Appendix H

# Threatened and Endangered Species Technical Study



# Threatened and Endangered Species

## Technical Study

Prepared by

Texas Department of Transportation

U.S. Department of Transportation
Federal Railroad Administration

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# Acronyms and Abbreviations

| | |
|---|---|
| °F | degrees Fahrenheit |
| BMP | best management practice |
| BNSF | Burlington Northern Santa Fe |
| CFR | Code of Federal Regulations |
| EIS | environmental impact statement |
| emerg. eff. | emergency effect |
| EMST | Ecological Mapping Systems of Texas |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| FRA | Federal Railroad Administration |
| GIS | geographic information system |
| HrSR | higher-speed rail |
| HSR | high-speed rail |
| IH-35 | Interstate Highway 35 |
| KCS | Kansas City Southern |
| Magnuson-Stevens Act | Magnuson-Stevens Fishery Conservation and Management Act |
| MBTA | Migratory Bird Treaty Act |
| mph | miles per hour |
| NEPA | National Environmental Policy Act |
| NLCD | National Land Cover Database |
| NOAA Fisheries | National Oceanic and Atmospheric Administration National Marine Fisheries Service |
| ODOT | Oklahoma Department of Transportation |
| ODWC | Oklahoma Department of Wildlife Conservation |
| Program | Texas-Oklahoma Passenger Rail Program |
| REAP | Regional Ecological Assessment Protocol |
| Study | Texas-Oklahoma Passenger Rail Study |
| TAC | Texas Administrative Code |
| TPWD | Texas Parks and Wildlife Department |

| | |
|---|---|
| TRE | Trinity Railway Express |
| TxDOT | Texas Department of Transportation |
| TXNDD | Texas Natural Diversity Database |
| UPRR | Union Pacific Railroad |
| U.S.C. | United States Code |
| USFWS | U.S. Fish and Wildlife Service |

# 1.0 Introduction

The Texas Department of Transportation (TxDOT), along with the Federal Railroad Administration (FRA), is preparing a service-level environmental impact statement (EIS) to evaluate intercity passenger rail service alternatives for the Texas-Oklahoma Passenger Rail Program (Program). The purpose of the Program is to enhance intercity mobility by providing enhanced passenger rail service as a transportation alternative that is competitive with automobile, bus, and air travel. Preparation of the service-level EIS, in support of which this technical study has been prepared, is one of two primary objectives of the Texas-Oklahoma Passenger Rail Study (Study). In addition to the service-level EIS, TxDOT and FRA are preparing a service development plan for the corridor to guide further development and capital investment in passenger rail improvements identified in the EIS Record of Decision. The Oklahoma Department of Transportation (ODOT) is a partnering state agency for the Study and the EIS.

The 850-mile corridor analyzed for the Study runs north-south and roughly parallels Interstate Highway 35 (IH-35), with the northern point in Edmond, Oklahoma (i.e., northern end of the Oklahoma City portion of the corridor), and the southern end in south Texas, potentially in Corpus Christi, Brownsville, Laredo, or the Rio Grande Valley, as shown on Figure 1-1. For this service-level analysis, a preliminary alignment was developed to represent each EIS alternative, based on conceptual engineering that considered and avoided obvious physical or environmental constraints. These alignments were not refined to optimize performance, reduce cost, avoid specific properties or individual environmental resources, or for any other such considerations. If an alternative is selected at the service-level for further development, the above considerations would be assessed at the project level. A broad corridor of study with a width of 500 feet has been identified along each route (EIS Study Area). This EIS Study Area provides an envelope that could accommodate areas for associated effects, including necessary roadway shifts, grade separations, construction activities, and affiliated features such as stations and parking, traction-power substations, power lines, and maintenance-of-way facilities. The area for which data were collected is identified as the Study Vicinity. Typically, county-wide data were collected for counties partially or completely within the Study Area.

The analysis provides quantitative information about threatened and endangered species within the EIS Study Area for each alternative and compares it against the No Build Alternative and other build alternatives in the same geographic region. The discussion of effects also provides qualitative differences in permanent, temporary, and direct and indirect effects that are associated with the service type (conventional rail, higher-speed rail, or high-speed rail) relative to the environmental context. However, because the 500-foot EIS Study Area does not represent the actual footprint of operation or construction phases, the analysis is primarily comparative, based on the presence of the resource within the EIS Study Area and the likelihood of effects as appropriate for this service-level analysis.

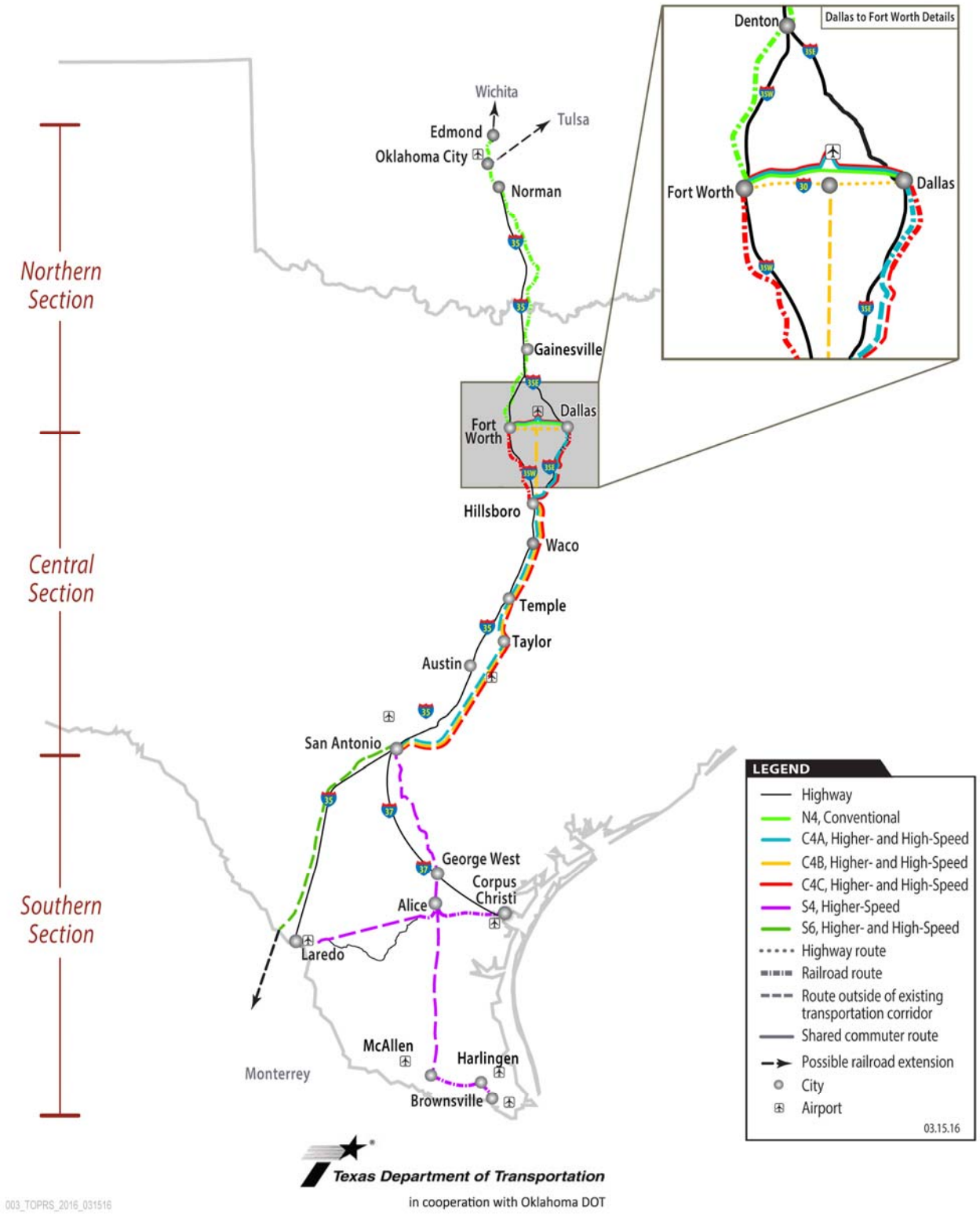



*Figure 1-1: Build Alternatives*

The build alternatives are divided into the following three geographic sections based on the key regional markets that could be served by passenger rail improvements:

- Northern Section: Oklahoma City to Dallas and Fort Worth
- Central Section: Dallas and Fort Worth to San Antonio
- Southern Section: San Antonio to South Texas

In addition, the alternatives consist of both a route, which refers to the specific corridor that a potential alignment follows, and a service type, which refers to the speed or category of rail transportation (conventional rail, higher-speed rail, or high-speed rail). The alternatives that have been carried forward for analysis in the EIS, including their geographic sections, routes, and service types, are listed in Table 1-1.

### *Table 1-1: Alternatives Carried Forward for Further Evaluation*

| Route | Service Type [a] |
|---|---|
| **Northern Section** | |
| N4A | CONV |
| **Central Section** | |
| C4A | HrSR |
| | HSR |
| C4B | HrSR |
| | HSR |
| C4C | HrSR |
| | HSR |
| **Southern Section** | |
| S4 | HrSR |
| S6 | HrSR |
| | HSR |

[a] CONV = conventional rail (up to 79 to 90 miles per hour [mph]); HrSR = higher-speed rail (up to 110 to 125 mph); HSR = high-speed rail (up to 220 to 250 mph)

The route alternatives were based on the alignments of existing transportation networks with corridors potentially suitable for passenger rail operations[1] (i.e., the existing railroad network and the existing interstate highway network, or they were located on new alignments outside existing

[1] The term "operations" includes maintenance of the facilities as well.

transportation corridors. Potential alignments described as "following" railway corridors share existing tracks, are located within an existing right-of-way, or are generally adjacent to existing tracks, depending on the service type. Alternatives that are outside the existing transportation corridor could have greater indirect effects than those located in the existing transportation corridor; for example, alternatives outside existing corridors could divide neighborhoods or wildlife communities or create a potential new barrier.

## *1.1 Service Type Descriptions*

The three service types (conventional rail, higher-speed rail, and high-speed rail) considered in this EIS are described below.

### 1.1.1 Conventional Rail

Conventional rail typically includes diesel-powered, steel-wheeled trains operating on steel tracks. Roadway crossings may be grade-separated depending on the type of roadway and amount of traffic, and rail rights-of-way may be fenced. Conventional rail would be operated at speeds up to 79 to 90 miles per hour (mph) and would mostly use existing railroad rights-of-way. For conventional rail alternatives, existing railroad track may be used, or in some cases, modifications such as double-tracking could be constructed within the existing right-of-way to accommodate additional trains.

### 1.1.2 Higher-Speed Rail

Higher-speed rail is similar to conventional rail in several respects. In many cases, higher-speed rail trains can run on the same steel tracks that support conventional rail, but higher speeds can require improvements such as upgrading wooden ties with concrete ties, improving signaling, and upgrading roadway crossings. In this case, higher-speed rail trains are assumed to be diesel-powered. Higher-speed rail would be operated at speeds up to 110 to 125 mph. Where proposed within an existing railroad right-of-way, a shared right-of-way with separate tracks for freight and passenger services would be constructed. Because of its maximum speed and because train frequency would be similar to conventional rail, higher-speed rail could operate on a single track with passing locations and would not require double-tracking. Where higher-speed rail is proposed outside an existing transportation corridor, the new alignment would be designed with curves and other features that could accommodate high-speed rail service if warranted by ridership and economic feasibility in the future. However, unlike high-speed rail, the design would not include electrification or a full double track, and some grade crossings would remain.

### 1.1.3 High-Speed Rail

High-speed rail includes electric trains powered by an overhead power supply system. Train sets are steel wheel on steel rail, but are designed to operate at high speeds with an aerodynamic shape,

and suspension and braking systems are designed for high-speed travel. High-speed rail would be operated at speeds up to 220 to 250 mph. The entire right-of-way would be fenced and fully grade-separated. The alignment would be electrified and double-tracked. This service type could only reach its maximum speeds outside existing transportation corridors because existing railroad alignments are not compatible with the speeds required and they do not have the required space for separation of freight and high-speed rail. In areas where this service type is within existing transportation corridors, it would operate at lower speeds.

## *1.2 Alternative Descriptions*

For this service-level analysis, a preliminary alignment was developed to represent each route alternative, based on conceptual engineering that considered obvious physical or environmental constraints. They are not detailed alignments that have been refined to optimize performance, reduce cost, avoid specific properties or individual environmental resources, or similar considerations, which would be assessed at the project-level phase for alternatives carried forward for further analysis.

The alternatives evaluated in the service-level EIS, shown on Figure 1-1, have been developed to a level of detail appropriate for a service-level analysis: the route alternatives represent a potential corridor where rail improvements could be implemented but do not specify the precise location of the track alignment. When a route alternative is refined to include a service type (conventional, higher-speed, or high-speed rail), it is then referred to as an alternative. Alternatives in the Northern, Central, and Southern sections could be built as individual, stand-alone projects or in combination with alternatives in another section. In addition, more than one alternative in the Central Section and Southern Section could be built in the future because the alternatives provide different service types for independent destinations. Details on connecting the alternatives would be determined during project-level studies.

Potential alignments are described below in terms of nearby transportation corridors and cities.

The Southern Section alternatives include a potential extension to Monterrey, Mexico. The EIS evaluates alignment corridors only within the United States; however, the potential extension to Monterrey has been included for ridership analysis purposes, and FRA and TxDOT have initiated coordination with the Mexican government about the potential extension.

### 1.2.1 No Build Alternative

The No Build Alternative would not fulfill the Program's purpose and need but is carried forward as a baseline alternative against which the build alternatives are compared. The No Build Alternative would consist of the existing transportation network, including roadway, passenger rail, and air travel in the Study Vicinity and committed improvements to these systems. The No Build Alternative includes existing and planned roadway, passenger rail, and air travel in the Study Vicinity (including operation, maintenance, and expansion). Information was collected from current regional transportation plans within the Study Vicinity and websites describing services such as train

schedules. These improvements and their evaluation at this service-level stage would require project-specific assessment. Conducting detailed project-specific assessments at this stage of the program development process is not feasible, except from a cumulative analysis perspective as included in the service-level EIS.

## 1.2.2 Northern Section: Oklahoma City to Dallas and Fort Worth

Due to feasibility based on initial ridership and cost information, only one route alternative with one service type was considered feasible in the Northern Section: Alternative N4A with conventional rail.

### *1.2.2.1 Alternative N4A Conventional Rail*


Alternative N4A would begin in Edmond, Oklahoma, and follow the BNSF rail alignment south to Oklahoma City. The alternative would continue south along the Burlington Northern Santa Fe (BNSF) rail alignment to Norman, Oklahoma; through Metro Junction, near Denton, Texas; and on to Fort Worth (as does the Heartland Flyer). From Fort Worth, the alternative would continue east to Dallas following the Trinity Railway Express (TRE) tracks. From Edmond, Oklahoma to Dallas, the route would be approximately 260 miles long. Because existing freight traffic would not preclude passenger service along this section of track, the route would provide passenger rail service on the existing BNSF track, with potential improvements within the existing BNSF right-of-way.

Alternative N4A would provide several improvements over the existing Heartland Flyer service. Alternative N4A would increase the number of daily round trips along this route (the Heartland Flyer currently offers one round trip per day), and the N4A route would extend from Fort Worth to Dallas without requiring a transfer (the Heartland Flyer service currently terminates in Fort Worth). In addition, Alternative N4A would provide improvements to existing station facilities and new train equipment with more onboard amenities, including business class available for a premium price.

