US Department of the Interior
Bureau of Land Management
Oklahoma Field Office
Amarillo Field Office

Bureau of Indian Affairs
Southern Plains Region
Eastern Oklahoma Region

Final Joint Environmental Impact Statement and
BLM Proposed Resource Management Plan and
BIA Integrated Resource Management Plan

June 2019

BIOLOGICAL ASSESSMENT

BLM Mission Statement

It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BIA Mission Statement

The Bureau of Indian Affairs' mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian tribes, and Alaska Natives.

TABLE OF CONTENTS

TABLES

Page

APPENDICES

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ACRONYMS AND ABBREVIATIONS

	Full Phrase
BA	biological assessment
BIA	United States Department of the Interior, Bureau of Indian Affairs
BLM	United States Department of the Interior, Bureau of Land Management
BMP	best management practice
CFR	Code of Federal Regulations
COA	condition of approval
CPA	conservation priority area
CSU	controlled surface use
DOI	United States Department of the Interior
DPS	distinct population segment
EIS	environmental impact statement
EMPSi	Environmental Management and Planning Solutions, Inc.
EO	element occurrence
ESA	Endangered Species Act of 1973, as amended
ESFO	Ecological Services Field Office
°F	degrees Fahrenheit
Forest Service	United States Department of Agriculture, Forest Service
GIS	geographic information systems
IPaC	Information for Planning and Conservation
LN	lease notice
MBTA	Migratory Bird Treaty Act of 1918
NEP	nonessential experimental population
NEPA	National Environmental Policy Act of 1970
NLAA	may affect, not likely to adversely affect
NLAM	may affect, not likely to destroy or adversely modify
NPS	United States Department of the Interior, National Park Service
NSO	no surface occupancy
NWR	National Wildlife Refuge
PCE	primary constituent element
RMP	resource management plan
ROW	right-of-way
SMA	surface management agency
SOP	standard operating procedure
SRMA	special recreation management area
TCP	traditional cultural property
THPO	tribal historic preservation officer
TL	timing limitation
TPWD	Texas Parks and Wildlife Department
US	United States
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFWS	United States Department of the Interior, Fish and Wildlife Service
VRM	visual resource management
WSR	Wild and Scenic River

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Chapter 1. Introduction

1.1 BACKGROUND

The United States (US) Department of the Interior (DOI), Bureau of Land Management (BLM), Oklahoma Field Office, in collaboration with the US Department of the Interior, Bureau of Indian Affairs (BIA), is preparing an environmental impact statement (EIS). This document will also result in a BLM resource management plan (RMP) and a BIA integrated RMP. The BLM RMP will guide the management of BLM-administered lands and federal mineral estate in Oklahoma, Kansas, and Texas. These lands are currently managed under the 1994 Oklahoma RMP (BLM 1994a), the 1991 Kansas RMP (BLM 1991), and the 1996 Texas RMP (BLM 1996a), as amended (BLM 1994b, 1996b, 2000, 2004, 2014).

The BIA Integrated RMP includes management direction for allotted and tribal surface mineral interests. These lands are administered by the BIA Eastern Oklahoma and Southern Plains Regional Offices in Oklahoma, Kansas, Texas, and Nebraska.

The BLM and BIA are the co-lead agencies preparing the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP.

Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (16 US Code [USC], Section 1531, et seq.), directs federal agencies to conserve and recover listed species and use their authorities in the furtherance of the purposes of the ESA by carrying out programs for the conservation of endangered and threatened species so that listing is no longer necessary (50 Code of Federal Regulations [CFR] 402). Furthermore, the ESA in Section 7(a)(2) directs federal agencies to consult (referred to as Section 7 consultation) with the US Fish and Wildlife Service (USFWS) when their activities "may affect" a listed species or designated critical habitat.

1.2 PURPOSE OF THE BIOLOGICAL ASSESSMENT

The biological assessment (BA) analyzes the potential effects of the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP on federally listed threatened, endangered, and proposed animal (wildlife, invertebrates, and fish) and plant species and critical habitat pursuant to Section 7(a)(2) of the ESA. This assessment addresses federally listed threatened and endangered animal and plant species that meet the following criteria:

- Known to occur in the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP decision area based on confirmed sightings
- Critical habitat designated or proposed within the decision area
- May occur in the decision area based on unconfirmed sightings
- Potential habitat exists for the species in the decision area

1.3 CONSULTATION HISTORY

The Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP will replace the 1994 Oklahoma RMP (BLM 1994a), the 1991 Kansas RMP (BLM 1991), and the 1996 Texas RMP (BLM 1996a), as amended (BLM 1994b, 1996b, 2000, 2004, 2014), as well as BIA management direction for allotted and tribal surface mineral interests. The USFWS is a cooperating agency/entity on the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP.

Consultation, including meetings and calls, specific to the BA are as follows:

- December 3, 2018—Meeting at the USFWS Tulsa Ecological Services Field Office between the BLM, BIA, USFWS, and Environmental Management and Planning Solutions, Inc. (EMPSi; contractor) to discuss the outline and content of the BA. The group reviewed management actions that could affect listed species and methods for analysis.
- April 18, 2019—The BLM, USFWS, and EMPSi participated in a call to discuss the action area and species to be analyzed in the BA. Representatives from USFWS Ecological Services Field Offices in Oklahoma, Kansas, and Texas were present to discuss species under their respective office's jurisdiction.
- May 17, 2019—Per discussion at the April 18, 2019, meeting, EMPSi provided an updated BA outline containing the BA species list, the "no effect" rationale statements for species and critical habitats that the proposed action would not affect, and sample analyses for USFWS review.

1.4 PROGRAMMATIC APPROACH AND SUBSEQUENT CONSULTATION PROCESS

Because the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP is a planning-level document, this BA focuses on the effect of the broad management

actions and allocations contained therein. Included are development of goals and objectives, allocations of land use, and establishment of criteria for future uses. During planning-level analysis, the management agencies cannot anticipate all the impacts of subsequent program-level or site-specific actions carried out under the framework of the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP; thus, future actions will be subject to a step-down, programmatic activity plan or project-specific consultations.

Program-level or site-specific decisions follow the overarching direction identified in the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP while determining actions for smaller geographic units of BLM-administered and BIA-managed land in the decision areas. Site-specific actions require site-specific decision-making supported by separate site-specific National Environmental Policy Act of 1970 (NEPA) analysis and ESA consultation.

Despite the general nature of the plans and use of the subsequent step-down consultation, this BA analyzes, in general, the potential impacts of these actions on listed and candidate species and critical habitat. Each site-specific action that could occur under the proposed action will be analyzed as required by NEPA and the ESA; there will be compliance with all federal laws during implementation of the project.

Often, the specific effects on species can be evaluated only at the site or project level and then analyzed with respect to the species baseline; therefore, additional site-specific Section 7 consultation would be required when the implementation of projects or other actions affect listed, proposed, or candidate species.

It is important to recognize that because this document is programmatic and addresses species over a wide geographic range, information on species, listing status, and critical habitat is likely to change or become less accurate over time. This BA, however, would still be able to provide guidance to the step-down, implementing BLM and BIA jurisdictions. This is because analyses are done largely by species assemblages, rather than individual species (see Section 5.1, Analysis Methods and Assumptions).

1.5 DESCRIPTION OF THE PLANNING AREA

The planning area is Oklahoma, Kansas, and Texas, regardless of landownership, and lands managed by the BIA Southern Plains Region in Richardson County, Nebraska (**Figure D-1)**. The 269,650,000-acre planning area is composed of federal, tribal trust or restricted (BIA), allotted, state, and private lands. Federal lands are administered by the BLM; US Department of Agriculture (USDA), Forest Service (Forest Service); USDA, Agricultural Research Service; US Department of Justice, Federal Bureau of Prisons; US Department of Defense; US Department of Energy; US Army Corps of Engineers; International Boundary and Water Commission; and US Department of the Interior, National Park

Service (NPS), Bureau of Reclamation, and USFWS. Individual trust lands are held in trust by the US government for the benefit of individual Indian allottees (or their heirs). The planning area encompasses 437 counties (105 in Kansas, 1 in Nebraska, 77 in Oklahoma, and 254 in Texas).

1.6 DESCRIPTION OF THE DECISION AREA

The decision area for the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP is where there are federal, tribal, or allottee interests. The decision area covers only the BLM-administered and BIA-managed surface lands and subsurface mineral estate in the planning area, with the exception of oil and gas mineral estate in Osage County.

The BLM decision area is composed of approximately 46,900 acres of BLM-administered surface lands and 4,754,700 acres of federal mineral estate. This includes a study area buffer boundary along the Red River in Texas and Oklahoma. Federal mineral estate is composed of split-estate land (private surface over federal minerals, which totals approximately 576,000 acres) and lands managed by other federal agencies that are not covered under a land use plan (such as Forest Service) or congressionally withdrawn (National Park Service and many Fish and Wildlife refuges). The BLM decision area is limited to such lands and federal mineral estate in Oklahoma, Kansas, and Texas (BLM GIS 2015).

The BIA decision area includes approximately 394,200 surface acres and 4,754,700 mineral estate acres for the BIA Eastern Oklahoma Regional Office. Additionally, approximately 1,442,000 acres of the BIA Eastern Oklahoma Regional Office are limited to coal or other minerals within Osage County, and are included within the decision area. Oil and gas fluid minerals within Osage County are covered under a separate EIS effort, and are not included in the total acres of mineral estate within the BIA decision area for this project. The BIA decision area also includes 457,500 surface acres and 631,800 mineral estate acres for the BIA Southern Plains Regional Office. The BIA decision area includes such lands and mineral estate in Oklahoma, Kansas, and Texas and Richardson County, Nebraska (BIA GIS 2015).

1.7 DESCRIPTION OF THE ACTION AREA

For the purposes of this consultation, the action area includes the decision area for the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP as described above. The action area also includes lands within 1 mile of the decision area that could be affected by noise, human presence, visual disturbance, and changes to the aquatic environment associated with the proposed action. The action area is shown in **Figure D-2**.

Chapter 2.
Proposed Action

The proposed action is the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP proposed plan, which is incorporated by reference in its entirety. For a complete description of the goals, objectives, and management actions, refer to Chapter 2 of the Final Joint EIS/ Proposed BLM RMP and BIA Integrated RMP.

The goals, objectives, and actions of the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP (the proposed action) that may affect listed species and critical habitat in the action area are summarized below.

Where actions are marked with an asterisk (*), the following note applies: Plus any applicable federal lands along the 116-mile stretch of the Red River between the North Fork of the Red River and the 98th Meridian that will be more specifically identified and mapped when they are surveyed. (No exact acreages of federal lands are available at this time because the full 116-mile stretch has not been surveyed.) Any such survey would be conducted in accordance with applicable law.

2.1 BLM Proposed Plan

2.1.1 Air Resources

Action: Minimize fugitive dust during construction activities, including well drilling, completion, workover, production, and road maintenance, using appropriate methods, such as water or approved chemicals, at construction areas and associated roads. The BLM Authorized Officer may direct the operator to change the level and type of treatment if dust abatement measures are observed to be insufficient to prevent fugitive dust.

Require reapplication, if necessary, due to the duration of construction activities, including well drilling, completion, workover, production, and road maintenance.

