5.3.5.1 Proposed Monitoring

No specific monitoring measures are warranted for wildlife based on the analysis presented in Section 3.5.3 (Environmental Consequences).

3.5.3.5.2 Proposed Mitigation Measures

No specific mitigation measures are warranted for wildlife based on the analysis presented in Section 3.5.3 (Environmental Consequences).

3.5.3.6 Summary of Effects and Conclusions

3.5.3.6.1 Special Status Species Conclusions

Special status avian, amphibian and mammal species at training ranges of the FRTC would continue to be exposed to aircraft noise, munitions noise, and noise from explosions. Noise may elicit physiological and behavioral responses in special status avian and mammal species under the action alternatives. Exposed individuals would be expected to quickly recover from these responses, and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Noise would have short-term effects on special status avian and mammal species, but would be widespread throughout the lands underneath the FRTC.

Under the action alternatives, special status avian, amphibian, and mammal species of the FRTC would continue to be exposed to energy stressors, and strike stressors, and secondary stressors. Additionally, special status avian, amphibian, vegetative, and mammal species of the FRTC would continue to be exposed to physical disturbance and strike stressors. As described above, these stressors are expected to result in short-term behavioral responses which are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. Additionally, there would be no takes for bald and golden eagles under the action alternatives.

3.5.3.6.2 Migratory Bird Treaty Act Determinations

The MBTA prohibits the taking, killing, or possessing of migratory birds or the parts, nests, or eggs of such birds, unless permitted by regulation. The Final Rule authorizing DoD to take migratory birds during military readiness activities was published in the FR on 28 February 2007 (50 C.F.R. Part 21). The Final Rules authorizes incidental take of migratory birds during military training and testing activities that would be conducted under the Proposed Action, but does not authorize incidental take during “non-military readiness activities” such as range investments or routine maintenance of targets. Accordingly, conclusions regarding compliance with the MBTA are presented separately for military readiness activities and non-military readiness activities.

The Final Rule authorizing DoD to take migratory birds during military readiness activities provides that the Armed Forces must confer and cooperate with USFWS on the development and implementation of conservation measures to minimize or mitigate adverse effects of a military readiness activity if the DoD determines that such activity may have a “significant adverse effect” on a population of a migratory bird species. An activity has a significant adverse effect if, over a reasonable period of time, it diminishes the capacity of a population of a migratory bird species to maintain genetic diversity, to reproduce, and to function effectively in its native ecosystem. As used here, population means a group of distinct, coexisting, conspecific individuals (i.e., organisms of the same species), whose breeding site fidelity, migration routes, and wintering areas are temporally and spatially stable, sufficiently distinct

geographically (at some time of the year), and adequately described so that the population can be effectively monitored to discern changes in its status.

The analysis presented in this section indicates that the combined effects of noise, general human disturbance, and reduced habitat quality associated with military readiness activities could result in reduced fitness of individual birds—in particular, species that may breed in habitats of the Bravo ranges. However, the analysis indicates that military readiness activities are not expected to have a significant adverse effect on a population of a migratory bird species.

Based on this conclusion, the conferencing requirements of the Final Rule authorizing DoD to take migratory birds during military readiness activities do not apply to the Proposed Action. In addition, continued implementation of the NAS Fallon INRMP would promote migratory bird conservation throughout the FRTC.

3.5.3.6.3 National Environmental Policy Act Conclusions

Table 3.5-5 lists each stressor analyzed for potential impacts at the FRTC. None of the alternatives would result in significant impacts on wildlife.

Table 3.5-5: Summary of Effects for Biological Resources

Stressor	Summary of Effects and National Environmental Policy Act Determinations
No Action Alternative	
Acoustic	• Noise may elicit physiological and behavioral responses in wildlife. Exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. • Noise would have short-term effects on wildlife, which would be widespread throughout the lands underneath the Fallon Range Training Complex (FRTC).
Energy	• Animals may respond to a laser beam, but exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals and population-level effects would not occur.
Physical Disturbance And Strike	• Aircraft strikes that might occur under the No Action Alternative would have minor localized effects on birds and bats and are not expected to affect other mammals, amphibians, or reptiles. • Munitions strikes are not expected to have population-level effects on wildlife species under the No Action Alternative. • Other ground disturbing activities under the No Action Alternative would not result in additional loss of vegetation communities or additional direct alteration of habitat.
Secondary	• Implementation of the No Action Alternative would not adversely affect sediments, water, or air quality and, therefore, would not indirectly impact terrestrial species or habitats.
Impact Conclusion	• The No Action Alternative would not result in significant impacts on biological resources.

Table 3.5-5: Summary of Effects for Biological Resources (continued)

Stressor	Summary of Effects and National Environmental Policy Act Determinations
Alternative 1	
Acoustic	• Noise may elicit physiological and behavioral responses in wildlife. Exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. • Noise would have short-term effects on wildlife, which would be widespread throughout the lands underneath the FRTC.
Energy	• Animals may respond to a laser beam, but exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals and population-level effects would not occur.
Physical Disturbance And Strike	• Aircraft strikes that might occur would have localized effects on and bats and are not expected to affect other mammals, amphibians, or reptiles. • Munition strikes are not expected to have population-level effects on wildlife species under Alternative 1. • Other ground disturbing activities under Alternative 1 would not result in additional loss of vegetation communities or additional direct alteration of habitat.
Secondary	• Implementation of Alternative 1 would not adversely affect sediments, water, or air quality and, therefore, would not indirectly impact terrestrial species or habitats.
Impact Conclusion	• Alternative 1 would not result in significant impacts on biological resources.
Alternative 2	
Acoustic	• Noise may elicit physiological and behavioral responses in wildlife. Exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals. Therefore, population-level effects would not occur. • Noise would have short-term effects on wildlife, which would be widespread throughout the lands underneath the FRTC.
Energy	• Animals may respond to a laser beam, but exposed individuals would be expected to quickly recover from these responses and exposure would be intermittent and infrequent. The short-term behavioral responses are not expected to affect the fitness of individuals and population-level effects would not occur.
Physical Disturbance And Strike	• Aircraft strikes that might occur would have localized effects on birds and bats and are not expected to affect other mammals, amphibians, or reptiles. • Munition strikes are not expected to have population-level effects on wildlife species under Alternative 2. • Other ground disturbing activities would not result in additional loss of vegetation communities or additional direct alteration of habitat.
Secondary	• Implementation of Alternative 2 would not adversely affect sediments, water, or air quality and, therefore, would not indirectly impact terrestrial species or habitats.
Impact Conclusion	• Alternative 2 would not result in significant impacts on biological resources.

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