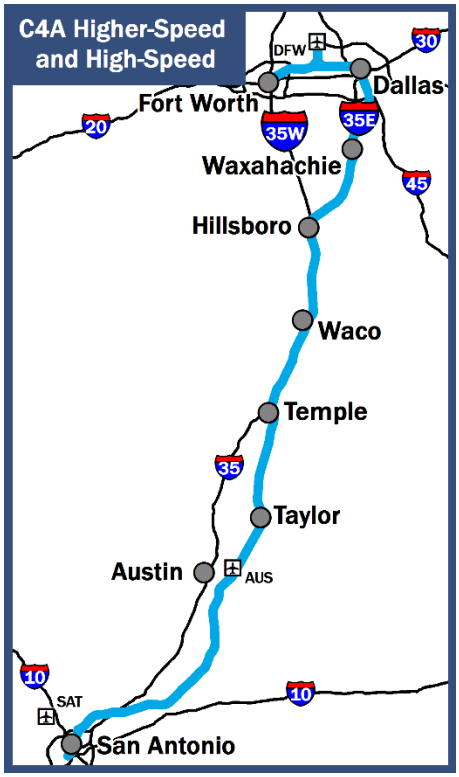
Alternative N4A assumes diesel-locomotive hauled equipment running three to six daily round trips. Two or three of the round trips would operate on an accelerated schedule, making roughly seven stops, with the remaining local trains making up to 12 stops.

## 1.2.3 Central Section: Dallas and Fort Worth to San Antonio

Three route alternatives, each with higher-speed and high-speed rail options, were evaluated in the Central Section: Alternatives C4A, C4B, and C4C.

The Central Section alternatives would provide several improvements over the existing Texas Eagle service in this corridor. All of the alternatives would increase the number of daily round trips along this route (the Texas Eagle currently offers one round trip per day). The high-speed options would provide faster service between Dallas and Fort Worth and Antonio – 2 hours versus 8 hours for the Texas Eagle Service. In addition, the Central Section alternatives would provide improvements to existing station facilities and new train equipment.

### *1.2.3.1 Alternative C4A Higher-Speed and High-Speed Rail*

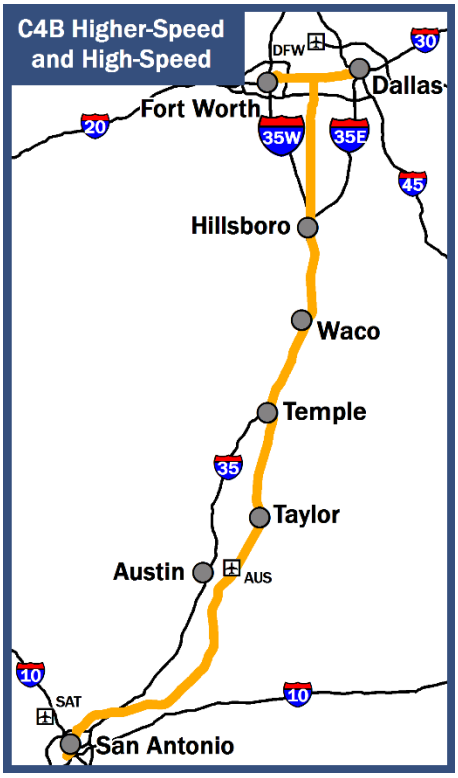



Alternative C4A would begin in Fort Worth and follow the TRE tracks east to Dallas. From Dallas, it would follow the BNSF alignment south toward Waxahachie where it would enter a new alignment outside existing highway and rail corridors to accommodate maximum operating speeds. Though outside existing transportation corridors, the southern portion of Alternative C4A would generally follow the BNSF alignment for about 250 miles, traveling south from Waxahachie through Hillsboro, Waco, Temple, Taylor, and Austin to San Antonio.

Alternative C4A Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running six to 12 daily round trips. Express trains would likely make seven stops, and local trains would make up to 12 stops.

Alternative C4A High-Speed Rail assumes true electric-powered, high-speed service running 12 to 20 daily round trips. Express trains would likely make six stops, and local trains would make up to nine stops.

### *1.2.3.2 Alternative C4B Higher-Speed and High-Speed Rail*

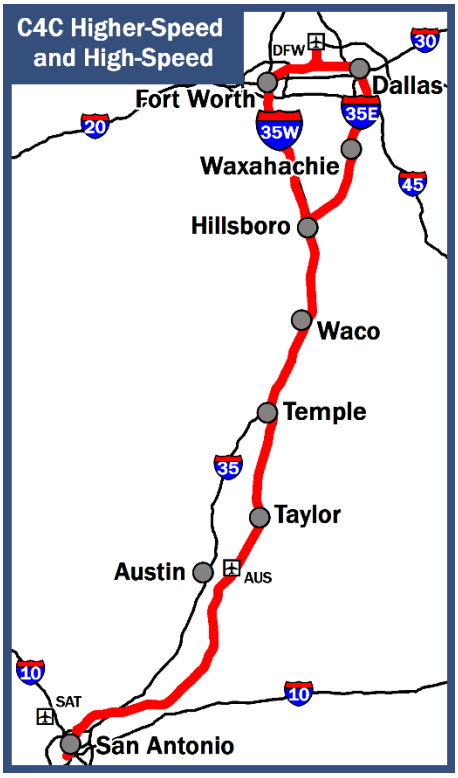



Alternative C4B would serve both Fort Worth and Dallas, with trains following a new elevated high-speed rail alignment over IH-30. In Arlington (between Dallas and Fort Worth), the alternative would turn south to Hillsboro on an alignment outside existing transportation corridors. The alternative would then follow the same high-speed rail alignment as Alternative C4A from Hillsboro to San Antonio.

Alternative C4B Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running six to 12 daily round trips. Express trains would likely make seven stops, and local trains would make up to 12 stops.

Alternative C4B High-Speed Rail assumes true electric-powered, high-speed service running 12 to 20 daily round trips. Express trains would likely make six stops, and local trains would make up to eight stops.

### *1.2.3.3 Alternative C4C Higher-Speed and High-Speed Rail*




Alternative C4C would follow the same potential alignment as Alternative C4A from Fort Worth east to Dallas and south to San Antonio, but would include a link from Hillsboro directly to Fort Worth parallel to the UPRR alignment. Service on the Alternative C4C route would operate in a clockwise direction, running from Hillsboro to Fort Worth, to Dallas, back to Hillsboro, and south to San Antonio in order to serve Fort Worth directly (while also being compatible with the general service for Alternative C4A).

Alternative C4C Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running six to 12 daily round trips. Express trains would likely make seven stops, and local trains would make up to 12 stops.

Alternative C4C High-Speed Rail assumes true electric-powered high-speed service running 12 to 20 daily round trips. Express trains would likely make six stops, and local trains would make up to nine stops.

## 1.2.4 Southern Section: San Antonio to South Texas

Two route alternatives were evaluated in the Southern Section: Alternative S4, with higher-speed rail, and Alternative S6, with higher-speed and high-speed rail options.

### *1.2.4.1 Alternative S4 Higher-Speed Rail*

Alternative S4 would begin in San Antonio and travel southeast along the UPRR alignment to George West, where it would continue outside existing transportation corridors to Alice. At Alice, the alternative would divide into three legs at a stop. The first leg would travel west along the Kansas City Southern (KCS) Railway to San Diego, Texas; it would then travel outside existing transportation corridors to east of Laredo in an alignment that would allow higher speeds and rejoin the KCS Railway to enter the highly developed Laredo area. The second leg would travel south along abandoned railroad tracks to McAllen and east to Harlingen and Brownsville. The third leg would travel east along the KCS Railway to Corpus Christi.


Alternative S4 assumes new high-performance diesel-locomotive hauled equipment running four to six daily round trips. Depending on corridor demand model forecasts, the primary service may be designated as Laredo-Alice-San Antonio and Corpus Christie-Alice-San Antonio, with a connecting feeder from Brownsville, Harlingen, and McAllen.

### *1.2.4.2 Alternative S6 Higher-Speed and High-Speed Rail*

Alternative S6 would begin in San Antonio and travel south on a new alignment outside existing transportation corridors to a station near the Laredo-Columbia Solidarity Bridge, which crosses the Rio Grande north of Laredo. The alternative would then cross on a new railway bridge to join a new rail line being constructed in Mexico, which would continue to Monterrey. This study only examines the physical effects of the U.S. component of this new line, but it does consider the ridership effect of such a connection.


Alternative S6 Higher-Speed Rail assumes new high-performance diesel-locomotive hauled equipment running four to six daily round trips between San Antonio and Laredo, which would be the only United States stops for the alternative. If an

extension from Laredo to Monterrey is added, the frequency of trips to Monterrey is assumed to be the same as those from San Antonio to Laredo.

Alternative S6 High-Speed Rail assumes true electric-powered, high-speed service running eight to 12 daily round trips between San Antonio and Laredo. If an extension from Laredo to Monterrey is added, the frequency of trips to Monterrey is assumed to be the same as those from San Antonio to Laredo.

### 1.2.5 Station Cities

The study does not evaluate specific station locations, and no conclusion about the exact location of stations will be made as part of the service-level EIS process. However, based on ridership data and transit connectivity information developed as part of the Alternatives Analysis (TxDOT 2014), and based on stakeholder input, the cities in which stations would most likely be located have been assumed. The size and design of stations would be appropriate for the service type and the route of the alternative. Cities that could have stations are listed in Table 1-2.

*Table 1-2: Cities with Potential Stations*

| Oklahoma | |
|---|---|
| Edmond | Pauls Valley |
| Oklahoma City | Ardmore |
| Norman | |
| **Texas** | |
| Gainesville | Austin |
| Fort Worth | San Antonio |
| Arlington | Alice |
| Dallas | Corpus Christi |
| Waxahachie | Harlingen |
| Waco | McAllen |
| Temple (also serving Killeen) | Brownsville |
| Taylor | Laredo |

# 2.0 Regulatory Context and Purpose

FRA's *Procedures for Considering Environmental Impacts* states: "The EIS should address both construction period and long-term impacts of alternatives on wildlife and vegetation in the affected environment. Where an alternative proposes to control or modify a stream or other body of water in some way, it shall contain evidence of consultation with the U.S. Fish and Wildlife Service (USFWS) and with the agencies exercising administration over the wildlife resources of affected States, as required by section 2(a) of the Fish and Wildlife Coordination Act, 16. U.S.C 662(a)," and "If applicable, the EIS shall discuss the impacts of the alternatives on endangered or threatened species of wildlife. The Department of the Interior lists such species in 50 CFR Part 17. There should be evidence of consultation with the Department of the Interior as required by Section 7 of the Endangered Species Act, 16 United States Code (U.S.C.) 1536." (64 Federal Register 28545).

The purpose of this technical study is to identify habitats and documented occurrences of federally and state-listed threatened and endangered species of flora and fauna within the EIS Study Area. This study identifies areas where these resources could be potentially affected by Program alternatives.

# 3.0 Evaluation Methods

The methodology used for the threatened and endangered plant and animal species effect evaluation consists of a combination of qualitative and quantitative assessments. A qualitative assessment was used for general comparisons of the Study alternatives when discussing issues such as the significance of effects or other issues that require a more detailed approach than warranted for in this technical report. A more detailed quantification of potential effects and biological analysis would occur during the project-level analysis. For each alternative, general conclusions are generated to support the relative predicted change in effects among the alternatives. The No Build Alternative is the primary basis of comparison. The intensity of an effect as a result of the build alternatives is characterized as negligible, moderate, or substantial compared to the No Build alternative. For threatened and endangered species, these terms are defined as follows:

- Negligible intensity effects from construction and operation of an alternative would have no effect on threatened and endangered species or their designated critical habitat.
- Moderate intensity effects from construction and operation of an alternative may affect, but would not likely adversely affect, threatened and endangered species or their designated critical habitat.
- Substantial intensity effects from construction and operation of an alternative may affect and would likely adversely affect threatened and endangered species or their designated critical habitat.

Readily available information, including special-status species occurrence data and mapped critical habitat, was used to quantitatively assess the potential magnitude of effects in the 500-foot-wide EIS Study Area for each build alternative. To evaluate the potential effects on threatened and endangered species, the following acreages were quantified:

- The locations and acreages of special-status plant and animal species occurrences within the EIS Study Area were determined. The analysis represents only known occurrences within the EIS Study Area, based on available data. Potential habitats for listed species would be more widespread and would be determined during focused surveys during the project-level analysis. The data used for analysis of the corridor within Texas were obtained from the 2011 Environmental Occurrences for Federal and State Listed and Tracked Threatened, Endangered, and Rare Species spatial dataset, acquired from the Texas Natural Diversity Database (TXNDD) (Michael Baker Jr., Inc. 2012). Federally and state-listed species in the portion of the EIS Study Area in Oklahoma were identified through a review of the county-by-county list of endangered and threatened species published by Oklahoma Department of Wildlife Conservation (ODWC). For the service-level analysis of threatened and endangered plant and animal species, only TXNDD data and the county-by-county list were used. Based on direction received from TxDOT regarding the methods of analysis for each of the environmental disciplines that were considered and included in the service-level EIS, data acquired via the Ecological Mapping

Systems of Texas (EMST), the National Land Cover Database (NLCD) and composite data from the U.S. Environmental Protection Agency's (EPA's) Regional Ecological Assessment Protocol (REAP) were included in the Natural Ecological Systems and Wildlife Technical Study and corresponding EIS section (CH2M 2016). Such data were used to assess the potential magnitude, or intensity, of the effects on land use coverage, ecoregions, wildlife corridors and assemblages, and sensitive plant communities and not incorporated within the threatened and endangered species analysis. During subsequent, project-level analysis, data from EMST, NLCD and REAP, as well as data from TXNDD and ODWC, will be used to determine if habitat is present within the study area of a preferred alternative and will be used to conduct a detailed analysis to determine actual effects on threatened and endangered species and habitats.

- The acreage of potential critical habitat within the EIS Study Area within the state of Texas was determined using data from the TXNDD. Critical habitat spatial data for the portion of the EIS Study Area in Oklahoma were acquired from the ODOT High-Speed Intercity Passenger Rail IH-35 data collection report (Meshek & Associates Inc. 2013).

# 4.0 Baseline/Affected Environment

## *4.1 Study Area*

As a first step in the threatened and endangered species effect analysis, a geographic information system (GIS) database in ARC/View was used to identify existing resources within the EIS Study Area, an approximately 850-mile-long corridor. The extent of the threatened and endangered species effect analysis conducted for the Northern, Central and Southern sections, including route alternatives and station locations, was limited to a 500-foot-wide buffer along the corridor. It is important to note that the EIS Study Area is not the actual area of effect associated with construction and operation of any of the alternatives. For example, the construction of a passenger rail alignment can reasonably occur within a 100-foot-wide right-of-way. The purpose of this service-level analysis is to use the EIS Study Area to determine the types of resources that may be affected, and the relative magnitude of resources that may be affected.