Action: Minimize fugitive dust during mining operations, including exploration, construction, production, and reclamation, using appropriate methods, such as water or approved chemicals. The BLM Authorized Officer may direct the operator to change the level and type of treatment if dust abatement measures are observed to be insufficient to prevent fugitive dust.

Require reapplication, if necessary, due to the duration of mining operations, including exploration, construction, production, and reclamation.

2.1.2 Soil Resources

Goal: Maintain or improve current soil productivity and status and minimize soil erosion.

Objective: Manage erodible soils to maintain or reduce erosion and to improve vegetative ground cover.

Objective: Minimize soil compaction and soil erosion.

2.1.3 Water Resources

Goal: Manage surface water and groundwater quality to maintain, improve, or restore the chemical, physical, and biological function of water resources.

Objective: Protect aquatic habitats for special status species, including fish, mussels, turtles, snails, plants, and migratory birds.

Objective: Conserve surface water and groundwater.

Action: Allow no mechanized or industrial use authorizations within 415 feet of perennial streams, rivers, ponds, springs, seeps, reservoirs, 100-year floodplains, sole source aquifers, or other Waters of the US unless the project could be conducted without adversely affecting these resources.

2.1.4 Vegetation

Goal: Protect, preserve, or enhance the health and function of natural vegetation communities on BLM-administered surface tracts, with an emphasis on high-priority habitats identified in the state wildlife action plans.

Objective: Reduce cover of noxious weeds and invasive plants in native plant communities and prevent establishment of new invasive species, especially as a result of BLM-permitted activities.

Objective: Where applicable, restore natural fire regimes in fire-dependent plant communities.

Objective: Restore degraded vegetation communities to improve natural processes and move toward desired future conditions where applicable.

Action: Use vegetation treatments to move toward desired future conditions according to quantitative objectives. Monitor using quantitative methods to determine if treatment achieved the objectives.

Action: Use prescribed fire, in coordination with local landowners and partners, to meet resource objectives. Mechanical and manual methods may be used where prescribed fire is not feasible.

Action: Allow integrated pest management techniques, including use of BLM-approved herbicides, manual and mechanical treatments, and biological controls, to meet resource management objectives.

Action: Apply herbicides in accordance with relevant and approved EISs, including the BLM Vegetation Treatments Using Herbicides Final Programmatic EIS Record of Decision (BLM 2007) and the Approved Resource Management Plan Amendment/Record of Decision for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States (BLM 2016a). Apply only herbicides approved for use on BLM-administered lands.

Action: Plant or seed native species as necessary to restore degraded plant communities.

Action: Plant native species during interim and final reclamation to enhance the habitat for pollinators, in accordance with Instruction Memorandum 2016-013 and BLM Manual 1745, on BLM-administered surface lands.

Action: Using the landscape approach, monitor ecological communities using the standard core indicators (e.g., bare ground, noxious weeds and invasive plants, plant species of management concern, proportion of large gaps in plant canopy, vegetation composition, and vegetation height).

Wetlands and Riparian Areas

Goal: On BLM-administered lands, achieve and manage proper functioning condition of riparian areas. Throughout the decision area (on BLM-administered lands and federal mineral estate), achieve a no net loss of wetlands.

Objective: Maintain proper functionality of riparian and wetland communities.

Action: Establish a 415-foot buffer around wetlands and riparian areas, including springs, seeps, playas, and saline lakes, for all use authorizations (3,000 acres*). The buffer distance will be established based on site-specific conditions, such as topography and vegetation; other resource program objectives; and the type of use, such as grazing, mining, and recreation. The buffer may be accomplished by such measures as avoidance, fencing, and creating water features for livestock grazing.

2.1.5 Fish and Wildlife

Goal: Manage BLM-administered surface tracts to support native fish and wildlife populations.

Objective: Restore and maintain fish and wildlife habitat to sustain populations.

Action: Improve wildlife habitat by such measures as improving riparian zones, remediating erosion, and stabilizing banks. Construct or install wildlife features, such as nest boxes/platforms, bat towers/boxes, and wildlife guzzlers. Work with landowners to voluntarily incorporate wildlife protection measures (such as escape ramps in troughs) associated with federal mineral estate.

Action: Allow integrated pest management techniques to control invasive species, including those that would control wild hogs.

Action: Promote activities that benefit the perpetuation of pollinators.

Migratory Birds

Objective: Protect, restore, and conserve populations and habitats of migratory birds.

Action: Avoid disturbing nesting migratory birds, with an emphasis on special status species and USFWS Birds of Conservation Concern (generally from March 1 to July 31, but times may vary by species and seasonal conditions). If active nests are observed, adhere to USFWS and BLM recommendations and mandates in determining appropriate buffer distances for species protected under the Migratory Bird Treaty Act (MBTA). Use best available science in these determinations.

Wildlife and Habitats

Action: Develop working relationships with local, state, and federal natural resource agencies and with universities, local schools, and other organizations to assist with the overall management of the Cross Bar Management Area.

Action: Conduct wildlife surveys on the Cross Bar Management Area, consistent with Texas Parks and Wildlife Department (TPWD) surveying methods.

2.1.6 Special Status Species

Goal: Protect, preserve, and enhance federally listed, proposed, and candidate species and their habitats and promote the recovery of these species for BLM-related actions, in accordance with Section 7 of the ESA, as amended (16 USC 1531 et seq.).

Goal: Maintain, protect, and enhance habitats of all special status species and ensure that BLM-authorized actions do not contribute to the need to list these species under the ESA.

Objective: Support special status species and/or habitat in coordination with the USFWS and other stakeholders.

Action: Perform population management, augmentation, and reintroduction in support of recovery actions, in consultation with the TPWD, Oklahoma Department of Wildlife Conservation, or Kansas Department of Wildlife, Parks, and Tourism regional biologist and the USFWS.

Action: Implement recovery and other conservation actions on BLM-administered surface lands to support special status species, including installing wildlife enhancement structures and restoring or enhancing riparian zones.

Action: Every project expected to include significant surface disturbance will be required to have a site-specific special status species habitat analysis conducted prior to a final decision. The proposed action and habitat analysis will also be coordinated with the appropriate regulatory agencies prior to a BLM decision.

Action: Before authorizing any surface-disturbing activity in areas known to support American burying beetle, USFWS protocols for conserving the American burying beetle would be implemented (based on consultation with the USFWS).

Action: Cross Bar Management Area: Wildlife program coordination, such as that needed to conduct special status species evaluations, will continue to be conducted with the TPWD, USFWS, and universities (BLM 2000).

2.1.7 Wildland Fire Ecology and Management

Objective: For naturally ignited fires, allow as appropriate, the ecological role of wildfire to maintain and enhance resources outside of wild-urban interface areas.

Objective: Hazardous fuels reduction treatments will be designed and implemented to reduce the risk to and consequences of wildfire on communities and ecosystems. Hazardous fuels treatments may be used to restore and maintain healthy ecosystems. Hazardous fuels reduction should be planned and implemented in an interdisciplinary and collaborative manner with Federally recognized Indian tribes and other federal, state, and local partners.

Action: Conduct hazardous fuel reduction treatments (e.g., thinning, mechanical, prescribed fire, and chemical) in areas with a higher probability for catastrophic wildland fire, and protect values at risk.

Action: With an approved Prescribed Fire Burn Plan and appropriate permits, allow prescribed burning to meet resource management objectives for vegetation and wildlife habitat.

2.1.8 Cultural Resources

Goal: Identify, and when appropriate, protect and preserve in place representative samples of significant cultural resources and ensure that they are available for appropriate uses and preservation by present and future generations.

Goal: Protect traditional use sites, traditional cultural properties (TCPs), and sacred sites.

2.1.9 Cave and Karst Resources

Goal: Manage and protect significant cave and cave-related resources, including unique geological features, biological resources, and cultural properties.

Objective: Encourage practices and policies that are adequate to ensure long-term protection of cave and karst systems, including sinkholes, overhangs, and underground drainage systems.

Action: Before permitting any use authorizations, the BLM would assess the potential of and associated impacts on cave and karst resources. Avoidance would be considered as the primary means of mitigating potential impacts. Apply conditions of approval (COAs) as necessary, if avoidance is not practical.

2.1.10 Solid Minerals

Goal: Provide for solid mineral leasing, exploration, and development, while protecting resources.

Objective: Provide for environmentally sound exploration and development of mineral resources.

Coal

Objective: Provide for the leasing of federal coal deposits while protecting natural resources.

Allocation: BLM-Administered Lands

One hundred acres shall be acceptable for further consideration for leasing for development by other than underground techniques (i.e., surface mining and underground mining could be used).

Zero acres shall be acceptable for further consideration only for development by underground techniques (i.e., only underground mining could be used).

Note: The unsuitability criteria in 43 CFR 3461.5 will be reapplied to all parcels before leasing. Federal minerals beneath incorporated cities, towns, and villages; national historic trails; and national wildlife refuges are not subject to leasing, per 43 CFR 3400.2.

Allocation: State and Other Federal Surface Management Agency (SMA) Lands

There are 1,206,900 acres of State and other federal SMA lands with BLM-administered federal mineral estate that shall be acceptable for further consideration for leasing, as follows:

There are 2,400 acres that shall be acceptable for further consideration for leasing for development by other than underground techniques (i.e., surface mining and underground mining could be used).

There are 1,204,500 acres that shall be acceptable for further consideration only for development by underground techniques (i.e., only underground mining could be used).

Note: Federal minerals beneath incorporated cities, towns, and villages; national historic trails; and national wildlife refuges are not subject to leasing, per 43 CFR 3400.2.

Allocation: Private Surface Estate Overlying Federal Mineral Estate

There are 464,700 acres of private surface estate with BLM-administered federal mineral estate that shall be acceptable for further consideration for leasing, as follows:

There are 464,700 acres that shall be acceptable for further consideration for leasing for development by other than underground techniques (i.e., surface mining and underground mining could be used).

Zero acres shall be acceptable for further consideration only for development by underground techniques (i.e., only underground mining could be used).

Note: The unsuitability criteria in 43 CFR 3461.5 will be applied to all parcels before leasing. For federal mineral estate beneath privately owned parcels where the surface is owned by qualified surface owners (per 43 CFR 3000.0-5 (gg) (1) and (2)), no leases for surface mining (i.e., mining by other than underground methods) would be issued without qualified surface owner consent. Federal minerals beneath incorporated cities, towns, and villages; national historic trails; and national wildlife refuges are not subject to leasing, per 43 CFR 3400.2.

Mineral Materials

Objective: Provide for mineral material sales while protecting natural resources.

Allocation: Manage 5,200 acres* of BLM surface and 4,423,000 acres of BLM-administered federal minerals as open to mineral material disposal and 9,900 acres as closed to mineral material disposal.

Action: Manage the following areas as closed to mineral material disposal:

- Cross Bar Special Recreation Management Area (SRMA)
- Wild and Scenic River (WSR) suitable segments

Action: New pits (caliche, sand, gravel, etc.) would be permitted as appropriate after detailed analysis of existing pit locations.

Nonenergy Solid Leasable Minerals (Gypsum, Sodium, Potassium, and Phosphate)

Objective: Provide for development of mineral resources, while protecting natural resources.