## *4.2 Regional Environment*

The EIS Study Area spans over 850 miles, from central Oklahoma to southern Texas. The Program encompasses a broad geographic area with climates that include semi-arid, humid subtropical, and modified subtropical conditions. The EIS Study Area generally crosses through low-elevation basins and valleys associated with the rolling Great Plains in the northern part of the Program corridor and the Coastal Plains in the southern part. Land cover types within the corridor include developed land and vegetated land with open grasslands, agricultural land, shrubland, and forests. The climate is characterized by a regime of moderate to hot summer drought and winter rain. Winter rain occurs as a result of low-pressure depressions associated with Pacific and Arctic fronts (University of Oklahoma 2014; Texas Climate Data 2014). Precipitation in the Northern Section averages about 48 inches per year near Oklahoma City and 37 inches near the Dallas and Fort Worth area. In the Central Section, precipitation averages 36 inches in Waco to 34 inches in Austin. In the Southern Section, annual precipitation ranges from 32 inches in San Antonio to 20 inches in Laredo. Precipitation is generally rain except during winter in the Northern Section, where it can snow. The daily high temperature ranges, on average, from 50 to 94 degrees Fahrenheit (°F) in the Northern Section to 67 to 100°F in the Southern Section; however, temperatures over 100°F are common in summer throughout the entire EIS Study Area (U.S. Climate Data 2014).

## *4.3 Regulatory Environment*

Applicable federal and state legislation, regulations, and orders pertaining to federally and state listed threatened and endangered species within the EIS Study Area are summarized below.

### 4.3.1 Federal

#### *4.3.1.1 Endangered Species Act of 1973 (16 U.S.C. 1531-1544 and 42 U.S.C. §4321, et seq.)*

The purpose of the Endangered Species Act (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. USFWS and the National Oceanic and Atmospheric

Administration National Marine Fisheries Service (NOAA Fisheries) administer the ESA. USFWS has primary responsibility for terrestrial and freshwater organisms; the responsibilities of NOAA Fisheries are mainly marine wildlife including whales and anadromous fish, such as salmon. Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to become endangered within the foreseeable future. All species of plants and animals, except pest insects, are eligible for listing if they meet the criteria for endangered or threatened classification. The ESA and subsequent amendments provide guidance for conserving federally listed species and the ecosystems upon which they depend. The following are applicable sections of the ESA:

- **Section 4 (Listing, Critical Habitat and Recovery).** Section 4 of the ESA (16 U.S.C. Section 1533) includes the procedures for listing a species and requires species to be listed as endangered or threatened solely on the basis of their biological status and threats to their existence. When evaluating a species for listing, USFWS considers five factors: (1) damage to, or destruction of, a species' habitat; (2) overutilization of the species for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing protection; and (5) other natural or manmade factors that affect the continued existence of the species. When one or more of these factors imperils the survival of a species, USFWS takes action to protect it. Section 4 also requires USFWS and NOAA Fisheries to designate critical habitat for any species it lists under the ESA. Critical habitat is defined as specific areas:
  - Within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection
  - Outside the geographical area occupied by the species if the agency determines that the area is essential for conservation

  Section 4 of the ESA directs USFWS and NOAA Fisheries to develop and implement recovery plans for threatened and endangered species, unless such a plan would not promote conservation of the species.
- **Section 7 (Interagency Consultation and Biological Assessments).** Section 7 of the ESA (16 U.S.C. Section 1536) requires federal agencies to consult with USFWS or NOAA Fisheries, as appropriate, so actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of threatened or endangered fish, wildlife, or plant species or result in the destruction or adverse modification of designated critical habitat for any such species. "Destruction or adverse modification" means a direct or indirect alteration that appreciably diminishes the value of critical habitat for the conservation of a listed species. Such alterations may include those that alter the physical or biological features essential to the conservation of a species or that preclude or significantly delay development of such features.

- **Section 9 (Prohibited Acts).** Section 9 of the ESA (16 U.S.C. Section 1538) and its implementing regulations prohibit the "take" of any fish or wildlife species listed under the ESA as endangered or threatened, unless otherwise authorized by federal regulations. Take includes the destruction of a listed species' habitat. Take also refers to activities that could harm a listed species (e.g., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct). Section 9 also prohibits specific activities with respect to endangered and threatened plants.
- **Section 10 (Permitting and Conservation Plans).** Section 10 of the ESA (16 U.S.C. Section 1539) provides a process by which nonfederal entities may obtain an Incidental Take Permit from USFWS or NOAA Fisheries for otherwise lawful activities that might incidentally result in the take of endangered or threatened species, subject to specific conditions. Take refers to activities that could result in harm to a listed species (e.g., harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct).

#### *4.3.1.2 U.S. Fish and Wildlife Coordination Act of 1934 (16 U.S.C. Sections 661 to 667e et seq.)*

The U.S. Fish and Wildlife Coordination Act applies to any federal project where any body of water is impounded, diverted, deepened, or otherwise modified. Project proponents are required to consult with USFWS and the appropriate state wildlife agencies (ODWC and Texas Parks and Wildlife Department [TPWD]).

The Fish and Wildlife Coordination Act provides the basic authority for USFWS' involvement in evaluating impacts on fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires federal agencies that construct, license, or permit water resource development projects to first consult with USFWS (and NOAA Fisheries in some instances) and state fish and wildlife agencies regarding the impacts on fish and wildlife resources and measures to mitigate these impacts.

#### *4.3.1.3 Migratory Bird Treaty Act of 1918 (16 U.S.C. Sections 703 to 712)*

The Migratory Bird Treaty Act (MBTA) protects selected species of birds that cross international boundaries (i.e., species that occur in more than one country at some point during their life cycle). The law prohibits the take of such species, including the removal of nests, eggs, and feathers.

The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations.

#### *4.3.1.4 Bald and Golden Eagle Protection Act (16 U.S.C. Sections 668 to 668d, 50 Code of Federal Regulations 22)*

The Bald and Golden Eagle Protection Act prohibits the destruction of bald and golden eagles and their occupied and unoccupied nests. It also makes it illegal to take, transport, or possess eagles or engage in commerce of these species.

#### *4.3.1.1 Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) (16 U.S.C. §§ 1801-1884)*

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) is the primary law governing marine fisheries management in U.S. federal waters. First passed in 1976, the Magnuson-Stevens Act fosters long-term biological and economic sustainability of our nation's marine fisheries out to 200 nautical miles from shore.

### 4.3.2 State Regulations

- **Oklahoma Wildlife Conservation Code (Oklahoma Statue Title 29).** This statute gives the state the authority to list a wildlife species as threatened or endangered within Oklahoma, although it might not be classified as federally threatened or endangered through the ESA. At the present time, four wildlife species are listed as state-threatened or state-endangered in Oklahoma. “Endangered” refers to any wildlife species or subspecies in the wild or in captivity whose prospects of survival and reproduction are in immediate jeopardy and includes those species listed as endangered by the federal government, as well as any species or subspecies identified as threatened by Oklahoma statute or Commission resolution, as outlined in Oklahoma Statute Title 29 (Laws 1974, c. 17, §2-109, emergency effect [emerg. eff.] April 8, 1974; Laws 1985, c. 172, §1, emerg. eff. June 18, 1985). State regulations also prohibit possession, hunting, chasing, harassing, and capture, shooting at, wounding or killing, take or attempt to take, trap or attempting to trap any endangered or threatened species or subspecies without specific written permission of the Director. In no event, however, may that permission conflict with federal law. Added by Laws 1974, c. 17, §5-412, emerg. eff. April 8, 1974. Amended by Laws 1985, c. 172, §3, emerg. eff. June 18, 1985; Laws 1992, c. 149, §8, emerg. eff. April 30, 1992; Laws 2010, c. 80, §3, emerg. eff. April 12, 2010.
- **Texas Parks and Wildlife Code Chapters 6 and 68 and 31 Texas Administrative Code (TAC) §65.171-65.176.** The Texas legislature authorized TPWD to establish a list of endangered animals in the state in 1973. State regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated as endangered or threatened without the issuance of a permit, as outlined in Chapters 6 and 68 of the Texas Parks and Wildlife Code as well as 31 TAC §65.171-65.176. Endangered species are those species the executive director of TPWD has named as being threatened with statewide extinction. Threatened species are

those species which the TPWD Commission has determined are likely to become endangered in the future.

- **Texas Parks and Wildlife Code Chapter 88 and 31 TAC §69.01-69.9.** These state regulations prohibit commerce in threatened and endangered plants and prohibit collection of listed plant species from public land without the issuance of a permit.

## *4.4 Sensitive Plants*

Federal and state regulations protect imperiled species and facilitate the recovery of such species and the ecosystems upon which they depend. No threatened, endangered, or rare plant species were identified as potentially occurring in the Northern or Central sections. In the Southern Section, Alternative S6 also had no threatened, endangered, or rare plant species identified. Federal and state regulations also provide guidance on how and when a species is listed and condition of a species sensitivity (e.g., endangered or threatened). Table 4-1 lists the sensitive plant species that potentially occur within the EIS Study Area and describes each species general habitat type and requirements. These species were identified by occurrences of federally and state-listed and tracked threatened, endangered, and rare species and a general description of their habitat types from a spatial dataset acquired from the TPWD TXNDD. Federally and state-listed species in the portion of the EIS Study Area in Oklahoma were identified through a review of the county-by-county list of endangered and threatened species published by ODWC because no spatial data are available at this time. Eighteen federally and state-listed or state-ranked plant species potentially occur within the Alternative S4 EIS Study Area.

*Table 4-1: Sensitive Plant Species within EIS Study Area by Section and Alternative*

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| **Northern Section** | | | |
| ***Alternative N4A (Conventional Rail)*** | | | |
| None | | | |
| **Central Section** | | | |
| ***Alternative C4A (Higher- and High-Speed Rail)*** | | | |
| None | | | |
| ***Alternative C4B (Higher- and High-Speed Rail)*** | | | |
| None | | | |
| ***Alternative C4C (Higher- and High-Speed Rail)*** | | | |
| None | | | |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| **Southern Section** | | | |
| ***Alternative S4 (Higher-Speed Rail)*** | | | |
| Bailey's ballmoss | *Tillandsia baileyi* | -- / -- / S2 | An air plant that grows on trees in woodland, savanna/open woodland, and shrubland in Texas. |
| Elmendorf's onion | *Allium elmendorfii* | -- / -- / S2 | Savanna/open woodland; known only from the Carrizo sands of eastern Bexar, Frio, Wilson, and Atacosa counties. |
| Falfurrias milkvine | *Matelea radiata* | -- / -- / SH | Unknown. |
| Green Island echeandia | *Echeandia texensis* | -- / -- / S1 | Grassland; on clay dunes, llanos, and open areas in Texas. |
| Johnston's frankenia | *Frankenia johnstonii* | LE, PDL / E / S3 | Shrubland; found in high-saline, rocky or eroding and reddish soil, associated with the Maverick soil series. It is found in Webb, Zapata, and Starr counties of south Texas; also in northern Mexico. |
| Lila de los llanos | *Echeandia chandleri* | -- / -- / S2 | Grassland; coastal plains in Texas and Mexico (San Luis Potosí, Tamaulipas). |
| Mexican mud-plantain | *Heteranthera mexicana* | -- / -- / S1 | Freshwater wetland (playas); riparian (resacas); populations are located in swales and ditches in an area that is subject to irregular rainfall. |
| Plains gumweed | *Grindelia oolepis* | -- / -- / S2 | Grassland; endemic to Texas and primarily found along roadsides and other disturbed rights-of-way. |
| Runyon's cory cactus | *Coryphantha macromeris var. runyonii* | -- / -- / S2 | Shrubland (Chihuahuan desert scrub, Tamaulipan thorn scrub), on nearly all substrates including nearly pure gypsum, gravelly soils, usually sandy alluvium or clay, rarely crevices or steep slopes in New |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| | | | Mexico, Texas and Mexico (Chihuahua, Coahuila, Durango, Zacatecas). |
| Runyon's water-willow | *Justicia runyonii* | -- / -- / S2 | Shrubland and woodland in Texas, Rio Grande Valley, and Northern Mexico. |
| Sandhill woolywhite | *Hymenopappus carrizoanus* | -- / -- / S2 | Savanna/open woodland (sandhills), oak woodlands on sandy soils. |
| Slender rushpea | *Hoffmannseggia tenella* | LE / E / S1 | Grassland; known to occur in four populations in Nueces and Kleberg counties in Texas. |
| South Texas ambrosia | *Ambrosia cheiranthifolia* | LE / E / S2 | Grassland; on seasonally wet clay and sands in Texas and Mexico (Tamaulipas). |
| St. Joseph's staff | *Manfreda longiflora* | -- / -- / S2 | Shrubland on clay slopes, dry gravelly hills or sandy prairies in Texas and Mexico (Tamaulipas). |
| Texas ayenia | *Ayenia limitaris* | LE / E / S1 | Shrubland; known to occur in only one small population of about 20 individuals in Hidalgo County. |
| Texas windmill-grass | *Chloris texensis* | -- / -- / S2 | Grassland (coastal prairie, saline prairie). |
| Vasey's adelia | *Adelia vaseyi* | -- / -- / S2 | Shrubland. |
| Walker's manioc | *Manihot walkerae* | LE / E / S1 | Shrubland; historically, Walker's manioc is known only from the lower Rio Grande Valley of Texas (Hidalgo and Starr counties) and northern Tamaulipas, Mexico. Now, located in three areas on the Lower Rio Grande National Wildlife Refuge in Starr and Hidalgo counties. |
| ***Alternative S6 (Higher- and High-Speed Rail)*** | | | |
| None | | | |
| Notes:<br>-- = Not listed | | | |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| **Federal Rankings**<br>LE = federally endangered<br>LT = federally threatened<br>PE = proposed endangered<br>PT = proposed threatened<br>C = Category 1 candidate for listing as threatened or endangered by USFWS<br>PDL = proposed delisted<br><br>**State Rankings**<br>E = state endangered<br>T = state threatened<br><br>TPWD Rankings<br>S1 = less than six occurrences known in Texas; critically imperiled in Texas; especially vulnerable to extirpation from the state<br>S2 = 6 to 20 known occurrences in Texas; imperiled in Texas because of rarity; very vulnerable to extirpation from the state<br>S3 = 21 to 100 known occurrences in Texas; either rare or uncommon in Texas<br>S4 = more than 100 occurrences in Texas; apparently secure in Texas although it may be quite rare in some areas of Texas<br>S5 = demonstrably secure in Texas<br>SH = historical in Texas, not verified within the past 40 years but suspected to exist<br>SR = reported from Texas in literature but not verified via specimens or field observations<br>SX = presumed extirpated from Texas<br><br>Sources: TPWD (2014b). | | | |

### 4.4.1 Acres of Potential Sensitive Plant Occurrences

No federally or state-listed plant species were identified within the EIS Study Area for either the Northern or Central Section. As identified in Table 4-1, 18 federally and state-listed or state-ranked plant species occur within the Southern Section EIS Study Area, all of which are located within the EIS Study Area for Alternative S4. No federally or state-listed plant species were identified within the EIS Study Area for Alternative S6. Table 4-2 lists the potential acres of the 18 habitats within the EIS Study Area associated with Alternative S4.

*Table 4-2: Acres of Potential Sensitive Plant Occurrences within Southern Section EIS Study Area*

| Common Name | Acres of Potential Habitat in the Study Area |
|---|---|
| **Alternative S4 (Higher-Speed Rail)** | |
| Bailey's ballmoss | 521 |
| Elmendorf's onion | 76 |
| Falfurrias milkvine | 600 |
| Green Island echeandia | 474 |
| Johnston's frankenia | 1 |
| Lila de los llanos | 170 |
| Mexican mud-plantain | 1,767 |
| Plains gumweed | 453 |
| Runyon's cory cactus | 384 |
| Runyon's water-willow | 304 |
| Sandhill woolywhite | 624 |
| Slender rushpea | 18 |
| South Texas ambrosia | 195 |
| St. Joseph's staff | 546 |
| Texas ayenia | 693 |
| Texas windmill-grass | 577 |
| Vasey's adelia | 120 |
| Walker's manioc | 600 |
| Sources: Meshek & Associates (2013); Michael Baker Jr., Inc. (2012). | |

As shown on Figures 4-1 through 4-3, the majority of the known occurrences of listed plant species that intersect with the Alternative S4 EIS Study Area are located in Atascosa, Bexar, Brooks, Cameron, Hidalgo, Jim Wells, and Nueces counties, in areas that would be constructed on an existing abandoned rail.

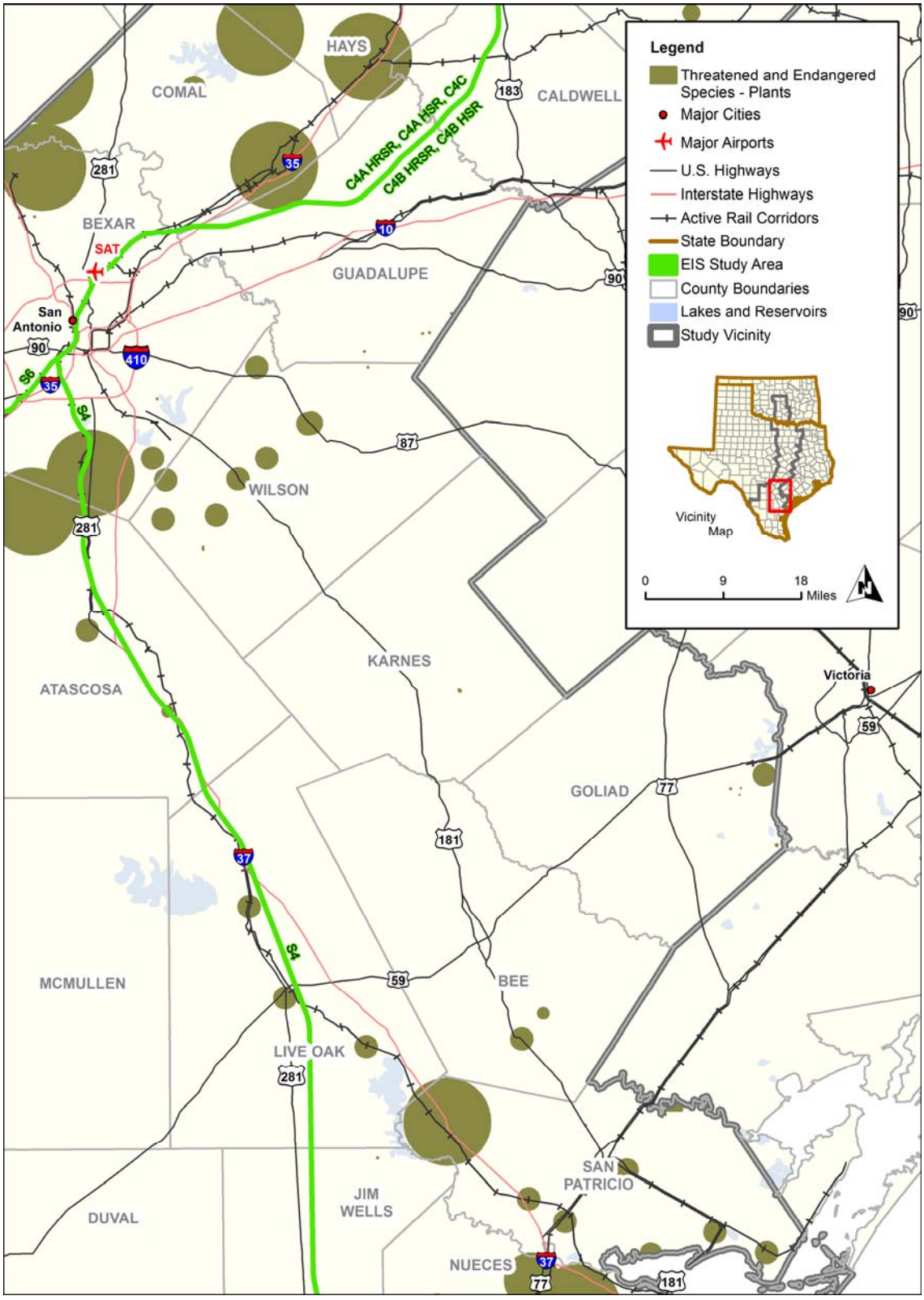



*Figure 4-1: Sensitive Plant Species Occurrences – Alternative S4*

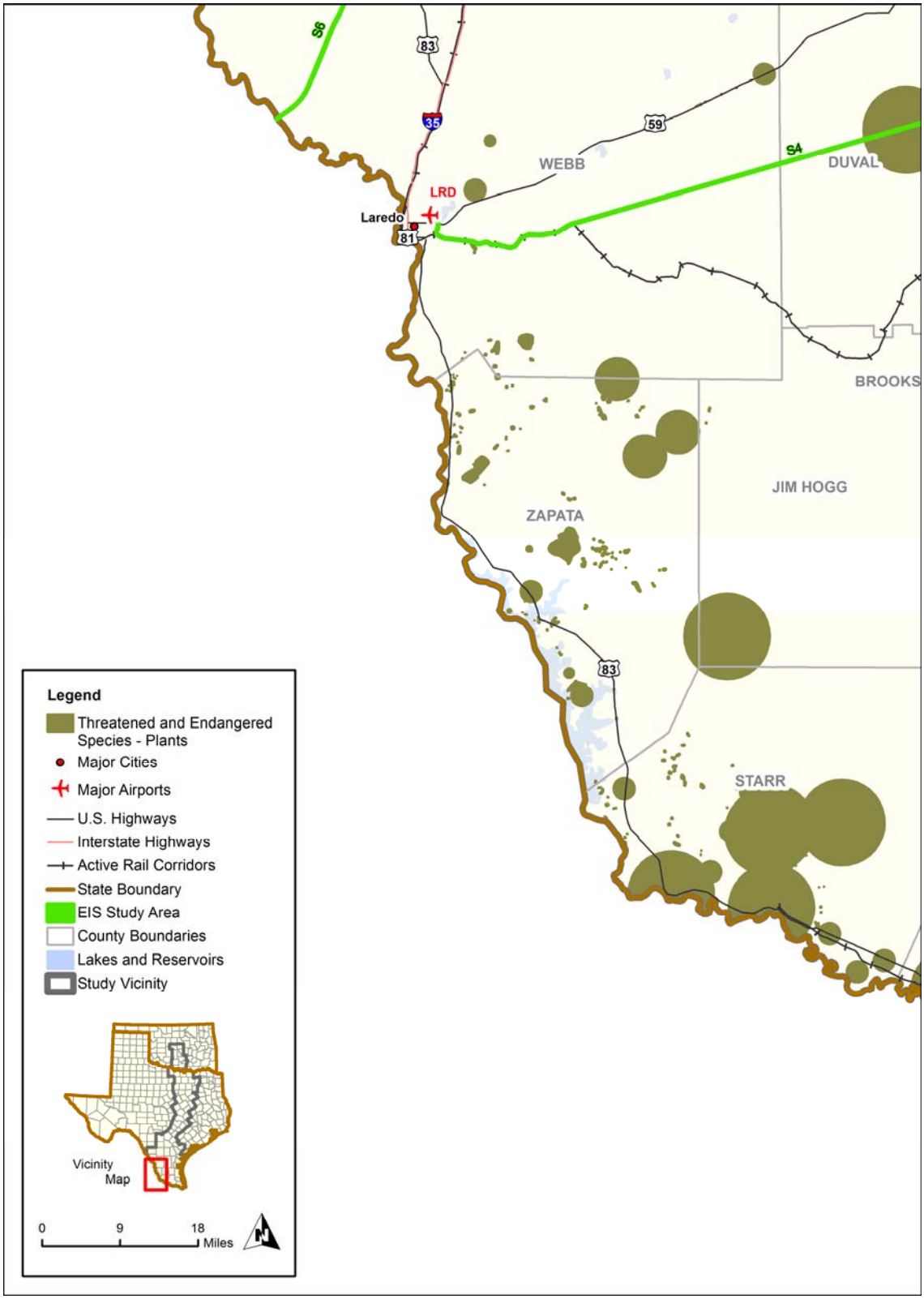



*Figure 4-2: Sensitive Plant Species Occurrences – Alternative S4*

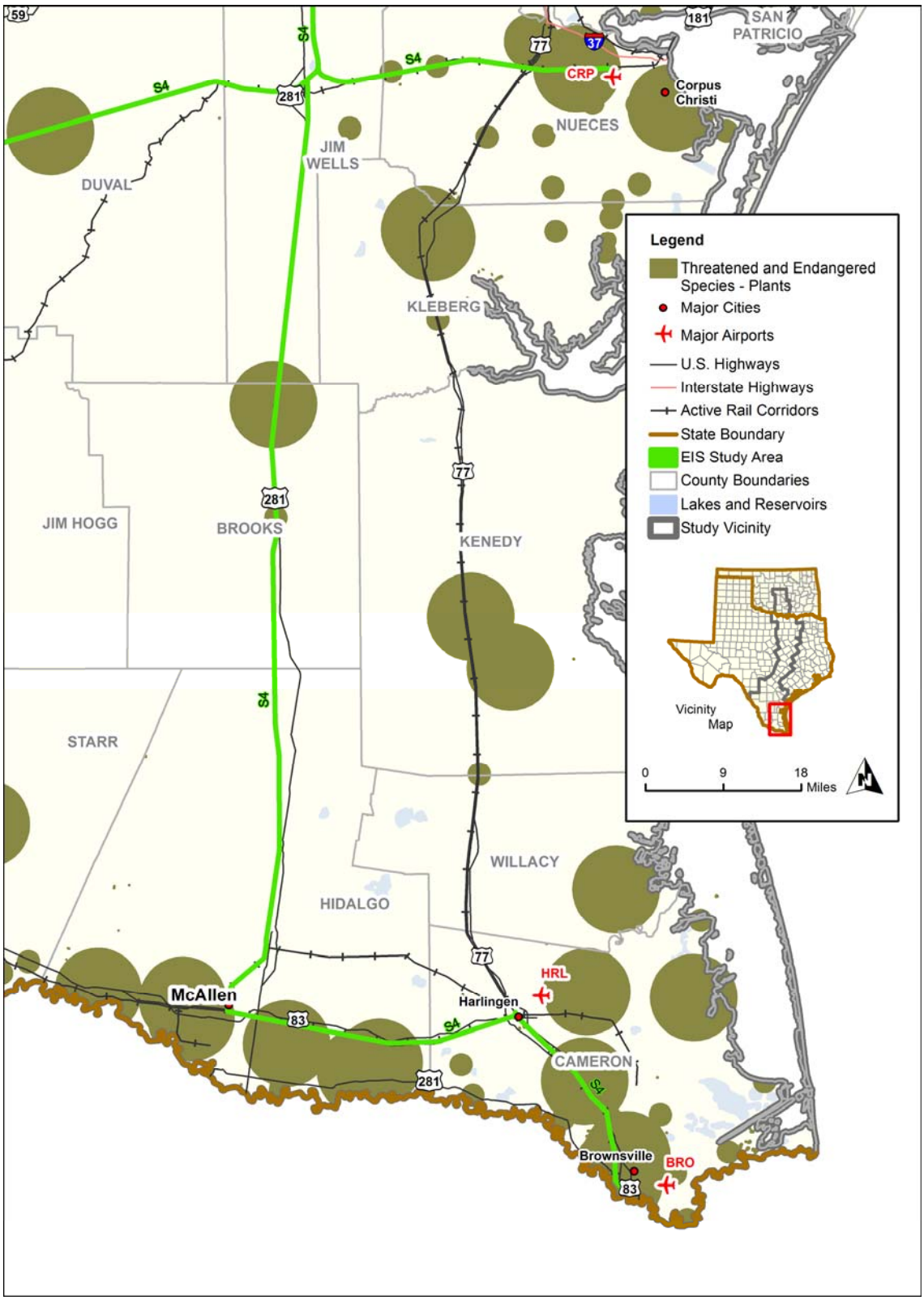



*Figure 4-3: Sensitive Plant Species Occurrences – Alternative S4*

## 4.5 Sensitive Wildlife

Sensitive wildlife species include federally and state-listed endangered and threatened species and federally proposed endangered and proposed threatened species. Twenty-two federally and state-listed wildlife species occur within the EIS Study Area.

Table 4-3 lists sensitive wildlife species, and their general habitat requirements, that occur within the EIS Study Area based on the spatial dataset acquired from the TXNDD. As previously stated, federally and state-listed species in Oklahoma were identified through a review of the county-by-county list of endangered and threatened species published by ODWC because no spatial data are available at this time. Additional details regarding sensitive wildlife habitat requirements and where each species is known to occur within the EIS Study Area are included in Sections 4.5.1 through 4.5.5.

*Table 4-3: Sensitive Wildlife Species within EIS Study Area by Section and Alternative*