Allocation: Manage 5,200 acres* of BLM surface and 4,423,000 acres of BLM-administered federal minerals as open to nonenergy solid leasable mineral development and 9,900 acres as closed to nonenergy solid leasable mineral development.

Action: Manage the following areas as closed to nonenergy solid leasable mineral development:

- Cross Bar SRMA
- WSR suitable segments

2.1.11 Fluid Leasable Minerals (Oil and Gas, Geothermal, and Tar Sands)

Goal: Provide for fluid mineral exploration and development, consistent with other resource objectives.

Objective: Provide for environmentally sound exploration and development of fluid mineral resources, while protecting natural resources.

Action: When drilling and abandoning wells, infiltration of oil, gas, or water into mineral deposits, mines, or workings must be prevented.

Open to Fluid Mineral Leasing, Subject to Standard Terms and Conditions

Allocation:

Manage 2,707,900 acres* of BLM-administered minerals as open to fluid mineral leasing subject to standard terms and conditions:

- BLM, split-estate, state managed surface (184,900 acres*)
- Other federal SMAs (2,253,000 acres)

Open with Major Stipulations
Allocation:

Manage 126,900** acres* of BLM-administered federal mineral estate* and 1,423,700** acres of federal mineral estate with other federal SMAs as open to fluid mineral leasing subject to major constraints, as applicable. See Appendix C for detailed stipulation description.

***Not all of the areas listed are mapped; the calculation is based on available data.*

Open with Moderate Stipulations
Allocation:

Manage 191,500** acres* of BLM-administered surface and 0** acres of the federal mineral estate with other federal SMAs as open to fluid mineral leasing, subject to moderate constraints, as applicable. See Appendix C for detailed stipulation description.

***Not all of the areas listed are mapped; the calculation is based on available data.*

Allocation:

Manage federal mineral estate as open to fluid mineral leasing subject to timing limitations (TLs), as applicable (see Appendix C for full descriptions of TLs).

Closed to Fluid Mineral Leasing
Allocation:

Manage 0 acres of BLM-administered surface and federal mineral estate as closed to fluid mineral leasing.

Manage 44,800** acres of federal mineral estate with other federal SMAs as closed to fluid mineral leasing:

- Department of Defense

***Not all of the areas listed are mapped; the calculation is based on available data.*

Lease Notices (LNs)

- LNs may apply to future leases (see Appendix C for full descriptions of LNs).

2.1.12 Livestock Grazing

Goal: Provide for livestock grazing by applying proper grazing management to maintain or improve the condition of vegetation; contribute to healthy sustainable ecosystems, clean water, and functional watersheds in accordance with 43 CFR 4180.1.

Objective: Improve/maintain rangeland health in accordance with Fundamentals of Rangeland Health and Standards and guidelines for grazing administration (see 43 CFR 4180) to ensure properly functioning ecosystems and to provide a sustainable forage base.

Action: Develop Rangeland Health Standards in accordance with BLM standards and guidelines for grazing administration. Interim management will follow fallback standards and guidelines identified in BLM standards and guidelines for grazing administration. See 43 CFR 4180.2 (f)(1) and (f)(2) for further information.

Allowable Use: Manage livestock grazing as follows:

- 15,100 acres* available
- 0 acres unavailable

Livestock grazing would be managed in accordance with fallback standards and guidelines until specific standards and guidelines are developed.

Allowable Use: The Cross Bar Management Area (11,800 acres) is available for livestock grazing (animal unit months to be based on forage production surveys).

Allowable Use: The Red River area is available for livestock grazing.

Action: Use prescriptive grazing as necessary for vegetation manipulation outside of grazing leases to meet project objectives.

Action: Range improvements will be authorized as necessary to facilitate proper grazing management and to maintain and enhance rangeland health.

2.1.13 Recreation and Visitor Services

Goal: Provide for a diversity of recreational opportunities that add to the recreation participant's quality of life, while protecting natural and cultural resources.

Action: Designate a portion of the Cross Bar Management Area as an SRMA (9,900 acres).

Manage as:

- Off-road vehicle use is limited
- NSO fluid minerals
- Closed to mineral material disposal and nonenergy leasables
- Right-of-way (ROW) avoidance

- Manage as visual resource management (VRM) Class III
- Recommend for retention

2.1.14 Travel, Transportation Management, and Access

Goal: Manage off-road vehicle access that would balance resource protection and uses.

Off-Road Vehicle Use

Allowable Use: Manage BLM-administered surface lands as the following:

- 0 acres: open to all types of vehicle use
- 0 acres: closed to off-road vehicle use
- 15,100 acres*: off-road vehicle use is limited

Allowable Use: Manage BLM-administered surface lands as the following at the Cross Bar Management Area:

- 0 acres: open to vehicle use
- 0 acres: closed to off-road vehicle use (except for the access road, which is open for administrative use)
- 11,800 acres: off-road vehicle use is limited

Allowable Use: Manage BLM-administered surface lands as the following for off-road vehicle use in the Red River area:

- Off-road vehicle use is limited

2.1.15 Lands and Realty, Including Renewable Energy (Wind, Solar, Hydro, and Biomass)

Land Use Authorizations

Objective: Address the needs of industry, utilities, the public, Federally recognized Indian tribes, and government entities for land use authorizations, while minimizing adverse impacts on other resource values.

Action: Encourage applicants to locate new facilities within previously disturbed areas or adjacent similar ROWs.

Allowable Use: Manage the following areas as ROW exclusion areas for new land use authorizations (200** acres):

- Significant cultural properties and sacred cultural sites allocated to conservation for future use, traditional use (e.g., TCPs), and public use
- Burial sites

- Designated critical habitat

***Not all of the areas listed are mapped; the calculation is based on available data.*

Allowable Use:

Manage the following areas as ROW avoidance areas for new land use authorizations (12,700** acres*):

- Cross Bar SRMA
- WSR suitable segments
- Highly erodible soils
- Riparian areas and wetlands
- Any special status species habitat
- VRM Class I and II
- Floodplains
- Cemeteries
- Occupied buildings
- Important Bird Areas

***Not all of the areas listed are mapped; the calculation is based on available data.*

Land Tenure

Action: Make the following surface lands available for consideration for disposal (5,200 acres*):

- Red River area*
- 1,900 acres Cross Bar Management Area Management Units 19, 21, and 29
- 3,300 acres other surface tracts

Consider the following when evaluating surface lands for disposal:

- Public resource values, including but not limited to:
  - Threatened, endangered, and sensitive species habitat
  - Developed recreation and recreation access sites
  - Class A scenery
  - Energy and mineral potential
  - Significant cultural properties, TCPs, and cultural sites

  - Other statute-authorized designations (e.g., National Historic and Scenic Trails)
- Accessibility of the land for public uses
- Amount of public investment in facilities or improvements and the potential for recovering those investments
- Difficulty or cost of administration (manageability)
- Suitability of the land for management by another federal agency
- Encumbrances, including:
  - Recreation and public purposes and small tract leases
  - Withdrawals
  - Other leases or permits
- Consistency of the decision with cooperative agreements and plans or policies of other agencies
- Suitability and the need for change in landownership or use for such purposes as community expansion or economic development, such as industrial, residential, or agricultural (other than grazing) development

Action: Pursue acquisitions as opportunities arise through exchange or purchase with willing proponents or sellers. Any new acquisitions would have to include permanent public access to those parcels. The emphasis for acquisition would be on parcels that meet the following criteria:

- Is within or adjacent to BLM-administered surface estate for improved management and meeting resource objectives
- Provides access to BLM-administered surface estate
- Provides resource value that benefits the public, including:
  - Threatened, endangered, and sensitive species habitat
  - Riparian areas
  - Fisheries, nesting/breeding habitat for game animals
  - Key big game seasonal habitat
  - Developed recreation and recreation access sites
  - Class A scenery
  - Energy and mineral potential
  - Significant cultural properties, TCPs, and cultural sites
  - Other statute-authorized designations (e.g., National Historic and Scenic Trails)

- Accessibility of the land for public uses
- Amount of public investments in facilities or improvements and the potential for recovering those investments
- Difficulty or cost of administration (manageability)

2.1.16 Forest, Woodland, and Special Products

Goal: Provide opportunities for traditional and nontraditional uses of forest and woodland products on a sustainable and multiple-use basis.

Objective: Manage timberland and woodland resources in tandem with other natural resources, with respect for traditional, religious, and cultural uses and values.

Allowable Use: All areas with viable timber stands are available for harvest, except in recreation management areas. Identify and preserve (avoid, minimize, or mitigate) areas with historic properties, including TCPs or sacred sites, through consultation with Federally recognized Indian tribes.

2.1.17 Wild and Scenic Rivers (WSRs)

Goal: Protect the fish, wildlife, cultural, historic, paleontological, scenic, geological, and other resource values as appropriate to those rivers that are eligible, suitable, or designated as part of the National WSR system.

Objective: Maintain or enhance outstandingly remarkable values, free-flowing character, water quality, and tentative classification of designated and suitable National WSR system segments.

Action: Determine the 7.25-mile Canadian River segment as preliminarily suitable for Congressional designation and inclusion into the National WSR System. Outstandingly remarkable values are recreation, fish, and cultural. The tentative classification is recreational.

Action: Manage this segment (1,100 acres) as follows:

- Preliminary classification: Recreational
- VRM Class III
- Closed to mineral material disposal and nonenergy leasables
- ROW avoidance

2.1.18 Treaty Rights and Tribal Interests

Goal: Ensure government-to-government consultation with Federally recognized Indian tribes that explicitly identifies and addresses extant tribal treaty rights for all affected Federally recognized Indian tribes, and provides an

opportunity for tribal issues and concerns to be identified and accounted for in planning.

Objective: Protect cultural properties, places, or objects important to Federally recognized Indian tribes to the degree possible under law, regulations, and guidance. Keep confidential and protected information about tribal practices and beliefs, the location with which they are associated, and sacred sites from public disclosure to the extent allowed by law.

2.2 BIA PROPOSED PLAN

2.2.1 Air Resources

Action: Implement best management practices (BMPs) as appropriate to discourage fugitive dust during ground-disturbing activities. BMP examples are as follows:

- Reduce dirt loading on windy days (greater than 20 miles per hour)
- Water roads
- Emergency contour tillage

(see Appendix B, BIA BMPs)

Objective: Coordinate with Federally recognized Indian tribes to develop a strategic climate change program.

Action: Implement strategic climate change program assessments and action plans for interested Federally recognized Indian tribes.

2.2.2 Water Resources

Goal: Manage surface and groundwater quality to maintain, improve, or restore chemical, physical, and biological function of water resources.

Objective: Protect aquatic habitats, in accordance with established water quality standards.

Action: Minimize the use of surface water and groundwater (e.g., during agricultural and fluid mineral development).

Action: Encourage the use of treatable nonpotable water for industrial purposes, including dust abatement, facility construction, agriculture, and oil and gas operations.

Action: Impose buffers when appropriate and necessary to prevent adverse water quality impacts and adverse impacts on water bodies and springs. Buffer sizes will be adjusted as necessary, based on site-specific conditions and tribal consultation around perennial streams, rivers, ponds, springs, seeps, reservoirs,

100-year floodplains, or other Waters of the US, unless the project could be conducted without adversely affecting these resources.

2.2.3 Vegetation

Goal: Promote the health and function of natural vegetation communities, with an emphasis on high-priority habitats or species identified in the federal, state, and tribal wildlife action plans.

Objective: Avoid actions that would degrade the health and function of existing natural vegetation communities.

Action: Use vegetation treatments (e.g., mechanical, chemical, and biological) to move toward historical native plant community, as identified through consultation with the tribal historic preservation officers (THPOs) and interested Federally recognized Indian tribes.

Forests, Woodlands, and Special Products

Objective: Manage and protect all woodlands on Indian forest lands, in collaboration with Federally recognized Indian tribes, by applying sound silvicultural principles. Protect forest and woodlands that are culturally significant and to protect TCPs as identified through consultation with THPOs and interested Federally recognized Indian tribes.

Wetlands and Riparian Areas

Objective: Protect and improve riparian and wetland communities to ensure ecological function and to meet cultural traditions.

Action: Allow for cultural harvesting of riparian vegetation (e.g., willows and river cane).

Objective: Avoid impacts to maintain proper functionality of riparian and wetland communities.

Action: Establish buffers. Buffer sizes will be adjusted, as necessary, based on site-specific conditions and tribal consultation around wetlands and riparian areas (including springs and seeps), unless the project could be conducted without adversely affecting these resources.

Disclosure Statement: All or portions of the lands under this lease contain wetlands or riparian areas or both. Surface development of these areas and within a designated buffer may be restricted or relocated in the lease area during the subsequent permitting and NEPA process. Avoid or mitigate any potential impacts on or disturbance to wetlands and riparian habitats on this lease. Develop any required mitigation during the Application for Permit to Drill process.

An exception/modification exists for drilling and boring as long as they not to affect riparian wetland function.

Noxious Weeds and Invasive Plants

Objective: Implement BIA programs to prevent the introduction and spread of invasive and noxious weeds, to monitor for and rapidly respond to the presence of noxious weeds, and to promote the restoration of native species and habitats in ecosystems that have been impaired by noxious weed infestation.

Action: Conduct noxious weed program to reduce noxious weeds, through fuels management, weed management, and range improvements.

2.2.4 Fish, Wildlife, and Recreation

Goal: Manage BIA-managed surface lands to support native fish and wildlife.

Objective: Protect Indian fish and wildlife resources as trust assets, and ensure that tribal and landowner input is considered for all agency actions and decisions that may affect these assets.

Objective: Provide for the conservation, prudent management, enhancement, orderly development, and wise use of fish and wildlife resources that hunting, fishing, gathering, and related rights depend on and that the associated resource management programs require.

Objective: Promote tribal stewardship for the conservation, prudent management, enhancement, orderly development, and wise use of fish and wildlife resources that hunting, fishing, gathering, and related rights depend on and that the associated resource management programs require.

Action: Implement fuels and vegetation treatments to sustain or improve wildlife habitat.

Action: Coordinate with the USFWS and state and tribal wildlife agencies to manage invasive fish and wildlife species.

Migratory Birds

Objective: Protect, restore, and conserve populations and habitats of migratory birds, in accordance with current laws and regulations.

Action: Avoid disturbing nesting migratory birds, with an emphasis on special status species and birds of conservation concern (generally from March 15 to June 1, but periods may vary by species and seasonal conditions). If active nests are observed, adhere to USFWS and Federally recognized Indian tribal recommendations and mandates in determining appropriate buffer distances for species protected under the MBTA. Use the best available science when making these determinations.

Action: To protect special status species, follow guidance in the USFWS Oklahoma Ecological Services Field Office Migratory Bird and Eagle Impact Avoidance Measures for Actions Associated with Oil and Gas Projects (USFWS 2014a) or similar guidance from other state and Federally recognized Indian tribal governments.

Recreation and Visitor Services

Goal: Manage BIA-managed surface lands to support Federally recognized Indian tribe-approved recreation opportunities.

Objective: Promote tribal stewardship for the conservation, prudent management, enhancement, orderly development, and wise use of fish and wildlife resources that recreational uses depend on and that the associated resource management programs require.

2.2.5 Special Status Species

Goal: Protect, preserve, and enhance federally listed, proposed, or candidate species, and tribally significant species and their habitats, and promote the recovery of these species for BIA actions, under Section 7 of the ESA, as amended (16 USC 1531 et seq.).

Objective: Support special status species by implementing recovery and other conservation actions for BIA-authorized actions, in coordination with the USFWS, THPOs, interested Federally recognized Indian tribes, and other stakeholders.

Action: Require every project to have a site-specific evaluation and obtain clearances through applicable agency coordination. Southern Plains Region: Ensure compliance with any stipulations or BMPs, where applicable.

Action: Promote recovery and other conservation actions to support special status species and restore or enhance riparian zones.

Action: Use the USFWS's Information for Planning and Conservation (IPaC) website, or equivalent, for endangered species, migratory birds, wildlife refuges, and wetland listings, and consultation with Federally recognized Indian tribal environmental professionals and THPOs, as applicable.

2.2.6 Wildland Fire Ecology and Fuels Management

Objective: For naturally ignited fires, assess and monitor risks and significant and sensitive cultural resources to determine the appropriate suppression (for Eastern Oklahoma Region only).

Objective: Design and implement hazardous fuels reduction treatments to reduce the risk to and consequences of wildfire on communities and ecosystems. Hazardous fuels treatments may be used to restore and maintain healthy ecosystems. Plan and implement hazardous fuels reduction in an

interdisciplinary and collaborative manner with Federally recognized Indian tribes and other federal, state, and local partners.

Southern Plains Action: With a permit, allow prescribed burning to meet resource management objectives for vegetation and wildlife habitat.

2.2.7 Cultural Resources

Goal: Identify, protect, and preserve, in place, representative samples of significant cultural resources and ensure they are available for appropriate uses by present and future generations. For prehistoric, protohistoric, and tribal historic cultural resources, conduct identification, protection, and preservation efforts in collaboration with THPOs and interested Federally recognized Indian tribes.

Goal: Allow traditional cultural resource uses, while protecting traditional use sites, where appropriate, including known TCPs and sacred sites.

Objective: When appropriate, protect against the loss, infringement, and abrogation of hunting, fishing, gathering, and related rights guaranteed to Federally recognized Indian tribes through treaty, statute, or executive order and support fulfilling tribal comanagement responsibilities associated with the exercise of such rights.

Action: For all activities, base buffers around cultural sites on the results of the preconstruction survey. Buffer sizes will vary, based on site type, and they may be adjusted as needed, based on site-specific conditions.

2.2.8 Cave and Karst Resources

Goal: Protect significant cave and cave-related resources, including unique geological features, biological resources, and cultural properties.

Objective: Encourage practices and policies that are adequate to ensure long-term protection of cave and karst systems, including sinkholes, overhangs, and underground drainage systems.

Action: Before approving any activities, the BIA will assess the potential of and associated impacts on cave and karst resources. The primary detection method is to review the BIA or other records on the presence of caves or karst features in the area of interest, in conjunction with a field exam to determine the presence of unrecorded cave or karst features. Depending on the results of cave detection, avoidance would be considered as the primary means of mitigating potential impacts.

In most cases, caves and karsts would be avoided by relocating the proposed project or activity, which is often done in consultation with the proponent, Federally recognized Indian tribe, THPO, and/or landowner at the time of a field examination. Additional mitigation may be required.

Action: Coordinate with THPOs; interested Federally recognized Indian tribes, including the tribal wildlife department; and the USFWS when caves are discovered, to determine appropriate management for the cultural and biological resources.

2.2.9 Minerals (Fluid and Solid)

Objective: Approve leases of the trust mineral estate in a manner that best helps tribes access their mineral resources in an environmentally responsible manner.

Oil and Gas

Action: Conduct all oil and gas leasing and lease operations following procedures established in the BIA's Fluid Mineral Estate Procedural Handbook (BIA 2012) and Onshore Energy and Mineral Lease Management Interagency Standard Operating Procedures (except in Osage County).

Solid Leasable Minerals (gypsum, sodium, potassium, phosphate, sandstone, gravel, and other minerals under 25 CFR)

Action: Avoid disturbing nesting migratory birds, with an emphasis on special status species and birds of conservation concern (generally from March 15 to June 1, but periods may vary by species and seasonal conditions). If active nests are observed, adhere to USFWS and Federally recognized Indian tribal recommendations and mandates in determining appropriate buffer distances for species protected under the MBTA. Use best available science in these determinations.

Action: Follow 25 CFR 214 in Osage County and the Onshore Energy and Mineral Lease Management Interagency Standard Operating Procedures, excluding Osage County.

Action: Avoid or minimize disturbance to culturally valued plant species, based on consultation with THPOs, interested Federally recognized Indian tribes, and surface owners during solid mineral development.

Disclosure Statement: Should proposed additional development or modification of the lease result in additional disturbance to vegetation, wildlife, cultural resources, or soils, notify the lessee that additional consideration under the NEPA, National Historic Preservation Act, ESA, and other applicable laws may be necessary.

Action: Require inclusion of Federally recognized Indian tribes' and/or states' water standards during solid mineral development.

Action: Prevent discharge of pollutants (including sediment) from the allotted trust and restricted lands into Federally recognized Indian tribe-designated

Outstanding Resource Waters (OAC 785:45 or other tribal and state requirements).

2.2.10 Soils, Agriculture, and Livestock Grazing

Soils and Agriculture

Goal: Maintain or improve soil productivity and maintain or minimize accelerated soil erosion.

Objective: Minimize soil compaction and soil erosion.

Livestock Grazing

Goal: Manage to protect, conserve, use, and maintain the highest productive potential on Indian grazing lands, by applying sound multiple-resource conservation planning and practices to the development, inventory, classification, management, and administration of grazing resources.

Action: Continue to provide support to landowners for water development on grazing leases.

Action: Work with the landowner/lessee to preserve current composition of native grass pastures.

Action: Make permanent native grass pastures unavailable to plowing and tilling.

Action: Require lessee to maintain existing conservation infrastructure (e.g., ponds, terraces, and drainage channels).

2.2.11 Travel, Transportation Management, and Access

Goal: Manage off-road vehicle use and access that would balance resource protection and uses.

2.2.12 Lands and Realty

Land Use Authorizations

Objective: Process land use authorizations to address the needs of Federally recognized Indian tribes or landowners, while minimizing adverse impacts on other resource values.

Action: Encourage applicants to locate new facilities in previously disturbed areas or near similar ROWs or easements.

2.2.13 Forest, Woodland, and Special Products

Goal: Incorporate an ecosystem-based, multiple-use philosophy for forest and woodland management, focused on sustainable resource management practices that address Federally recognized Indian tribes' and landowner goals.

Objective: Manage timberland and woodland resources in conjunction with other natural resources, with respect for traditional, religious, and cultural uses and values.

Objective: Develop and maintain relationships with Federally recognized Indian tribes or agencies for managing environmental and natural resources.

Objective: Maintain a viable seed tree crop where forestry projects take place.

Action: Support existing and new forest management plans that contain ecological restoration and management programs.