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| **Northern Section** | | | |
| ***Alternative N4A (Conventional Rail)l*** | | | |
| Arkansas River shiner | *Notropis girardi* | LT / -- / -- | Historically inhabited the main channels of wide, shallow, sand-bottomed rivers and larger streams of the Arkansas River basin. Adults are uncommon in quiet pools or backwaters, and almost never occur in tributaries having deep water and bottoms of mud or stone. Juveniles associated most strongly with current, conductivity (total dissolved solids), and backwater and island habitat types. |
| Black-capped vireo | *Vireo atricapillus* | LE / -- / -- | Rangelands with scattered clumps of shrubs separated by open grassland. There are two known populations of black-capped vireos in Oklahoma. One population is large (more than 2,000 birds) and is located in the Wichita Mountains of northern Comanche County. The other population is small (less than 30 birds) and occurs in the canyon lands of northern Blaine County, north of Watonga. |
| Black-sided darter | *Percina maculata* | -- / T / -- | Clear, gravel-bottom, perennial streams. |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| Interior least tern | *Sterna antillarum* | LE / -- / -- | Nesting habitat–bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs.<br>For feeding, needs shallow water with an abundance of small fish. Shallow water areas of lakes, ponds, and rivers located close to nesting areas are preferred.<br>Occurs in Oklahoma during the late spring and summer breeding season (mid-May through late August) on portions of the Arkansas, Cimarron, Canadian, and Red rivers. |
| Piping plover | *Charadrius melodus* | LT / -- / -- | Estuary/estuarine and coastal.<br>Winter – beaches, sand flats, mudflats, algal mats, emergent sea grass beds, wash-over passes, and very small dunes where seaweed (sargassum) or other debris has accumulated sand; spoil islands along the Intracoastal Waterway; bare or sparsely vegetated coastal areas. There are two nesting records for the piping plover in the Oklahoma panhandle, but it is normally a spring and fall migrant through the state. Most records for migrating piping plovers occur across the main body of the state, with recent records including Woodward, Alfalfa, Oklahoma, Cleveland, Tulsa, and Washington counties. |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| Whooping crane | *Grus Americana* | LE / -- / -- | Saltwater wetland and estuary.<br>Winter – primarily freshwater and brackish marshes of south Texas, salt marshes, and tidal flats on the mainland and barrier islands dominated by salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eyebut; recently a few flocks have used waterbodies (e.g., Granger Lake), stopping short of coastal destination; shallow, seasonally and semi-permanently flooded palustrine wetlands for roosting, and various cropland and emergent wetlands. During migration, whooping cranes pass through the western half of Oklahoma, with most sightings occurring west of IH-35 and east of Guymon, in the panhandle. |
| **Central Section** | | | |
| ***Alternative C4A (Higher- and High-Speed Rail)*** | | | |
| Mountain plover | *Charadrius montanus* | PT / -- /S2 | Agricultural and grassland.<br>Winter – shortgrass prairie, heavily grazed rangelands and agricultural fields in south Texas.<br>Breeding – short- and mixed-grass prairie, prairie dog colonies, agricultural lands, and semidesert habitats in west Texas and panhandle.<br>Nest locally in the western Great Plains from Montana south to New Mexico, in Utah, and in Mexico; winter in a broad band from Texas west and north to the Central Valley of California. |
| Texas garter snake | *Thamnophis sirtalis annectens* | -- / -- / S3 | Riparian, around lacustrine and cultural aquatic sites; marshy, flooded pastureland or meadows, particularly in spring when frogs are present in numbers; at other times, grassy or brushy terrain near hill country streams and ponds. Central and north Texas and Oklahoma. |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| ***Alternative C4B (Higher- and High-Speed Rail)*** | | | |
| Mountain plover | *Charadrius montanus* | PT / -- /S2 | See above. |
| Texas garter snake | *Thamnophis sirtalis annectens* | -- / -- / S3 | See above. |
| ***Alternative C4C (Higher- and High-Speed Rail)*** | | | |
| Mountain plover | *Charadrius montanus* | PT / -- /S2 | See above. |
| Texas garter snake | *Thamnophis sirtalis annectens* | -- / -- / S3 | See above. |
| **Southern Section** | | | |
| ***Alternative S4 (Higher-Speed Rail)*** | | | |
| Black-spotted newt | *Notophthalmus meridionalis* | -- / -- / S2 | Freshwater wetland, riparian, riverine, cultural aquatic; edaphically limited: deep, poorly drained, clayey sediments (such as the Tiocano and Edroy clay soils) with slow permeability allow formation of ephemeral ponds or wetlands during periods of heavy rain, within a matrix of native, intact Tamaulipan thornscrub; permanent and temporary ponds, roadside ditches, and pools of small streams may also be used; breed in shallow ephemeral ponds ranging in depth from 0.5–2 meters, with firm clay bottoms, and some with rooted macrophytes; salinities ranging from 0.5–1.0%; not found in water bodies with predatory fish, high salinity, intense cattle usage, or agricultural runoff. Texas counties bordering the Gulf Coast, south from Aransas and Refugio counties, and the central portion of the Tamaulipan Province, south from Bexar County. |
| Black-striped snake | *Coniophanes imperialis* | -- / -- / S2 | Savannas, thornscrub, agricultural landscapes, and edges of wet or marshy areas; semiarid coastal sandplain; also survives around buildings and in vacant lots in localized suburban areas. South Texas along the Gulf Coast to Veracruz, Mexico. |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| Jaguar | *Panthera onca* | LE / E / SH | Forest, woodland, and riparian. Broadleaf deciduous and mixed mature forest, canyons and rocky caves or dense thickets for denning, large blocks. |
| Jaguarundi[a] | *Herpailurus yaguarondi* | LE / E/ S1 | Shrubland; dense thornscrub over loamy clay soils (holding moisture); riparian areas and brushy arroyos. |
| Keeled earless lizard | *Holbrookia propinqua* | -- / -- / S3 | Coastal, barren/sparse vegetation, shrubland; native coastal grasslands, barrier islands. South Texas and along the Gulf Coast of Mexico. |
| Mexican blackhead snake | *Tantilla atriceps* | -- / -- / S1 | Shrubland; wooded and grassland/thorn brush communities, desert flats to wooded mountain canyons. Restricted to two counties (Kleburg and Duval) in south Texas. In Mexico, occurs from central Coahuila south to San Luis Potosi, with isolated populations found in Tamaulipas. |
| Mexican treefrog | *Smilisca baudinii* | -- / -- / S3 | Riparian, freshwater wetland, cultural aquatic, woodland; nocturnal and most active after rains; forested and brushy areas around streams, resacas, and roadside ditches; observed in tops of palm trees; seek shelter from heat and dry conditions under loose tree bark, in tree holes, in damp soil, and in the leaves of palms, banana plants, and other broadleaves. Restricted to the extreme southern tip of Texas, in Cameron and Hidalgo counties. |
| Northern cat-eyed snake | *Leptodeira septentrionalis* | -- / T / S2 | Forest, woodland, thornscrub with ponds or streams (frogs and toads are primary food). Restricted to counties along the Rio Grande Valley in the few remaining stretches of thornscrub and subtropical habitats. |
| Reticulate collared lizard | *Crotaphytus reticulatus* | -- / T / S2 | Desert scrub, scrubland; thornscrub vegetation, usually on well-drained rolling terrain of shallow gravel, caliche, or sandy soils; scattered flat rocks below escarpments or isolated rock outcrops among scattered clumps of prickly-pear and |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|
| | | | mesquite; mesquite savanna and grasslands near rocky outcrops; shrub and rock structure in habitat are important. Occurs in the Rio Grande Valley of south Texas and Mexico, excluding the coastal areas. |
| Sheep frog | *Hypopachus variolosus* | -- / T / S2 | Shrubland, riparian, cultural aquatic; thornscrub, oak woodland, mesquite savanna, short and mixed grassland, agricultural areas and other open areas; ephemeral and permanent wetlands key for breeding. Occurs from the eastern half of south Texas, from Bee County south to Cameron, Hidalgo, and Starr counties. |
| South Texas siren (large form) | *Siren sp. 1* | -- / T / S2 | Freshwater wetland, cultural aquatic, lacustrine; wholly aquatic; shallow, muddy, vegetated wetlands, resacas, ditches, swamps, ponds and larger lakes and streams; structure (thick vegetation, rocks, and logs) and muddy bottom typically associated with unmanaged or unmanipulated waterways. Eastern third of Texas, from the lower Rio Grande Valley northward along the Gulf Coast to Louisiana. |
| Texas indigo snake | *Drymarchon melanurus erebennus* | -- / T / S4 | Shrubland, savanna; riparian corridors in thorn brush woodland, mesquite savanna of the coastal plain, mixed-grass prairies, coastal sandhills, and desert scrubland; often uses small mammal burrows (e.g., gopher [Geomys]). Southern Texas south into Mexico. |
| Texas scarlet snake | *Cemophora coccinea lineri* | -- / T / S1 | Coastal, shrubland, and desert scrub. Known to occur in several counties located along the Texas coastal bend and in adjunct south Texas. |
| ***Alternative S6 (Higher- and High-Speed Rail)*** | | | |
| Texas tortoise | *Gopherus berlandieri* | -- / -- / S2 | Savanna, shrubland; semi-desert scrub and barrier islands, on sand, clay or caliche; lomas surrounded by salt flats and marshes; south of a line through Del Rio, San Antonio, and Rockport, Texas. |

| Common Name | Scientific Name | Status (Federal/State/ TPWD Ranking) | General Habitat Type(s) |
|---|---|---|---|

Notes:

-- = Not listed

**Federal Rankings**

LE = federally endangered

LT = federally threatened

PE = proposed endangered

PT = proposed threatened

C = Category 1 candidate for listing as threatened or endangered by USFWS

PDL = proposed delisted

**State Rankings**

E = state endangered

T = state threatened

TPWD Rankings

S1 = less than six occurrences known in Texas; critically imperiled in Texas; especially vulnerable to extirpation from the state

S2 = 6 to 20 known occurrences in Texas; imperiled in Texas because of rarity; very vulnerable to extirpation from the state

S3 = 21 to 100 known occurrences in Texas; either rare or uncommon in Texas

S4 = more than 100 occurrences in Texas; apparently secure in Texas although it may be quite rare in some areas of Texas

S5 = demonstrably secure in Texas

SH = historical in Texas, not verified within the past 40 years but suspected to exist

SR = reported from Texas in literature but not verified via specimens or field observations

SX = presumed extirpated from Texas

[a] TxDOT staff noted that jaguarundi are no longer found in Texas; however, the species was included in information from the resource agency databases and is therefore referenced in this document. TxDOT staff also noted that black bear and ocelot are found in the area. These species were not included in the resource agency databases and are, therefore, not referenced in this document. Assessment of these species will be included in project-level analysis as appropriate.

Sources: Meshek & Associates (2013); Michael Baker Jr., Inc. (2012); Southwestern Center for Herpetological Research (2014); ODWC (2014a); ODWC (2014b); Texas Natural Sciences Center (2014); TPWD (2014a); TPWD (2014b).

### 4.5.1 Invertebrates

Analysis of the GIS database and other occurrence records indicate that no sensitive invertebrates occur within the EIS Study Area. In addition, there are no proposed or final designated critical habitat areas for any invertebrate species within the EIS Study Area.

### 4.5.2 Fishes

According to records of previous occurrences, sensitive fish species potentially occurring within the EIS Study Area include the Arkansas River shiner and the black-sided darter. The Arkansas River shiner is federally threatened and inhabits the shallow braided channels of wide sandy prairie rivers in the Arkansas River system. The black-sided darter is listed as threatened by ODWC and is found in clear, gravel-bottom, perennial streams in eastern Oklahoma along the state line with Arkansas (ODWC 2014).

### 4.5.3 Reptiles and Amphibians

According to records of previous occurrences, sensitive reptile and amphibian species potentially occurring within the EIS Study Area include the black-spotted newt (S2), black-striped snake (S2), keeled earless lizard (S3), Mexican blackhead snake (S1), Mexican treefrog (S3), northern cat-eyed snake (T, S2), reticulate collared lizard (T, S2), sheep frog (T, S2), south Texas siren (T, S2), Texas indigo snake (T, S4), Texas garter snake (T, S3), Texas scarlet snake (S1), and Texas tortoise (S2) (TPWD 2014a, TPWD 2014b; ODWC 2014; Southwestern Center for Herpetological Research 2014; Texas Natural Science Center 2014). General habitat requirements and occurrences for each species are included in Table 4-3.

### 4.5.4 Birds

According to records of previous occurrences, sensitive bird species potentially occurring within the EIS Study Area include the black-capped vireo (LE) interior least tern (LE), mountain plover (PT, S2), piping plover (LT), and whooping crane (LE) (TPWD 2014a, TPWD 2014b; ODWC 2014). General habitat requirements and occurrences for each species are included in Table 4-3.

### 4.5.5 Mammals

Sensitive mammal species potentially occurring within the EIS Study Area include the jaguar and jaguarundi. The jaguar is federally and state endangered and once was recorded from southern California, Arizona, New Mexico, Texas, and perhaps farther east in Louisiana. Jaguars are now absent from much of its former range and has been extirpated as a resident in most or all of the northern extent of the range in the southwestern United States and northern Mexico. The jaguarundi is federally and state endangered and found in the south Texas brush country and lower Rio Grande Valley. Jaguarundis are also found in northern Mexico, Central America, and South America (TPWD 2014b). (Note: TxDOT staff noted that jaguarundi are no longer found in Texas; however, the species was included in information from the resource agency databases and is therefore referenced in this document. TxDOT staff also noted that black bear and ocelot are found in the area. These species were not included in the resource agency databases and are, therefore, not referenced in this document. Assessment of these species will be included in project-level analysis as appropriate.)

### 4.5.6 Acres of Potential Sensitive Wildlife Occurrences

Spatial data for special-status species in Oklahoma were not available for this assessment; therefore, federally and state-listed species were identified through a review of the county-by-county list of endangered and threatened species published by ODWC.

According to the list, the following six special-status species (five of which are federally listed as endangered or threatened) are known to occur within the EIS Study Area for Alternative N4A (conventional rail):

- Arkansas River shiner
- Black-capped vireo
- Black-sided darter
- Interior least tern
- Piping plover
- Whooping crane

As listed in Table 4-4, two special-status wildlife species have the potential to occur within or near the EIS Study Areas for Alternatives C4A (higher- and high-speed rail), C4B (higher- and high-speed rail), and C4C (higher- and high-speed rail) and could be affected by the construction and operation of the alternatives. Table 4-4 also summarizes acreage of habitat within the EIS Study Area associated with each species by alternative.

*Table 4-4. Acres of Potential Sensitive Wildlife Occurrences within Central Section EIS Study Area*

| Common Name | Acres of Wildlife Occurrences |
|---|---|
| **Alternative C4A (Higher- and High-Speed Rail)** | |
| Mountain plover | 324 |
| Texas garter snake | 1,490 |
| **Alternative C4B (Higher- and High-Speed Rail)** | |
| Mountain plover | 324 |
| Texas garter snake | 1,493 |
| **Alternative C4C (Higher- and High-Speed Rail)** | |
| Mountain plover | 324 |
| Texas garter snake | 1,604 |
| Sources: Meshek & Associates (2013); Michael Baker Jr., Inc. (2012). | |

As shown on Figures 4-4 and 4-5, the recorded occurrences of sensitive wildlife species identified within the EIS Study Areas for Alternatives C4A, C4B, and C4C are represented by relatively large areas intersected by the EIS Study Area. In addition, the occurrences are located in the portions of each Central Section alternative that would be outside of existing transportation corridors.

As listed in Table 4-5, 13 federally or state-listed wildlife species potentially occur within the EIS Study Area for Alternative S4 (higher-speed rail), and one state-listed wildlife species potentially occurs within the EIS Study Area for Alternative S6 (higher- and high-speed rail). Table 4-5 also lists the potential acres of habitats within the EIS Study Area associated with the Southern Section alternatives.