Action: In the Eastern Oklahoma Region, develop and/or incorporate forestry management BMPs, utilizing the Oklahoma Forestry Services BMPs (Oklahoma Forestry Services 2008).

Action: Incorporate management direction identified in the BIA Forest Management Handbook (BIA 2009).

Action: Use a variety of silvicultural tools, such as commercial harvesting, pre-commercial thinning, prescribed fire, site preparation, and natural and artificial regeneration, to move stand structure, composition, and other characteristics toward that of a target forest (e.g., old growth, hardwood, and pine).

2.2.14 Treaty Rights and Tribal Interests

Objective: Protect against the loss, infringement, and abrogation of hunting, fishing, gathering, and related rights guaranteed to Federally recognized Indian tribes by the United States through treaty, statute, or executive order and support fulfilling tribal comanagement responsibilities associated with the exercise of such rights.

2.3 ADDITIONAL MANAGEMENT

Relevant Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP appendices to this BA are as follows. These appendices are part of the proposed action:

- Appendix A, BLM BMPs and SOPs
- Appendix B, BIA BMPs
- Appendix C, BLM Mineral Stipulations

Chapter 3.
Species and Critical Habitat Considered and Evaluated

3.1 Evaluation Process

Official species lists for the action area were obtained from the USFWS Information for Planning and Consultation (IPaC) website on November 29, 2018, and again on April 22, 2019. An official species list was provided by each USFWS Ecological Services Field Office (ESFO) in the planning area. In addition to the IPaC lists above, a list of special status species on the USFWS National Listing Workplan (USFWS 2016a) with documented ranges in the planning area was obtained from the USFWS.

Using these lists, the BLM and BIA determined which of those species and critical habitats had potential to be affected by the proposed action and thus should be analyzed in the BA.

This process occurred primarily through geographic information systems (GIS) analysis. The action area (BLM GIS 2015; BIA GIS 2015) was overlaid with species' ranges and designated or proposed critical habitats available on the USFWS ECOS system (USFWS GIS 2019), to determine where listed species' ranges or critical habitats and the action area intersected. In general, the proposed action would not affect species with ranges and critical habitats outside the action area. These species and critical habitats were dismissed from further analysis, with documented rationale, unless otherwise noted in the BA. Species with ranges or critical habitats that overlapped the action area were generally analyzed in detail in the BA. In cases, the BLM and BIA determined the proposed action would not affect species with ranges or critical habitats in the action area, based on spatially restricted ranges, seasonal presence, or other factors. These species and critical habitats were dismissed from further analysis, with documented rationale.

Some species and critical habitats on the official species lists are under multiple USFWS ESFO jurisdictions. For clarity, species and critical habitats under multiple USFWS ESFO jurisdictions are listed separately, followed by species and critical habitats under the jurisdiction of a single USFWS ESFO.

The tables below describe, for each species and critical habitat on the official species lists, whether the species is known or expected to occur within the action area or is known or suspected to have suitable habitat there. The tables also indicate if critical habitat for a species has been designated or proposed in the action area.

Species that are not known from, or that have no potential to occur in, the action area are identified in the tables below, and are not discussed further in the BA. The proposed action would have **no effect** on these species. To be excluded from analysis in the BA, one or more of the following criteria must be met:

- The species does not occur, nor is expected to occur, in the action area, during the time activities would occur;
- The species occurs in habitats that are not present;
- The action area is outside the geographical or elevational range of the species; and/or
- The BLM and BIA have determined that there is no potential for the proposed action to affect the species or its critical habitat.

Similarly, the proposed action would have **no effect** on critical habitats that are outside the action area, or where the BLM and BIA have determined that there is no potential for the proposed action to affect them. Rationale for this determination is given in the tables below.

3.2 SPECIES UNDER THE JURISDICTION OF MULTIPLE STATE ESFOS

3.2.1 Wildlife

Table 3-1
Wildlife Species and Critical Habitat Considered and Evaluated – Multiple State ESFOs

	Common and Scientific Name	Status[1]	Critical Habitat	ESFOs[2]	Assessed/Rationale for Exclusion
Birds	Red knot *Calidris canutus rufa*	T	No	OK, TX (Arl, Aus, Coast)	Analyzed in detail; see *Shorebirds* species assemblage
	Piping plover *Charadrius melodus*	T	Designated	OK, TX (Arl, Aus, Coast)	Analyzed in detail; see *Shorebirds* species assemblage

	Common and Scientific Name	Status[1]	Critical Habitat	ESFOs[2]	Assessed/Rationale for Exclusion
	Whooping crane *Grus americana*	E	Designated	OK, TX (Arl, Aus, Coast)	Analyzed in detail
	Red-cockaded woodpecker *Picoides borealis*	E	No	OK, TX (Arl, Coast)	Analyzed in detail
	Interior least tern *Sterna antillarum*	E	No	KS, OK, TX (Arl, Aus, Coast)	Analyzed in detail; see *Shorebirds* species assemblage
Fishes	Arkansas River shiner *Notropis. girardi*	T	Designated	KS, OK, TX (Arl)	Analyzed in detail; see *Pelagic Broadcast-spawning Fishes* species assemblage
	Neosho madtom *Noturus placidus*	T	No	KS, OK	Analyzed in detail; see *Benthic-spawning Fishes* species assemblage
	Pallid sturgeon *Scaphirhynchus albus*	E	No	KS, NE	Analyzed in detail; see *Pelagic Broadcast-spawning Fishes* species assemblage
Mollusks	Neosho mucket *Lampsilis rafinesqueana*	E	Designated	KS, OK	Analyzed in detail; see *Freshwater Mollusks* species assemblage
	Rabbitsfoot mussel *Quadrula cylindrica*	T	Designated	KS, OK	Analyzed in detail; see *Freshwater Mollusks* species assemblage
Insects	American burying beetle *Nicrophorus americanus*	E[3]	No	KS, OK, TX (Arl)	Analyzed in detail
Mammals	Gray bat *Myotis grisescens*	E	No	KS, OK	Analyzed in detail; see *Bats* species assemblage
	Northern long-eared bat *M. septentrionalis*	T	No	KS, NE, OK	Analyzed in detail; see *Bats* species assemblage

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

E—Federally listed endangered; T—Federally listed threatened

[2] KS—Kansas Ecological Services Field Office; NE—Nebraska Ecological Services Field Office; OK—Oklahoma Ecological Services Field Office; TX (Arl)—Arlington Ecological Services Field Office; TX (Aus)—Austin Ecological Services Field Office; TX (Coast)—Texas Coastal Ecological Services Field Office

[3]On May 1, 2019, the USFWS proposed downlisting the American burying beetle from endangered to threatened; the proposal is currently under review.

Red Knot

Species Description

The red knot (*Calidris canutus rufa*) is a robin-sized shorebird about 9 to 11 inches in length. The red knot is easily recognized during the breeding season by its distinctive rufous plumage (USFWS 2015a). The subspecies, *C. C. rufa*, is distinct as it is believed to occupy separate breeding areas, in addition to having distinctive morphological traits (i.e., body size and plumage characteristics), migration routes, and annual cycles (USFWS 2015a).

Life History

The red knot lives for about 7 years and breeds at about 2 years of age. Breeding territories occur along the Arctic coasts. The red knot lays a clutch of usually four eggs between June and July. Incubation lasts about 20 to 25 days (NatureServe 2019). Fledging occurs at about 18 days after eggs hatch (NatureServe 2019).

Red knots migrate in large flocks northward through the contiguous United States mainly from April to June, and migrate southward from July to October (USFWS 2015a). Arrival in breeding areas occurs in late May or early June with most flocks having departed breeding areas by mid-August. The species is more abundant in migration along the US Atlantic coast than on the Pacific coast (USFWS 2015a).

Red knots are restricted to the ocean coasts during winter, and occur primarily along the coasts during migration; however, small numbers of red knots are reported annually during spring and fall migration across the interior US (i.e., greater than 25 miles from the Gulf or Atlantic coasts; USFWS 2015a). Such reported sightings are concentrated along the Great Lakes, but multiple reports have been made from nearly every interior state (USFWS 2015a). As a shorebird, this species mainly eats mollusks, eggs of crab and horseshoe crab, insects, some seeds, and small fishes (NatureServe 2019).

Threats

Primary impacts and threats to the species include loss of habitat, predation on breeding grounds, reduced prey availability during migration and wintering, and increasing frequency and severity of asynchronies ("mismatches") in the timing of the birds' annual migratory cycle relative to favorable food and weather conditions (USFWS 2015b).

Status and Distribution

Red knot was listed as threatened on December 11, 2014, due to the impacts and threats described above (USFWS 2015b).

During migration the species is known or believed to occur throughout much of the United States, including Nebraska, Kansas, Oklahoma, and Texas (USFWS

2019a). The range includes breeding grounds in the Canadian Arctic to migration stopover areas along the Atlantic and Gulf Coasts of North America, to wintering grounds throughout the southeastern US, the Gulf Coast, and South America (reaching as far south as Tierra del Fuego at the southern tip of South America) (USFWS 2015b).

Wintering areas for red knot include the northwest Gulf of Mexico from the Mexican State of Tamaulipas through Texas (particularly at Laguna Madre) to Louisiana, and the southeast US from Florida (particularly the central Gulf Coast) to North Carolina (USFWS 2015b). Habitat for the red knot is limited in Oklahoma with fewer than five red knots reported annually (Oklahoma Department of Wildlife Conservation 2019).

Of the approximately 502,100,900 acres of this species' total range, approximately 26,126,000 acres (5 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Piping Plover

Species Description

Unless otherwise noted, the following information is taken from the Draft Revised Recovery Plan for the Wintering Range of the Northern Great Plains Piping Plover (*Charadrius melodus*) and Comprehensive Conservation Strategy for the Piping Plover in its Coastal Migration and Wintering Range in the Continental United States (USFWS 2015c).

Piping plover are small, round, and robust shorebirds known for their high-pitched "piping" call. Piping plover have large, dark eyes and short, broad bills; their plumage ranges from gray to brown, with white undersides. As adults, piping plover develop a black collar as well as a distinct black line between their eyes on their forehead. During breeding season, their normally black bill develops an orange hue at its base.

The species is made up of two subspecies from three distinct breeding populations in three geographic regions in North America. Atlantic populations along the coast of the US and Canada belong to the *Charadrius melodus melodus* subspecies, while those in the Great Lakes and Northern Great Plains regions belong to *C. m. circumcinctus* (Miller et al. 2010).

Life History

Piping plover typically arrive on their breeding grounds the first half of April and begin nesting soon thereafter. Courting pairs can be observed foraging for invertebrates and defending territory on unvegetated or sparsely vegetated sandy, loamy, or rocky areas along beaches, lakeshores, marshes, lakes, and

rivers. Males construct nests and place them in loose substrate along exposed sandbars or shoreline. Nests are constructed by scraping away surface debris, creating a small depression near clumps of vegetation away from the high tide. Nesting and feeding territories are generally contiguous and may occupy an area of up to 2 acres. Incubation is shared by both adults, and eggs hatch in 25 to 28 days. Young leave the nest and begin to forage almost immediately.

Threats

Loss and degradation of riverine habitats from damming, water use, predation, invasive plants, and human disturbance are the primary threats to the species. Recent studies have indicated that impacts on piping plover habitat may be particularly exacerbated by increased human recreational use (Gibson et al. 2018). Anthropogenic disturbances such as dog walking and off-road vehicle use may lead to decreased body mass and increased mortality. Recreational use, as well as modifications to coastline and riverine habitat, may be reducing benthic invertebrate populations, thus reducing food availability for piping plover.

Status and Distribution

In January 1986, the piping plover was listed as federally threatened in the Northeast Region (Region 5) and federally endangered in the Great Lakes-Big River Region (Region 3) (50 *Federal Register 50726*). A 5-year review of the piping plover and ten other species was initiated in 2014.

Breeding activity is limited in the action area. Occasionally, birds from the northern Great Plains population nest in Oklahoma and Kansas. Generally, piping plovers favor open sand, gravel, or cobble beaches for breeding. Breeding sites are generally found on islands, lakeshores, coastal shorelines, and river margins. Piping plovers winter in coastal areas of the US from North Carolina to Texas.

Of the approximately 315,695,200 acres of this species' total range, approximately 23,888,000 acres (8 percent) occur in the action area.

Critical Habitat

Critical habitat has been designated for breeding populations in the northern Great Plains and Great Lakes watershed regions; however, no critical habitat for breeding populations exists within the action area. For wintering populations, a total of 256,513 acres of critical habitat have been designated along the Gulf Coast (USFWS 2002a). Approximately 77,000 acres (30 percent) of piping plover winter critical habitat is in the action area, as shown in **Figure D-3**.

Whooping Crane

Species Description

Adult whooping cranes are white with a red crown and a long, dark, pointed bill. Immature whooping cranes are cinnamon brown. While in flight, their long

necks are kept straight and their long dark legs trail behind. Adult whooping cranes' black wing tips are visible during flight. As the tallest North American bird, males approach 5 feet when standing erect. Males are generally larger than females (CWS and USFWS 2007).

Life History

Whooping cranes may start breeding as early as 3 years of age, but the average is 5 years. Most whooping cranes breed at Wood Buffalo National Park, Alberta, Canada, where they begin to arrive in April to begin nest construction. Generally, two olive-buff eggs are laid in late April or May, and they hatch approximately 1 month later; however, most breeding pairs, when successful, arrive at the winter range with one chick (CWS and USFWS 2007).

Whooping cranes winter at Aransas National Wildlife Refuge (NWR) in Texas, generally arriving between late October and mid-November. Spring migration generally begins in late March to mid-April, when whooping cranes depart Aransas NWR for breeding grounds at Wood Buffalo National Park. Parents separate from young of the previous season when they depart for spring migration.

Whooping crane is a long-lived species, with a lifespan of up to 30 years in the wild and up to 40 years in captivity (CWS and USFWS 2007).

Threats

The following factors have contributed to the whooping crane's decline (CWS and USFWS 2007):

- Habitat alteration or destruction from human population growth in North America, including conversion of much of the historical nesting habitat to agricultural production, and alterations in freshwater inflows to wintering grounds
- Hunting was a primary reason for historical decline; though now illegal, birds are occasionally mistakenly shot by hunters or purposefully shot by vandals.
- Adult whooping cranes are generally not susceptible to predation, but eggs and chicks are predated on breeding grounds by black bear (*Ursus americanus*), wolverine (*Gulo luscus*), gray wolf (*Canis lupus*), and other predators. In wintering grounds, predation by bobcat (*Lynx rufus*) and alligator (*Alligator mississippiensis*) are significant in introduced populations in Florida. Eagles also prey on juvenile whooping cranes during their migration.

Status and Distribution

The whooping crane was listed as endangered in 1967. The current International Recovery Plan for the Whooping Crane, Third Revision (CWS and USFWS 2007) was approved in 2007.

Wintering is at Aransas NWR as described above, which is in the action area. Whooping cranes migrating between winter and summer ranges pass through the action area, though there are no nesting areas there. Important stopover or roosting habitat for whooping crane, as defined by the USFWS Oklahoma ESFO (USFWS 2015d), occurs in the action area and is used by whooping cranes during migration. Important stopover or roosting habitat in Oklahoma along the migration corridor is defined as the Cimarron, Red, Washita, South Canadian, and Arkansas Rivers and all reservoirs or emergent (not forested) wetlands larger than 10 acres. Other stopover areas in the action area are the Washita and Salt Plains NWRs in Oklahoma, Kirwin and Quivira NWRs in Kansas, and the Cheyenne Bottoms State Wildlife Area in Kansas (see Figure 2 in CWS and USFWS 2007).

Of the approximately 380,007,400 acres of this species' total range, approximately 17,839,900 acres (5 percent) occur in the action area.

Critical Habitat

Critical habitat for whooping crane was designated in 1978 (43 *Federal Register* 20938). Critical habitat units are found in Kansas (Quivira NWR), Oklahoma (Salt Plains NWR), and Texas (Aransas NWR), as shown in **Figure D-4**. Of the 371,000 acres of critical habitat designated, approximately 149,800 acres (40 percent) occur in the action area.

Designated critical habitat primary constituent elements (PCEs) are:

- Space for individuals and population growth and for normal behavior
- Food, water, air, light, minerals, or other nutritional or physiological requirements
- Cover or shelter
- Sites for breeding, reproduction, or rearing
- Habitats that are protected from disturbances or are representative of the geographical distribution of the species

Red-cockaded Woodpecker

Species Description

Red-cockaded woodpecker is a relatively small black-and-white woodpecker with a longish bill that is black with barred white stripes above, and white with

black spots below. Males have a small red mark on the side of the nape (USFWS 2008a).

Life History

Red-cockaded woodpeckers are the only woodpeckers to excavate nest and roost sites over several years in living trees. Living in small family groups, red-cockaded woodpeckers are a social species and cooperatively breed. Red-cockaded woodpeckers live in groups with a breeding pair and as many as four helpers, usually male offspring from the previous year. Each group needs about 200 acres of mature pine forest to support its foraging and nesting habitat needs. Cavity (nesting) trees occupied by a group are called a cluster and may include 1 to 20 or more trees on 3 to 60 acres (USFWS 2008a).

Threats

Limiting factors are those that directly affect the number of potential breeding groups, because this is the primary driver of population size. Several factors currently affect the persistence of breeding groups, primarily the factors that limit suitable nesting habitat, such as fire suppression and lack of cavity trees. Fire suppression has resulted in the loss of potential breeding groups throughout the range of red-cockaded woodpeckers, because the birds cannot tolerate the hardwood encroachment that results from lack of fire (USFWS 2003a). Other threats to woodpeckers include lack of cavity trees (and potential cavity trees), habitat fragmentation, isolation of groups, degradation of foraging habitat, and genetic loss from small population sizes (USFWS 2003a).

Status and Distribution

The red-cockaded woodpecker was listed as endangered in 1970 (USFWS 1970a). There are an estimated 6,105 known active clusters across 11 states. This is less than 3 percent of estimated abundance at the time of European settlement (USFWS 2003a, 2006a).

The historical range included the southeastern Piedmont and Coastal Plain from New Jersey to Texas, and inland to Kentucky, Tennessee, Missouri, and Oklahoma. Now the species is virtually extirpated north of North Carolina and in all interior states except Arkansas. Populations are fragmented and most are quite small. The range includes McCurtain and Pushmataha Counties in southeastern Oklahoma, and Angelina, Cherokee, Grimes, Hardin, Houston, Jasper, Liberty, Montgomery, Nacogdoches, Newton, Polk, Sabine, San Augustine, San Jacinto, Shelby, Trinity, Tyler, and Walker Counties in eastern Texas (NatureServe 2019).

Of the approximately 115,768,400 acres of this species' total range, approximately 1,872,700 acres (2 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Interior Least Tern

Species Description

The least tern is the smallest North American tern. It is gray above, with a black cap and nape, white forehead, and a black line running from the crown through the eye to the base of the bill.

Life History

Least terns are colonial nesters. Colony size may vary from a few breeding birds to greater than 1,200. Least tern chicks leave their nests within a few days of hatching, but remain near the nests and are fed by their parents until fledging (USFWS 2013a).

Interior populations mainly eat aquatic invertebrates, primarily cyprinids (minnows). They nest in shallow depressions on the ground on sandy beaches, salt flats, or sparsely vegetated river or lake banks in North America; they winter in Mexico and Central America.

Threats

Their habitat has been decimated by human use of beaches and sandbars and by upstream dams that remove alluvium and create scour in river channels, reducing sandbars and beaches used for nesting.

Status and Distribution

Interior least tern was listed endangered on May 28, 1985 (USFWS 1985). Least terns were formerly more widespread and common but now survive only in scattered remnants. Interior least terns nest locally along the lower Mississippi River; the Missouri River and many of its tributaries in Kansas, Nebraska, South Dakota, North Dakota, and Montana; the Arkansas River in Oklahoma and Arkansas; the Cimarron and Canadian Rivers in Oklahoma and Texas; and the Red and Rio Grande Rivers in Oklahoma and Texas (USFWS 2013a).

The interior least tern has distinct breeding and wintering areas. Wintering is thought to occur on beaches along the Central American coast and along the northern coast of South America from Venezuela to northeastern Brazil. Wintering least terns have been reported in Guyana, El Salvador, and Guatemala.

Of the approximately 315,695,200 acres of this species' total range, approximately 23,870,000 acres (8 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Arkansas River Shiner

Species Description

The Arkansas River shiner is a small, streamlined minnow with a small, dorsally flattened head, rounded snout, and subterminal mouth.

Life History

Arkansas River shiners are open-water, broadcast spawners. They undergo multiple, asynchronous spawning events in a single season, beginning as early as April until as late as September (USFWS 2000).

Shiner eggs are nonadhesive, drifting with swift currents, and hatching occurs within 24 to 48 hours after spawning. After 3 to 4 days, larvae are capable of swimming and seek out backwater pools and quiet water at the mouth of tributaries where food is more abundant (USFWS 1998a).

These fish are generalized foragers, feeding on both pelagic and benthic food items, such as fly larvae, copepods, immature mayflies, insect eggs, seeds, and detritus (USFWS 1998a).

Historically, this species has inhabited the main channels of wide, shallow, sandy-bottomed rivers and larger streams of the Arkansas River basin. Juveniles inhabit quiet pools or backwaters, but adults are uncommon in these areas and almost never occur in tributaries with deep water and muddy or stony substrate (USFWS 1998a).

The species is considered a habitat generalist, with no obvious selection for any particular habitat (i.e., main channel, side channel, backwaters, and pools). Arkansas River shiners in the South Canadian River of central Oklahoma use a broad range of microhabitat features, and distributions are most strongly associated with water depth, sand ridge and midchannel habitats, dissolved oxygen, and current (USFWS 1998a).

Threats

A primary threat to the species is habitat destruction and modification from stream dewatering or depletion due to diversion of surface water and groundwater pumping, construction of impoundments, and water quality degradation. Other concerns are competition with the nonindigenous Red River shiner (*Notropis bairdi*) in the Cimarron River, incidental capture, drought, and other natural factors.

Status and Distribution

The USFWS listed the Arkansas River basin population as a threatened species under the ESA in 1998 mainly due to habitat destruction and modification (USFWS 1998a).