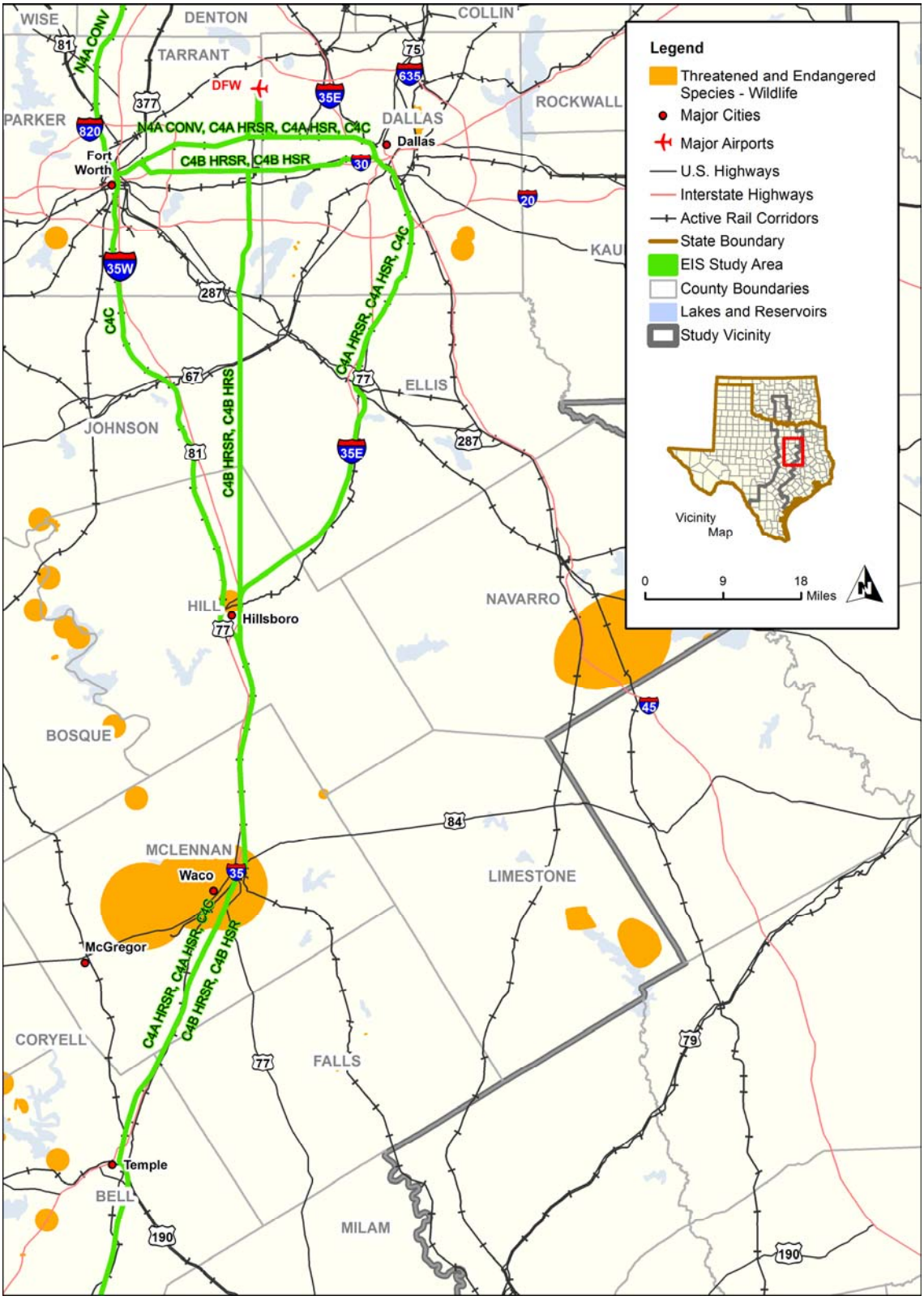



*Figure 4-4: Sensitive Wildlife Species Occurrences – Central Section Alternatives*

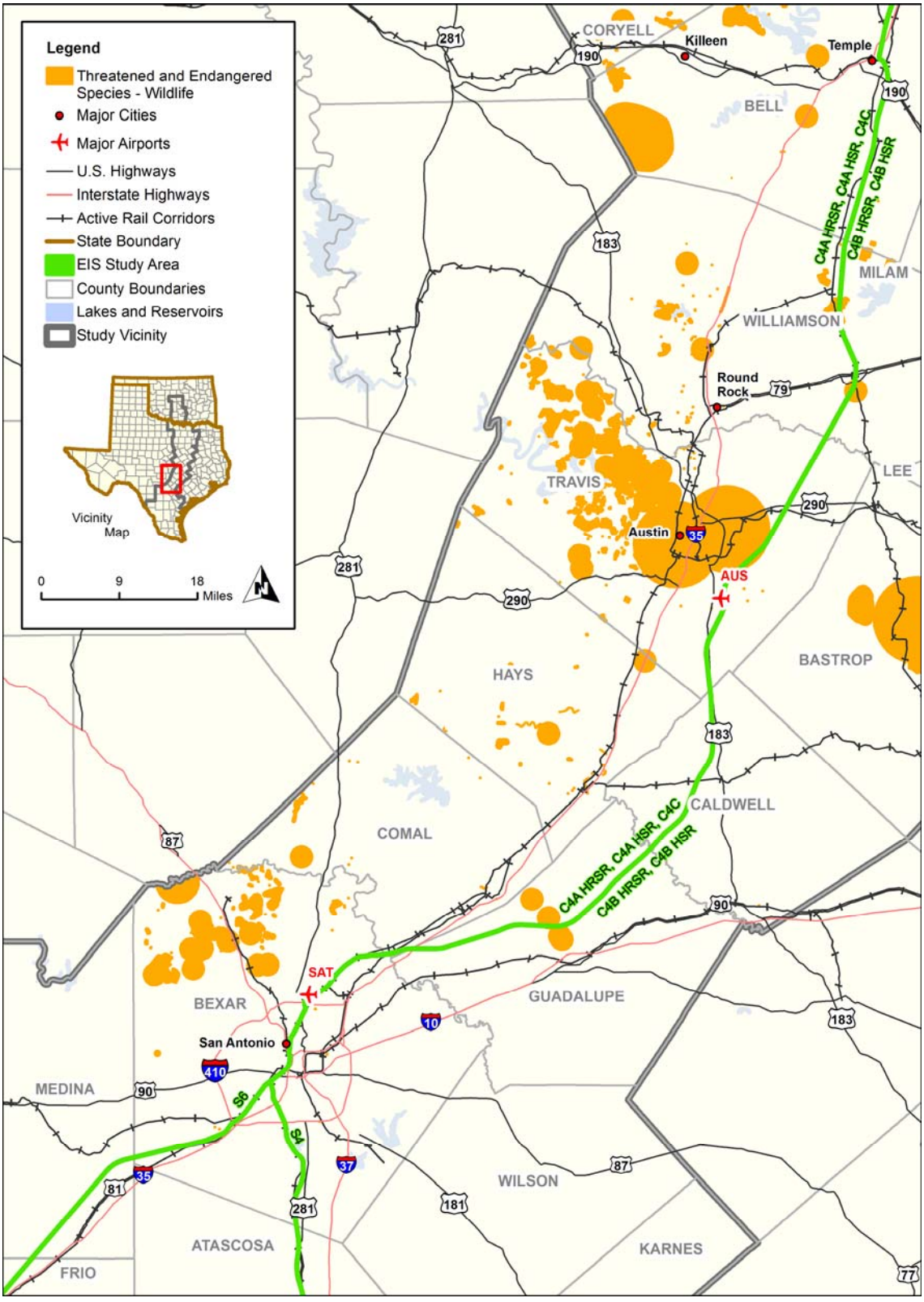



*Figure 4-5: Sensitive Wildlife Species Occurrences – Central Section Alternatives*

*Table 4-5: Acres of Potential Sensitive Wildlife Habitat within Southern Section EIS Study Area*

| Common Name | Acres of Potential Habitat |
|---|---|
| **Alternative S4 (Higher-Speed Rail)** | |
| Black-spotted newt | 1,477 |
| Black-striped snake | 160 |
| Jaguar | 601 |
| Jaguarundi[a] | 515 |
| Keeled earless lizard | 150 |
| Mexican blackhead snake | 151 |
| Mexican treefrog | 402 |
| Northern cat-eyed snake | 374 |
| Reticulate collared lizard | 94 |
| Sheep frog | 906 |
| South Texas siren (large form) | 1,288 |
| Texas indigo snake | 1,195 |
| Texas scarlet snake | 3 |
| **Alternative S6 (Higher- and High-Speed Rail)** | |
| Texas tortoise | 3 |

Sources: Meshek & Associates (2013); Michael Baker Jr., Inc. (2012)

[a] TxDOT staff noted that jaguarundi are no longer found in Texas; however, the species was included in information from the resource agency databases and is therefore referenced in this document. TxDOT staff also noted that black bear and ocelot are found in the area. These species were not included in the resource agency databases and are, therefore, not referenced in this document. Assessment of these species will be included in project-level analysis as appropriate.

As shown on Figures 4-6 through 4-8, most of the known occurrences of listed wildlife species that intersect with the Alternative S4 EIS Study Area are located in Brooks, Cameron, Hidalgo, Jim Wells, Live Oak, and Nueces counties in areas that would be constructed on an existing abandoned rail.

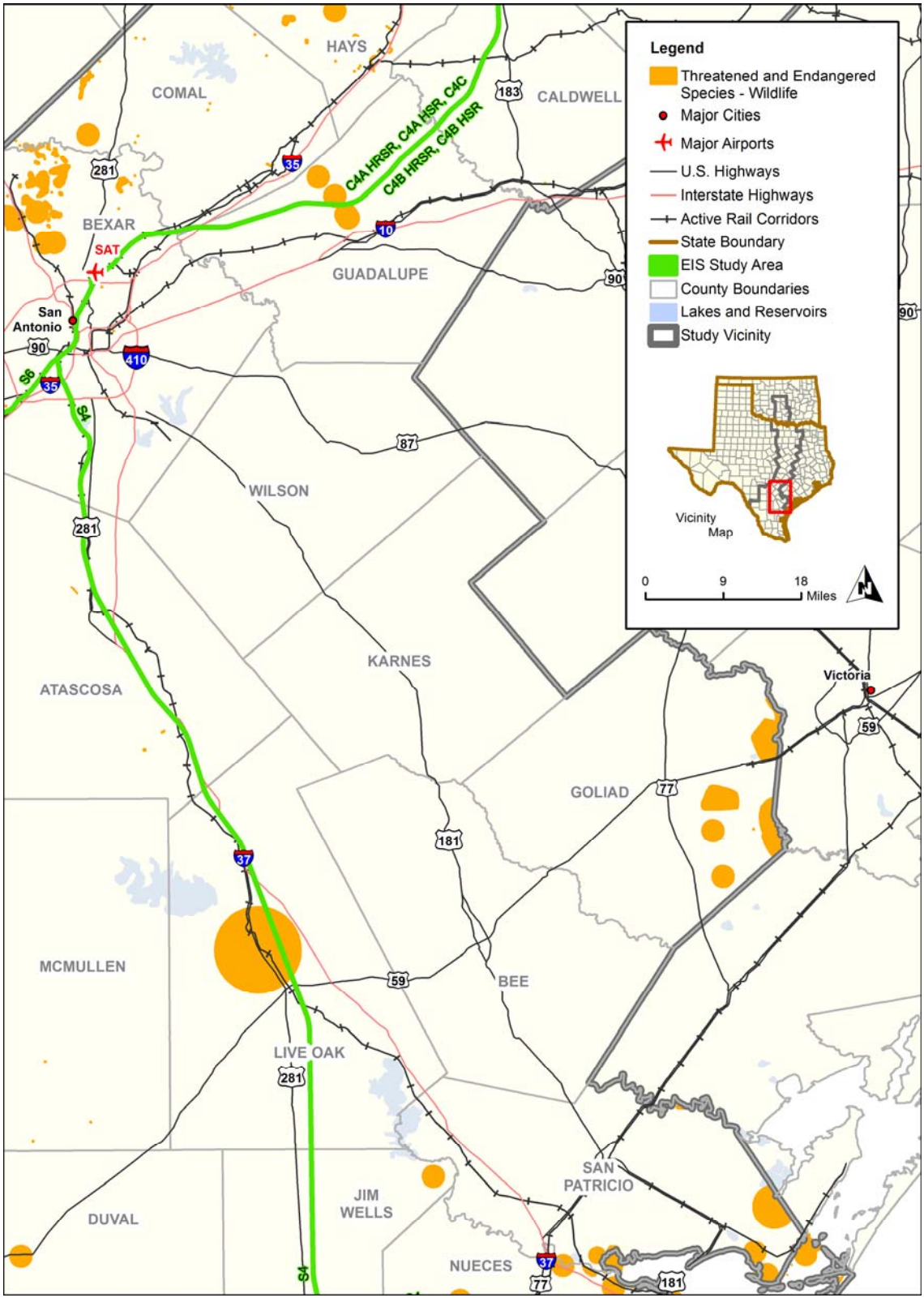



*Figure 4-6: Sensitive Wildlife Species Occurrences – Alternative S4*

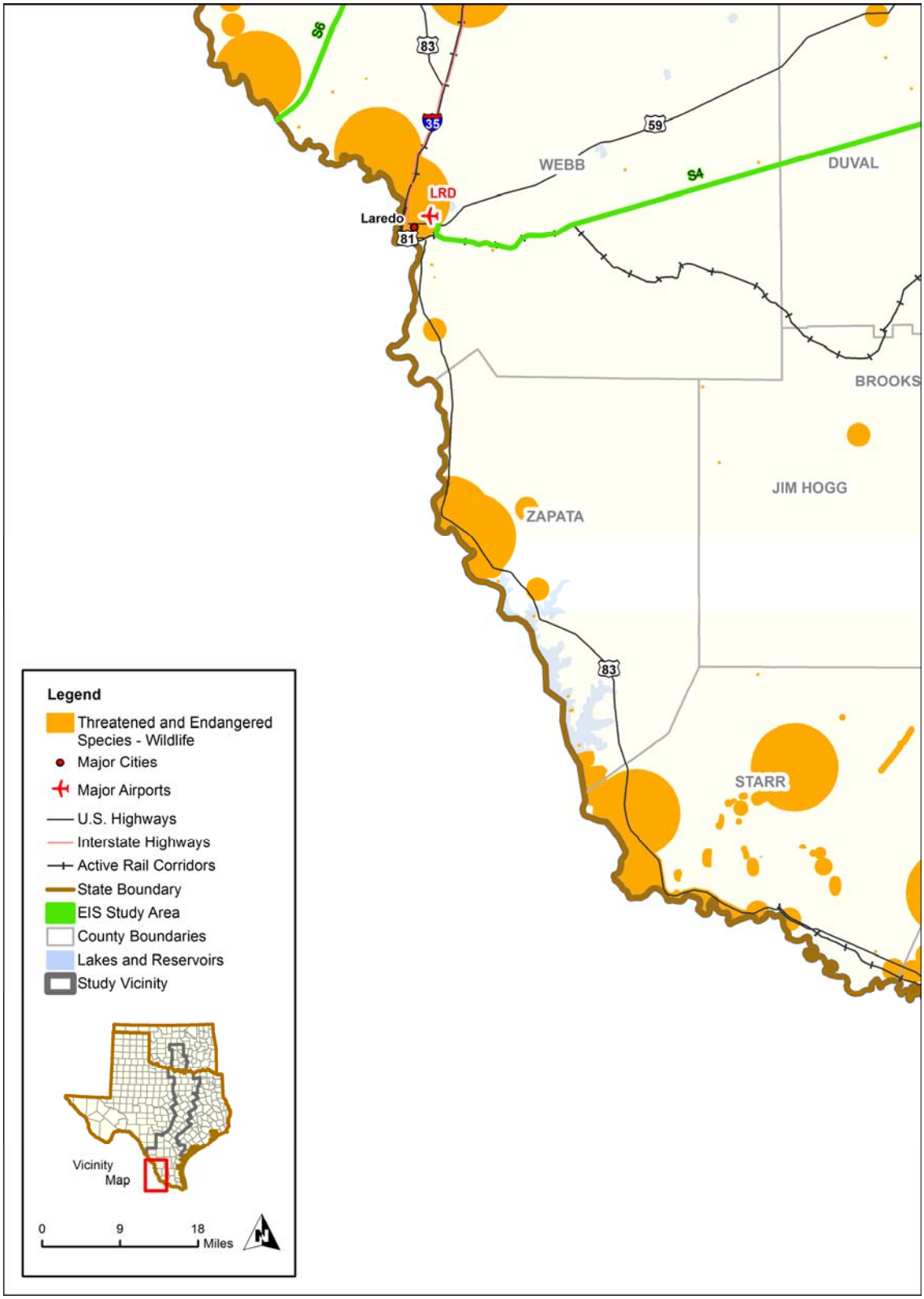



*Figure 4-7: Sensitive Wildlife Species Occurrences – Alternative S4*

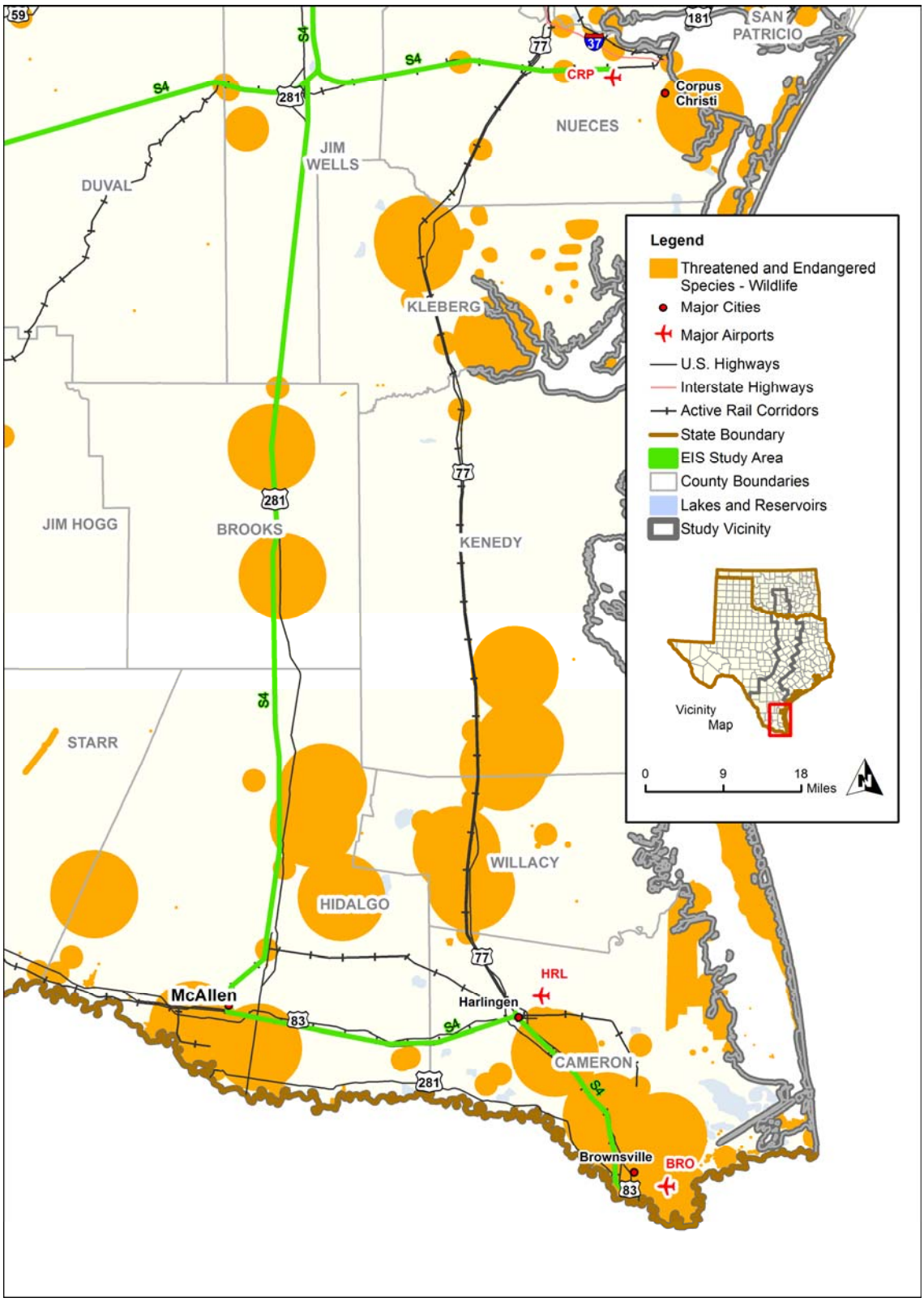



*Figure 4-8: Sensitive Wildlife Species Occurrences – Alternative S4*

## *4.6 Critical Habitat*

Critical habitats are areas considered essential for the conservation of a federally listed species. These areas provide notice to the public and land managers of the importance of these areas to the conservation of listed species. Special protections and/or restrictions are possible in areas where federal funding, permits, licenses, authorizations, or actions occur or are required. According to the spatial dataset acquired from the TXNDD and ODWC, critical habitat for one species, the Arkansas River shiner, is located within the Alternative N4A EIS Study Area. As identified on Figure 4-9, the critical habitat for the Arkansas River shiner is represented by a relatively narrow line (the Canadian River) that perpendicularly intersects the EIS Study Area for Alternative N4A (conventional rail), immediately south of Norman, Okla. Alternative N4A (conventional rail), which passes over the critical habitat, would follow the BNSF rail alignment and existing TRE tracks. No other designated critical habitat areas were identified as being within the EIS Study Area (TPWD 2014b; ODWC 2014).

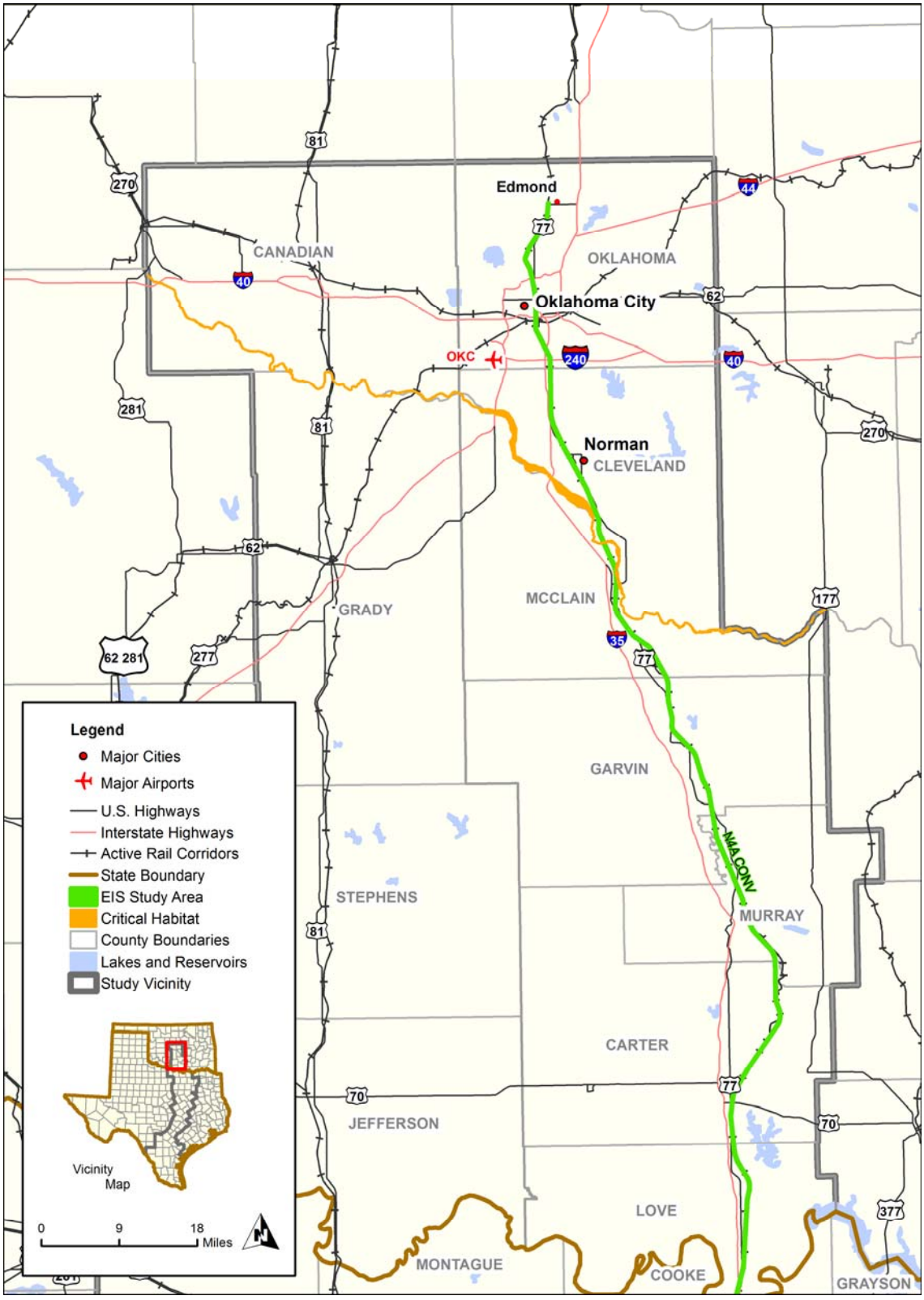



*Figure 4-9: Critical Habitat – Northern Section Alternative*

# 5.0 Potential Effects on Threatened and Endangered Species

The potential effects of the build alternatives and No Build Alternative on threatened and endangered species within the EIS Study Area are presented in this section. Some alternatives in the Northern, Central, and Southern sections could be built alone or combined with alternatives. More than one alternative in the Central and Southern sections could also be built in the future, because the alternatives within these sections provide different service options for independent destinations. Details about how alternatives might connect would be analyzed in the project-level EIS. Therefore, this study does not provide a summary of effects for the entire corridor from Oklahoma City to Laredo and Brownsville, Texas. Rather, this analysis compares each alternative to the No Build Alternative and, if applicable, to another build alternative for that same section.

Specific station locations were not analyzed as part of this service-level threatened and endangered species technical study. To maximize access, stations generally tend to be constructed in populated areas (i.e., urban or suburban areas) and not in undeveloped or rural locations. Therefore, potential effects associated with the construction and operation of stations on threatened and endangered plants and wildlife would likely not be more than the potential resources captured during the analysis of the 500-foot-wide EIS Study Area.

## *5.1 No Build Alternative*

The No Build Alternative, as described in Section 1.2.1, is used as the baseline for comparison. The No Build Alternative would not implement the Program of rail improvements associated with this service-level evaluation and would not meet the purpose and need of the Program; therefore, the No Build Alternative would not affect threatened, endangered, or sensitive species, nor any critical habitat.

## *5.2 Northern Section: Oklahoma City to Dallas and Fort Worth*

The following sections provide potential effects and their relative intensity from construction and operation of the build alternative in the Northern Section on sensitive plants, wildlife, and critical habitat.

### 5.2.1 Sensitive Plants

No federally or state-listed plant species were identified within the Alternative N4A EIS Study Area. Furthermore, Alternative N4A (conventional rail) would follow the BNSF rail alignment and existing TRE tracks. Therefore, effects on sensitive plant species due to the construction and operation of Alternative N4A would be negligible compared to the No Build Alternative.

### 5.2.2 Sensitive Wildlife

The probability of the six federally listed species occurring within the existing rights-of-way associated with Alternative N4A (conventional rail) is low because of the noise and land disturbances associated with the active rail line operation and maintenance. Therefore, effects on

wildlife species due to the construction of Alternative N4A would be negligible compared to the No Build Alternative.

Operations effects for Alternative N4A would be moderate because this alternative would not likely be fenced, making wildlife, including the listed species known to occur within the EIS Study Area, vulnerable to an increased risk for strikes from the additional rail traffic along the route. Additionally, more noise and vibration from the added rail traffic along the route could disrupt listed species in the area. Habitats throughout the EIS Study Area could be potential roosting/nesting habitat for migratory and resident birds (including federally and state-listed species). Removal of or disturbance to the habitat during the bird nesting season (February 1 to September 15) could result in effects on nesting species that are protected by the MBTA. Such effects would have a noticeable effect on wildlife, including sensitive species.

### 5.2.3 Critical Habitat

Approximately 34 acres of designated critical habitat for the federally threatened Arkansas River shiner are located within the Alternative N4A EIS Study Area. Best management practices (BMPs) would be implemented during construction and operation to limit potential effects. Therefore, the potential effects associated with construction and operation of Alternative N4A (conventional rail) would be negligible compared with the No Build Alternative.

### 5.2.4 Construction Effects

No federally or state-listed plant species were identified within the Alternative N4A EIS Study Area, and negligible effects on listed wildlife and critical habitat would be anticipated. However, further studies and analysis would be necessary during the project-level analysis to assess qualitative and quantitative effects on threatened and endangered species and critical habitat in the Northern Section. During the project-level analysis, field investigations or surveys would be conducted to determine the likelihood of effects on listed species and their habitats within the Alternative N4A EIS Study Area. Significant loss of habitat for the listed species (if present) due to the construction of Alternative N4A (conventional rail) would constitute a substantial effect.

Effects on listed wildlife species and associated habitats as a result of constructing Alternative N4A could result from vegetation clearing for construction equipment and the stockpiling of soil, ballast, or other construction materials. Additionally, short-term noise, vibration, and air pollution from construction equipment and activities could affect nearby terrestrial habitats and their corresponding wildlife. However, such effects would not be substantial given the anticipated size of these potential construction effect areas compared to the amount of listed-species habitat that would remain in the area. In addition, no permanent effects on listed species would be expected because Alternative N4A would use existing rights-of-way.

### 5.2.5 Operational Effects

Potential operational (including maintenance) effects of Alternative N4A (conventional rail) would be considered moderate compared to the No Build Alternative because the additional rail traffic that would occur in the EIS Study Area would make listed bird species vulnerable to an increased risk for strikes. Additional operational effects associated with the Northern Section include disruption of listed species, increased potential for spills or releases, and noise and vibration from the additional rail traffic. These effects would be moderate and have a noticeable effect on listed wildlife, but the effects could be mitigated through the use of BMPs during operation.

## *5.3 Central Section (Dallas and Fort Worth to San Antonio)*

The following sections provide potential effects and their relative intensity from the construction and operation of the build alternatives on sensitive plants and wildlife and critical habitat within the Central Section.

### 5.3.1 Sensitive Plants

No federally or state-listed plant species were identified within the EIS Study Areas for Alternatives C4A (higher- and high-speed rail), C4B (higher- and high-speed rail), and C4C (higher- and high-speed rail). Therefore, effects on sensitive plant species due to the construction and operation of Alternatives C4A, C4B, and C4C would be negligible compared to the No Build Alternative.

### 5.3.2 Sensitive Wildlife

Potential effects on listed wildlife species associated with construction of Alternatives C4A (higher- and high-speed rail), C4B (higher- and high-speed rail), and C4C (higher- and high-speed rail) would be substantial compared to the No Build Alternative because construction outside of existing transportation corridors would have a noticeable, inevitable effect. Loss of habitat for listed species (if present) would be an adverse effect. TxDOT and ODOT would initiate Section 7 consultation with USFWS for effects on listed species. Alternatives C4A, C4B, and C4C would be fully fenced, reducing the likelihood of some wildlife strikes. However, contiguous fencing can create a barrier that results in isolation of small populations of animals. Additional subsequent analysis, including effects of fencing, will be conducted during project-level analysis.

### 5.3.3 Critical Habitat

No critical habitat was identified within the EIS Study Areas for Alternatives C4A (higher- and high-speed rail), C4B (higher- and high-speed rail), and C4C (higher- and high-speed rail). Therefore, effects on critical habitats due to the construction and operation of Alternatives C4A, C4B, and C4C would be negligible compared to the No Build Alternative.

### 5.3.4 Construction Effects

No federally or state-listed plant species and no critical habitats were identified within the EIS Study Areas for Alternatives C4A (higher- and high-speed rail), C4B (higher- and high-speed rail), and C4C (higher- and high-speed rail). However, two special-status wildlife species have the potential to occur within or near the EIS Study Areas and could be affected by the construction of the build alternatives. Short- and long-term effects on mountain plover and Texas garter snake could occur and could include the temporary clearing of potential habitat to accommodate construction equipment and stockpile soil, ballast, and other construction materials. Additionally, short-term noise, vibration, and air pollution from construction equipment and activities could temporarily affect listed species by disrupting life history requirements (e.g., foraging and nesting). Further studies and analyses would be necessary in the project-level EIS to assess effects on wildlife species in the Central Section. Loss of habitat for the listed species (if present) during construction would constitute a substantial adverse effect. TxDOT and ODOT would initiate Section 7 consultation with USFWS in response to potential effects on special-status species.