Historically, the Arkansas River shiner was widespread and abundant throughout the western portion of the Arkansas River basin in Kansas, New Mexico, Oklahoma, and Texas. It has disappeared from over 80 percent of its historical range and is now almost entirely restricted to about 508 miles of the Canadian River in New Mexico, Oklahoma, and Texas. An extremely small population may still persist in the Cimarron River in Oklahoma and Kansas as well as in the Beaver/North Canadian River of Oklahoma (USFWS 2005).

Of the approximately 18,114,300 acres of this species' total range, approximately 2,126,800 acres (12 percent) occur in the action area.

Critical Habitat

The USFWS designated final critical habitat for the Arkansas River basin population of the Arkansas River shiner in 2005 within portions of the Canadian River (often referred to as the South Canadian River) in New Mexico, Texas, and Oklahoma; the Beaver/North Canadian River in Oklahoma; the Cimarron River in Kansas and Oklahoma; and the Arkansas River in Kansas. Critical habitat covers approximately 532 miles of linear distance of rivers, including 300 feet of adjacent riparian areas measured laterally from each bank (USFWS 2005). Of the 31,600 acres of critical habitat designated, approximately 21,200 acres (67 percent) occur in the action area, as shown in **Figure D-5**.

Critical habitat PCEs are (USFWS 2000):

1. A natural, unregulated hydrologic regime complete with episodes of flood and drought or, if flows are modified or regulated, a hydrologic regime characterized by the duration, magnitude, and frequency of flow events capable of forming and maintaining channel and instream habitat necessary for particular Arkansas River shiner life stages in appropriate seasons

2. A complex, braided channel with pool, riffle (shallow area in a streambed causing ripples), run, and backwater components that provide a suitable variety of depths and current velocities in appropriate seasons

3. A suitable, unimpounded stretch of flowing water of sufficient length to allow hatching and development of the larvae

4. Substrates of predominantly sand, with some patches of silt, gravel, and cobble

5. Water quality characterized by low concentrations of contaminants and natural, daily and seasonally variable temperature, turbidity, conductivity, dissolved oxygen, and pH

6. Abundant terrestrial, semiaquatic, and aquatic invertebrate food base

7. Few or no predatory or competitive nonnative species present

Neosho Madtom

Species Description

The Neosho madtom is a small fish in the catfish family (Ictaluridae). It occurs in the Cottonwood, Neosho, and Spring Rivers in Kansas. Its range minimally extends into Oklahoma and Missouri (USFWS 2013b).

Life History

The Neosho madtom is short lived, typically living 1 to 2 years and possibly only reproducing in a single season. Spawning likely takes place during high-flow events in May and June. Spawning Neosho madtom may use cavity spaces at the head or crest of gravel bars as nests (USFWS 2013b).

Neosho madtom lives on riffles and gravel bars at the bottom of shallow streams. It primarily inhabits shallow gravel substrates (05. To 2.5 inches in diameter), where it remains during the day. It comes out at night to forage, primarily on aquatic insect larvae. Adults prefer gravel riffles with currents of 1 to 4 feet per second (USFWS 2013b).

Population sizes and densities can be highly variable between individual sample sites and years. The availability of suitable substrate, water quality, and aquatic invertebrates are the major influences on Neosho madtom population distribution and numbers (USFWS 2013b).

Threats

Habitat destruction and modification, primarily due to impoundments, dredging activities, and increased water demands, have decreased the distribution and abundance of the species and isolated populations (USFWS 1990a). Habitat alteration and fragmentation by dams have limited the species to approximately two-thirds of its original range.

Status and Distribution

The USFWS listed the Neosho madtom as a threatened species under the ESA in 1990 (USFWS 1990a).

Historically, the Neosho madtom range included the main stem rivers of the Neosho and Spring River drainage system south to the Neosho's confluence with the Arkansas River in Oklahoma (the Neosho River is now referred to as the Grand River in Oklahoma). It also occurred in the Illinois River in Oklahoma.

The original recovery plan for the species (USFWS 1991a) recognized three populations: the Cottonwood and Neosho River population upstream from John Redmond Dam; the Neosho River population downstream of John Redmond Dam to the backwaters of Lake O' the Cherokees in Ottawa County, Oklahoma; and the Spring River population from the confluence of the North

Fork Spring River in Jasper County, Missouri, downstream to its confluence with Turkey Creek (USFWS 2013b).

Since then, the Spring River population has been isolated from its Neosho River source population by the Lake O' the Cherokees, and the species has been captured downstream of Empire Lake, suggesting that two separate populations likely exist in the Spring River.

Additionally, the species has been found in the South Fork of the Cottonwood River. In 1987, it was found in Lightning Creek in Labette County, Kansas (see Figure 1 in USFWS 2013b).

Of the approximately 5,546,500 acres of this species' total range, approximately 466,600 acres (8 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Pallid Sturgeon

Species Description

The pallid sturgeon is a bottom-dwelling, slow-growing fish native to the Missouri and Mississippi Rivers.

Life History

Pallid sturgeon are long lived and reach reproductive age relatively late (5 years of age for males and 15 to 20 years for females). Water temperatures influence growth and maturity, while fecundity is related to body size. Females spawn every 2 to 3 years, with larger fish producing as many as 150,000–170,000 eggs and smaller females producing 43,000–58,000 eggs (USFWS 2014b).

Adults can move long distances upstream prior to spawning. Spawning occurs between March and July, but fish at lower latitudes typically spawn earlier than those at higher latitudes. The timing is influenced by day length, water temperature, and flow. Eggs likely hatch within 5 to 7 days, and larvae are predominantly pelagic. They drift for 11 to 13 days and likely disperse several hundred miles downstream (USFWS 2014b).

Little is known about egg deposition, fertilization, and retention in spawning substrate outside of controlled laboratory settings. Spawning habitat in the Lower Missouri River is characterized by deep, relatively fast, and turbulent flow, on the outside of river bends. Spawning habitat on the Upper Missouri and Yellowstone Rivers consists of gravel patches interspersed with compacted sand in deep, relatively fast flows (Deloney et al. 2016).

Ideal habitat conditions for pallid sturgeon are large, free-flowing, warm-water, and turbid rivers with a diverse assemblage of dynamic physical habitats. They

primarily occur in main channel, secondary channel, and channel border habitats throughout their range and are rarely seen in backwaters or sloughs. Specific habitat use may vary with availability and by life stage, size, age, and geographic location. Juveniles and adults primarily feed on fish and aquatic insect larvae (USFWS 2014b).

The species is often associated with sandy and fine bottom materials and is typically found in areas where relative depths (the depth at the fish location divided by the maximum channel cross section depth) exceed 75 percent. Bottom water velocities where individuals have been collected range from 1.9 feet per second to 2.9 feet per second. Fish have been collected from locations with both high and low levels of turbidity but appear to be adapted to low-visibility environments (USFWS 2014b).

Threats

The main threats to pallid sturgeon include activities that affect river connectivity and hydrology, illegal harvest, impaired water quality and quantity, entrainment, and life history attributes that limit reproductive rates (USFWS 2014b).

Status and Distribution

Pallid sturgeon was listed as an endangered species under the ESA in 1990 (USFWS 1990b).

Pallid sturgeon inhabit the Missouri and Mississippi Rivers and some tributaries from Montana to Louisiana. The historical distribution included the Missouri and Yellowstone Rivers in Montana downstream to the Missouri-Mississippi confluence and the Mississippi River possibly from near Keokuk, Iowa, downstream to New Orleans, Louisiana (USFWS 2014b).

Beginning in the mid to late 1960s, the species experienced a dramatic decline throughout its range due to habitat modification through river channelization, construction of impoundments, and related changes in water flow. Since listing in 1990, sturgeon has been documented in several reaches of the Missouri River, in the lower Milk and Yellowstone Rivers, the lower Big Sioux River, the lower Platte River, the lower Niobrara River, and the lower Kansas River (see Figure 3 in USFWS 2014b).

Of the approximately 90,418,900 acres of this species' total range, approximately 176,800 acres (less than1 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Neosho Mucket

Species Description

The Neosho mucket is a freshwater mussel in the family Unionidae. It is endemic to the Arkansas River system and inhabits rivers and streams in Arkansas, Kansas, Missouri, and Oklahoma.

Life History

Neosho muckets spawn in late April and May, and female brooding occurs May through August. The average fecundity of muckets in the Spring River, Kansas, was reported as approximately 1.3 million glochidia per female. Neosho mucket glochidia[1] are obligate parasites on several bass species. After transformation, juvenile mussels drop from their fish host and sink to the stream bottom where, given suitable conditions, they grow and mature into adults (USFWS 2012a).

Little is known about the Neosho mucket's habitat requirements. The species is associated with shallow riffles and runs comprised of gravel substrate and moderate to swift currents. It is most often found in areas with swift current, but in Shoal Creek and the Illinois River it occurs in areas out of the main current (USFWS 2018a).

Freshwater mussels generally live embedded in the bottom of rivers, streams, and other bodies of water. Mussels are filter feeders that generally position themselves on or near the substrate to take in oxygen and food from the water column. Juveniles typically burrow completely beneath the substrate and use their pedal (foot) to bring food particles inside their shell for ingestion. Sources of nutrition include algae, bacteria, detritus, microzooplankton, and potentially dissolved organic matter (USFWS 2012a).

Threats

Threats include curtailment of habitat and range, small population sizes, and their resulting vulnerability to natural or human-induced events, such as impoundments, sedimentation, chemical contaminants, mining, invasive species, and temperature (USFWS 2018a).

Status and Distribution

The USFWS listed the species as endangered under the ESA in 2013 (USFWS 2013c).

Neosho mucket historically occurred in at least 17 streams within the Illinois, Neosho, and Verdigris River basins covering four states (Arkansas, Kansas, Oklahoma, and Missouri). Data indicate it has been extirpated from approximately 834 miles or 62 percent of its historical range. Currently, disjunct populations occur over approximately 509 river miles. Most of this extirpation

[1] A microscopic larval stage of some freshwater mussels

has occurred within the Oklahoma and Kansas portions of the species' range (Table 1 in USFWS 2012a).

With the exception of one viable population in the Spring River, all extant populations are declining (USFWS 2018a). Mechanisms contributing to the decline of the species range from local (e.g., riparian clearing and chemical contaminants) to regional influences (e.g., altered flow regimes, sedimentation, and channelization), and global climate change (USFWS 2018a).

Of the approximately 13,405,800 acres of this species' total range, approximately 3,914,700 acres (29 percent) occur in the action area.

Critical Habitat

Critical habitat for the Neosho mucket was designated in 2015 and consists of approximately 528 river miles in Arkansas, Kansas, Missouri, and Oklahoma (USFWS 2015e). Of this, approximately 55.1 miles (10 percent) occur in the action area, as shown in **Figure D-6**.

The PCEs of final critical habitat for the Neosho mucket are as follows (USFWS 2015e):

(1) Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish, such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae

(2) A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats

(3) Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages

(4) The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the Neosho mucket.

Suitable fish hosts for Neosho mucket glochidia include smallmouth bass (*Micropterus dolomieu*), largemouth bass (*Micropterus salmoides*), and spotted bass (*Micropterus punctulatus*).