### 5.3.5 Operational Effects

Alternatives C4A, C4B, and C4C have higher- and high-speed rail options, and portions of each would be constructed outside of existing transportation corridors. Potential operational effects of the higher-speed rail alternatives would be moderate compared to the No Build Alternative because of the disruption of listed species caused by noise and vibration from the added rail traffic. The high-speed rail alternatives have greater potential for effects on threatened and endangered wildlife species than the higher-speed rail alternatives because the noise and vibration generated by high-speed rail travels farther than that generated by higher-speed rail. However, the effects would be mitigated to a certain extent as Alternatives C4A, C4B, and C4C would be fully fenced, reducing the likelihood of some strikes. Although fencing would be installed, portions of the alternatives outside of existing transportation corridors could also be designed with undercrossings to maintain wildlife migratory paths or corridors. As described in Section 5.3.2, contiguous fencing can create a barrier that results in isolation of small populations of animals. Additional subsequent analysis, including effects of fencing, will be conducted during project-level analysis.

## *5.4 Southern Section – San Antonio to South Texas*

The following sections provide potential effects and their relative intensity from the construction and operation of the build alternatives on sensitive plants, wildlife, and critical habitat within the Southern Section.

### 5.4.1 Sensitive Plants

Alternative S4 (higher-speed rail) would have a substantial effect on listed plant species in the Southern Section because construction of the alternative would occur outside of existing

transportation corridors (e.g., in Duval County). Although significant portions of Alternative S4 would be constructed within existing transportation corridors (e.g., KCS Railway and revitalization of abandoned tracks), effects on sensitive plant species along the portion of the alternative outside of existing transportation corridors would be considered a substantial effect compared to the No Build Alternative. Effects on sensitive plants are typically related to construction activities such as grading and vegetation removal; therefore, operation of Alternative S4 is not expected to cause additional effects and would be considered negligible. Loss of habitat for listed species (if present) would be an adverse effect. TxDOT and ODOT would initiate Section 7 consultation with USFWS for effects on listed species.

Under Alternative S6 (higher- and high-speed rail), potential effects on listed plant species would be negligible compared to the No Build Alternative because no listed plant species have been recorded within the EIS Study Area.

### 5.4.2 Sensitive Wildlife

Alternative S4 (higher-speed rail) would have a substantial effect on listed wildlife species because of potential effects on habitats during construction located outside of existing transportation corridors (e.g., in Duval and Webb counties). Although significant portions of Alternative S4 would be constructed within existing transportation corridors (e.g., KCS Railway and revitalization of abandoned tracks), effects on sensitive wildlife species where construction would occur outside of existing transportation corridors would have a substantial effect compared to the No Build Alternative. Loss of habitat for listed species (if present) would be an adverse effect. TxDOT and ODOT would initiate Section 7 consultation with USFWS for effects on listed species.

Based on the spatial dataset acquired from the TXNDD, 3 acres of listed wildlife habitat (state-listed Texas tortoise) are within the EIS Study Area for Alternative S6 (higher-speed rail). Potential effects on sensitive wildlife species from construction of Alternative S6 Higher-Speed Rail would be negligible because effects on this particular species (Texas tortoise) could be reduced with preconstruction surveys and monitoring. Potential operations effects would be moderate because of disruption of listed species from noise and vibration from the added rail traffic along the route. Such effects would have a noticeable effect on wildlife, but the effects could be reduced through the use of BMPs.

### 5.4.3 Critical Habitat

No critical habitat was identified within the EIS Study Areas for Alternatives S4 (higher-speed rail) and S6 (higher- and high-speed rail). Therefore, effects on critical habitat due to the construction and operation would be negligible compared to the No Build Alternative.

### 5.4.4 Construction Effects

Effects on listed plant and wildlife species could occur during construction of Alternatives S4 (higher-speed rail) and S6 (higher- and high-speed rail) outside of existing transportation corridors. Effects could include the clearing of vegetation for construction equipment and the stockpiling of soil, ballast, or other construction materials. These effects would be considered long-term to permanent. In addition, short-term noise, vibration, and air pollution from construction equipment and activities could temporarily affect listed species by disrupting life history requirements (e.g., foraging) or causing avoidance behavior. Further studies and analysis would be necessary in the project-level EIS to further assess effects on plant and wildlife species in the Southern Section. Loss of habitat for listed species (if present) would be an adverse effect. TxDOT and ODOT would initiate Section 7 consultation with USFWS for effects on listed species.

### 5.4.5 Operational Effects

Potential operational effects for Alternatives S4 (higher-speed rail) and S6 (higher- and high-speed rail) would be moderate compared to the No Build Alternative because of the disruption of listed species caused by noise and vibration from the additional rail traffic. The high-speed rail option of Alternative S6 would have higher potential for effects on threatened and endangered wildlife species than Alternative S4 and the higher-speed option of Alternative S6 because the noise and vibration generated by the high-speed rail travels farther than that generated by higher-speed rail. However, Alternatives S4 and S6 would be fully fenced, reducing the likelihood of strikes. Additionally, portions of the alternatives located outside of existing transportation corridors could be designed with pathways or undercrossings to maintain wildlife migratory paths or corridors.

## *5.5 Summary of Potential Effects*

The construction of Alternative N4A (conventional rail) would have a negligible effect on sensitive plants, wildlife, and critical habitat because the alternative would be constructed within existing transportation corridors, in areas already disturbed by development. However, from an operations standpoint, Alternative N4A would have a moderate effect on wildlife species. The alternative would not likely be fenced, making wildlife (including listed species) vulnerable to an increased risk for strikes from the additional rail traffic that would occur.

The Central Section alternatives would have a negligible effect on sensitive plant species and critical habitat because there are no occurrences of these resources within the EIS Study Area. However, construction of the Central Section alternatives would have a substantial effect on sensitive wildlife species because significant acreage of one federally listed and one sensitive species is known to occur in the portions of the EIS Study Area. From an operations standpoint, effects would be moderate because disruption of wildlife species from noise and vibration would occur.

In the Southern Section, Alternative S4 (higher-speed rail) would have a substantial effect on sensitive plant and wildlife species. Seven federally listed and 24 other sensitive plant and wildlife species have the potential to occur within the EIS Study Area. Within portions of the alternative outside existing transportation corridors, effects would be long-term or permanent and would likely adversely affect threatened and endangered species. Although Alternative S6 (higher- and high-speed rail) would be constructed in a new, direct route, outside existing transportation corridors, construction effects would be negligible because only 3 acres of one sensitive wildlife species (Texas tortoise) and no plant species or critical habitat occurs within the EIS Study Area.

Table 5-1 summarizes the qualitative assessment of potential effects (negligible, moderate, or substantial) for the alternatives and includes measures that could be taken to avoid or reduce the potential effects of the alternatives. As stated previously, this service-level analysis did not include detailed fieldwork to identify potential habitats or populations of threatened and endangered species. Acreages listed below are not the actual areas of effect associated with construction and operation of any of the alternatives. This service-level analysis uses the 500-foot EIS Study Area to determine the types of resources that may be affected and, more importantly, the relative magnitude of resources that may be affected. Some alternatives could be built alone or combined with other section alternatives. In addition, more than one alternative in the Central and Southern sections could be built in the future because the alternatives provide different service options for the independent destinations. Details about how alternatives might connect, as well as measures to reduce effects, would be analyzed at the project-level EIS phase.

## *5.6 Subsequent Analysis and Avoidance, Minimization, and Mitigation Strategies*

Once a preferred alternative is selected, field investigations or surveys will be conducted to define actual critical habitats and to develop avoidance and minimization strategies and to determine the likelihood of impacts on listed species and their habitats within the EIS Study Area during subsequent analysis. Critical habitats and species assessments will be conducted in accordance with federal and state regulations, including formal biological assessments for protected species and consultation with USFWS, TPWD and ODWC, as needed. The boundaries of listed plant and wildlife habitat will be confirmed to avoid or minimize effects on these areas. Habitat and species assessments will be conducted in accordance with federal and state regulations.

BMPs, design features, and mitigation measures to reduce or eliminate impacts on sensitive habitats and species would be coordinated with federal and state agencies. To minimize construction effects and minimize disturbance of terrestrial and aquatic habitats and wildlife, BMPs used during construction and operations would include the following:

- Conduct preconstruction surveys and monitoring in advance of clearing, grading, or construction to identify protected nest sites and avoid these areas until nesting has completed.

- Construct multiple and varying crossing structures at a crossing point to provide connectivity for species likely to use a given area.
- Construct at least one crossing structure within an individual's home range and where suitable habitat for species occurs (if possible) on both sides of the crossing structure.
- Monitor structures for obstructions, such as detritus or silt blockages, that impede movement.
- Manage human activity near crossing structures with the use of fencing, signage, etc.

Local ordinances would be followed for erosion, sediment, and stormwater controls during construction to minimize potential effects on aquatic resources. For terrestrial habitats that might be temporarily disturbed by construction, preconstruction conditions or better would be restored once construction is complete.

*Table 5-1: Summary of Acres within EIS Study Area by Section and Alternative*

| Resource | Status Federal/State/TPWD Ranking | No Build Alternative | Northern Section | | Central Section | | | | | | Southern Section | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | N4A (CONV) | | C4A (HrSR and HSR) | | C4B (HrSR and HSR) | | C4C (HrSR and HSR) | | S4 (HrSR) | | S6 (HrSR and HSR) | |
| | | Potential Acres of Occurrences within EIS Study Area | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis |
| **Sensitive Plants** | | | | | | | | | | | | | | |
| Bailey's ballmoss | -- / -- / S2 | 0 | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 521 | Construction – **Substantial**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** |
| Elmendorf's onion | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 76 | | 0 | |
| Falfurrias milkvine | -- / -- / SH | 0 | 0 | | 0 | | 0 | | 0 | | 600 | | 0 | |
| Green Island echeandia | -- / -- / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 474 | | 0 | |
| Johnston's frankenia | LE, PDL / E / S3 | 0 | 0 | | 0 | | 0 | | 0 | | 1 | | 0 | |
| Lila de los llanos | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 170 | | 0 | |
| Mexican mud-plantain | -- / -- / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 1,767 | | 0 | |
| Plains gumweed | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 453 | | 0 | |
| Runyon's cory cactus | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 384 | | 0 | |
| Runyon's water-willow | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 304 | | 0 | |
| Sandhill woolywhite | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 624 | | 0 | |
| Slender rushpea | LE / E / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 18 | | 0 | |
| South Texas ambrosia | LE / E / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 195 | | 0 | |
| St. Joseph's staff | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 546 | | 0 | |
| Texas ayenia | LE / E / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 693 | | 0 | |
| Texas windmill-grass | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 577 | | 0 | |
| Vasey's adelia | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 120 | | 0 | |
| Walker's manioc | LE / E / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 600 | | 0 | |

| Resource | Status Federal/State/TPWD Ranking | No Build Alternative | Northern Section | | Central Section | | | | | | Southern Section | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | N4A (CONV) | | C4A (HrSR and HSR) | | C4B (HrSR and HSR) | | C4C (HrSR and HSR) | | S4 (HrSR) | | S6 (HrSR and HSR) | |
| | | Potential Acres of Occurrences within EIS Study Area | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis |
| **Sensitive Wildlife** | | | | | | | | | | | | | | |
| Arkansas River shiner | LT / -- / -- | 0 | Present | Construction – **Negligible**<br>Operations - **Moderate** | 0 | Construction – **Substantial**<br>Operations - **Moderate** | 0 | Construction – **Substantial**<br>Operations - **Moderate** | 0 | Construction – **Substantial**<br>Operations - **Moderate** | 0 | Construction – **Substantial**<br>Operations - **Moderate** | 0 | Construction – **Negligible**<br>Operations - **Moderate** |
| Black-capped vireo | LE / -- / -- | 0 | Present | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Black-sided darter | -- / T / -- | 0 | Present | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Black-spotted newt | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 1,477 | | 0 | |
| Black-striped snake | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 160 | | 0 | |
| Interior least tern | LE / -- / -- | 0 | Present | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Jaguar | LE / E / SH | 0 | 0 | | 0 | | 0 | | 0 | | 601 | | 0 | |
| Jaguarundi[a] | LE / E/ S1 | 0 | 0 | | 0 | | 0 | | 0 | | 515 | | 0 | |
| Keeled earless lizard | -- / -- / S3 | 0 | 0 | | 0 | | 0 | | 0 | | 150 | | 0 | |
| Mexican blackhead snake | -- / -- / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 151 | | 0 | |
| Mexican treefrog | -- / -- / S3 | 0 | 0 | | 0 | | 0 | | 0 | | 402 | | 0 | |
| Mountain plover | PT / -- /S2 | 0 | 0 | | 324 | | 324 | | 324 | | 0 | | 0 | |
| Northern cat-eyed snake | -- / T / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 374 | | 0 | |
| Piping plover | LT / -- / -- | 0 | Present | | 0 | | 0 | | 0 | | 0 | | 0 | |
| Reticulate collared lizard | -- / T / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 94 | | 0 | |
| Sheep frog | -- / T / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 906 | | 0 | |
| South Texas siren (large form) | -- / T / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 1,288 | | 0 | |
| Texas garter snake | -- / -- / S3 | 0 | 0 | | 1,490 | | 1,492 | | 1,604 | | 0 | | 0 | |
| Texas indigo snake | -- / T / S4 | 0 | 0 | | 0 | | 0 | | 0 | | 1,195 | | 0 | |
| Texas scarlet snake | -- / T / S1 | 0 | 0 | | 0 | | 0 | | 0 | | 3 | | 0 | |
| Texas tortoise | -- / -- / S2 | 0 | 0 | | 0 | | 0 | | 0 | | 0 | | 3 | |
| Whooping crane | LE / -- / -- | 0 | Present | | 0 | | 0 | | 0 | | 0 | | 0 | |

| Resource | Status Federal/State/TPWD Ranking | No Build Alternative | Northern Section | | Central Section | | | | | | Southern Section | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | N4A (CONV) | | C4A (HrSR and HSR) | | C4B (HrSR and HSR) | | C4C (HrSR and HSR) | | S4 (HrSR) | | S6 (HrSR and HSR) | |
| | | Potential Acres of Occurrences within EIS Study Area | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis | Potential Acres of Occurrences within EIS Study Area | Qualitative Analysis |
| **Critical Habitat** | | | | | | | | | | | | | | |
| Arkansas River shiner | | 0 | 34 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** | 0 | Construction – **Negligible**<br>Operations - **Negligible** |

Notes:

-- = Not listed

**Federal Rankings**

LE = federally endangered

LT = federally threatened

PE = proposed endangered

PT = proposed threatened

C = Category 1 candidate for listing as threatened or endangered by USFWS

PDL = proposed delisted

**State Rankings**

E = state endangered

T = state threatened

S1 = less than six occurrences known in Texas; critically imperiled in Texas; vulnerable to extirpation from the state

S2 = 6 to 20 known occurrences in Texas; imperiled in Texas because of rarity; vulnerable to extirpation from the state

S3 = 21 to 100 known occurrences in Texas; either rare or uncommon in Texas

S4 = more than 100 occurrences in Texas; apparently secure in Texas although it may be rare in some areas of Texas

S5 = demonstrably secure in Texas

SH = historical in Texas, not verified within the past 40 years but suspected to exist

SR = reported from Texas in literature but not verified via specimens or field observations

SX = presumed extirpated from Texas

[a] Texas Department of Transportation (TxDOT) staff noted that jaguarundi are no longer found in Texas; however, the species was included in information from the resource agency databases and is therefore referenced in this document. TxDOT staff also noted that black bear and ocelot are found in the area. These species were not included in the resource agency databases and are, therefore, not referenced in this document. Assessment of these species will be included in project-level analysis as appropriate.

# 6.0 References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