(5) Competitive or predaceous invasive (nonnative) species in quantities low enough to have a minimal effect on survival of freshwater mussels

Rabbitsfoot Mussel

Species Description

The rabbitsfoot mussel is a medium to large freshwater mussel in the family Unionidae. It is found in streams and rivers within the lower Great Lakes subbasin and Mississippi River basin.

Life History

Brooding occurs between May and late August. During brooding periods, rabbitsfoot exhibits seasonal movement toward shallower water. This strategy increases host fish exposure but also vulnerability to predation and fluctuating water levels, especially downstream of dams.

Females use all four gills as a marsupium or brooding pouch for its glochidia, which they release as conglutinates[2]. Fecundity in river basins west of the Mississippi River ranged from 46,000 to 169,000 larvae per female. Glochidia attach to suitable fish hosts, which include various species of shiners. After transformation, juvenile mussels drop from their fish host and sink to the stream bottom where they develop into adults under suitable conditions (USFWS 2012a).

Rabbitsfoot primarily inhabits small- to medium-sized streams and also occurs in some larger rivers. These mussels usually are found in shallow water areas along the bank and adjacent runs and shoals with relatively lower water velocity. They also have been found in deep water runs of 9 to 12 feet of water. This species seldom burrows but lies on its side in generally gravelly and sandy substrates (USFWS 2012a).

Status and Distribution

The USFWS listed the species as threatened under the ESA in 2013 (USFWS 2013c).

Rabbitsfoot historically occurred in 140 streams within the lower Great Lakes subbasin and Mississippi River basin in Alabama, Arkansas, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, Tennessee, and West Virginia. Populations are considered to be extant in 51 streams in 13 states, representing a 64 percent decline relative to historical populations (Table 2 USFWS 2012a). Extant populations are highly

[2] matrices holding numerous glochidia together and embryos and undeveloped ova

fragmented and restricted to short reaches. Historical and current data indicate the rabbitsfoot is declining range-wide (USFWS 2012a).

Of the approximately 42,450,300 acres of this species' total range, approximately 1,998,400 acres (5 percent) occur in the action area.

Critical Habitat

Critical habitat for the rabbitsfoot was designated in 2015 and consists of approximately 1,431 river miles in Alabama, Arkansas, Illinois, Indiana, Kansas, Kentucky, Mississippi, Missouri, Ohio, Oklahoma, Pennsylvania, and Tennessee (USFWS 2015e). Of this, approximately 39.1 miles (3 percent) occur in the action area, as shown in **Figure D-7**.

The PCEs of final critical habitat for the rabbitsfoot are as follows (USFWS 2015e):

(1) Geomorphically stable river channels and banks (channels that maintain lateral dimensions, longitudinal profiles, and sinuosity patterns over time without an aggrading or degrading bed elevation) with habitats that support a diversity of freshwater mussel and native fish, such as stable riffles, sometimes with runs, and mid-channel island habitats that provide flow refuges consisting of gravel and sand substrates with low to moderate amounts of fine sediment and attached filamentous algae

(2) A hydrologic flow regime (the severity, frequency, duration, and seasonality of discharge over time) necessary to maintain benthic habitats where the species are found and to maintain connectivity of rivers with the floodplain, allowing the exchange of nutrients and sediment for maintenance of the mussel's and fish host's habitat, food availability, spawning habitat for native fishes, and the ability for newly transformed juveniles to settle and become established in their habitats

(3) Water and sediment quality (including, but not limited to, conductivity, hardness, turbidity, temperature, pH, ammonia, heavy metals, and chemical constituents) necessary to sustain natural physiological processes for normal behavior, growth, and viability of all life stages

(4) The occurrence of natural fish assemblages, reflected by fish species richness, relative abundance, and community composition, for each inhabited river or creek that will serve as an indication of appropriate presence and abundance of fish hosts necessary for recruitment of the rabbitsfoot. Suitable fish hosts for rabbitsfoot may include, but are not limited to, blacktail shiner (*Cyprinella venusta*) and cardinal shiner (*Luxilus cardinalis*) from the Black and Little Rivers, red shiner (*C. lutrensis*), spotfin shiner (*C. spiloptera*), bluntface shiner (*C. camura*), rainbow darter (*Etheostoma caeruleum*), rosyface shiner

(*Notropis rubellus*), striped shiner (*L. chrysocephalus*), and emerald shiner (*N. atherinoides*).

(5) Competitive or predaceous invasive (nonnative) species in quantities low enough to have a minimal effect on survival of freshwater mussels

American Burying Beetle

Species Description

The American burying beetle is a member of the beetle family Silphidae and is in the subfamily Nicrophorinae. *Nicrophorus* species bury vertebrate carcasses for reproductive purposes and exhibit parental care of young. The American burying beetle is the largest species of its genus in North America, measuring 1 to 1.4 inches long. The body is shiny black and has hardened protective wings with two scalloped-shaped, orange-red markings. The most diagnostic feature of the American burying beetle is the large orange-red marking behind the head, a feature shared with no other members of the genus in North America (USFWS 1991b).

Life History

The American burying beetle is an annual species, fully nocturnal, and active when night temperatures consistently exceed 60 degrees Fahrenheit (°F; USFWS 1991b). The American burying beetle is dormant the remainder of the year (September to May). Adults and larvae are dependent on carrion for food and reproduction. The preferred carrion sources are dead birds and small mammals, which the American burying beetle can locate from up to 2 miles away (USFWS 1991b).

This species is known to occur in grasslands, old field shrubland, and hardwood forests. Vegetation communities range from large mowed and grazed fields to dense shrub thickets. Oklahoma habitats vary from deciduous oak-hickory and coniferous forests atop ridges or hillsides to deciduous riparian corridors and pasturelands on valley floors. Soil characteristics are also important to the beetle's ability to bury carrion. Extremely xeric, saturated, or loose sandy soils are unsuitable for these activities (USFWS 1991b).

Threats

The decline of American burying beetle has been attributed to disease/pathogens, pesticide use, direct habitat loss and alteration, interspecific competition, increased competition for prey and edge habitat, decreased abundance of prey, loss of genetic diversity in isolated populations, and certain agricultural and grazing practices (USFWS 1991b).

Status and Distribution

American burying beetle was listed as endangered in 1989 (54 *Federal Register* 29652). The Final Recovery Plan was completed in 1991 (USFWS 1991b). A 5-

year review was completed in 2008 (USFWS 2008b) that recommended the status remain endangered. In 2019, the USFWS proposed to downlist American burying beetle from endangered to threatened and issued a 4(d) rule (USFWS 2019b).

Historically, this species occurred in the eastern United States and Ontario and Nova Scotia, Canada. It is currently known to be extant only on Block Island in Rhode Island and in Nebraska, South Dakota, Oklahoma, and likely Arkansas (NatureServe 2019). It was confirmed in Texas in 2004.

Of the approximately 50,755,100 acres of this species' total range, approximately 11,258,500 acres (22 percent) occur in the action area. The current known distribution of this species is depicted in **Figure D-8**. Approximately 3,854,300 acres of conservation priority areas (CPAs)[3] are in the action area, as shown in **Figure D-8**.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Gray Bat

Species Description

The gray bat is one of the largest species in the genus *Myotis* in eastern North America. Gray bats are distinguished from other bats by the unicolored gray fur on their backs and the wing membrane connection to their ankle instead of at the toe (USFWS 2009a).

Life History

Gray bats are nocturnal and eat a variety of flying aquatic and terrestrial insects present along rivers, streams, lakes, or reservoirs (USFWS 2009a). Gray bats occupy caves or cave-like habitats year-round, with few rare exceptions. During the winter, gray bats hibernate in deep, vertical caves. In the summer, they roost in caves scattered along rivers. These caves are in limestone karst areas of the southeastern United States. They have not been documented using man-made buildings or bridges.

Threats

Human disturbance is the main reason for the continued decline of gray bats in caves that are not protected. While gray bats can be infected by white-nose syndrome, mortality is rarely observed and it does not appear white-nose syndrome is a threat to gray bat populations, which is the primary threat for other *Myotis* species (Anderson 2018).

[3] CPAs are areas with recent (within 10 years) documented beetle presence that the USFWS believes are likely to contain important conservation elements, such as documented presence over multiple years; relatively high-density populations; suitable breeding, feeding, and sheltering habitat; and carrion resources (USFWS 2014c).

Status and Distribution

The gray bat was listed endangered on April 28, 1976, by the USFWS. The Gray Bat Recovery Plan was completed in 1982 (USFWS 1982). Survey efforts and attempted population estimates of changes have shown increases in population levels over 100 percent since 1982. Although populations have increased, nine priority cave populations are still roughly 37 percent of historical populations at these sites (USFWS 2009a). Overall, this species is recovering, and numbers have increased significantly in many areas.

The gray bat occupies a limited geographic range in limestone karst areas of the southeastern United States. The primary range of gray bats is concentrated in the cave regions of Alabama, Arkansas, Kentucky, Missouri, and Tennessee, with smaller populations found in adjacent states (USFWS 2009a). A few can be found in northwestern Florida, western Georgia, southeastern Kansas, southern Indiana, southern and southwestern Illinois, northeastern Oklahoma, northeastern Mississippi, western Virginia, and possibly western North Carolina (USFWS 1997a).

Of the approximately 111,004,400 acres of this species' total range, approximately 2,130,300 acres (2 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Northern Long-eared Bat

Species Description

The northern long-eared bat is a medium-sized bat about 3 to 3.7 inches in length, weighing about a quarter of an ounce. This bat is distinguished by its long ears compared with other *Myotis* species.

Life History

Like most North American bats, northern long-eared bats emerge at dusk to feed on a variety of insects during the night. They primarily forage through the understory of forested areas feeding on moths, flies, leafhoppers, caddisflies, and beetles, which they catch in flight using echolocation or by gleaning insects from vegetation.

Northern long-eared bats predominantly overwinter in hibernacula that include caves and abandoned mines. Hibernacula are so significant to the northern long-eared bat that they are considered a primary driver in the species distribution (USFWS 2016b). The overwinter physiological needs of the species include maintaining body temperature above freezing, minimizing water loss, meeting energetic needs until prey again become available, and responding to disturbance or disease, such as white-nose syndrome. Due to the complex interactions of hibernacula characteristics and bat physiology, changes or

disturbances to hibernacula can significantly affect the survival of hibernating bats (USFWS 2016b).

Hibernacula and surrounding forest habitats play important roles in the life cycle of the northern long-eared bat beyond the time when the bats are overwintering. In both the early spring and fall, the hibernacula and surrounding forested habitats are the focus of bat activity in two separate periods referred to as "spring staging" and "fall swarming."

During the spring staging, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but reenter the same or alternative hibernacula to resume daily bouts of torpor. During the summer, northern long-eared bats roost individually or in colonies underneath bark and in cavities or in crevices of both live trees and snags. Beginning in mid- to late summer, after their young have gained some level of independence, northern long-eared bats exhibit a behavior near hibernacula referred to as fall swarming. Both males and females are present at swarming sites (often with other species of bats) where heightened activity is observed, followed by increased breeding behavior and bouts of torpor prior to winter hibernation (USFWS 2016b).

Threats

The northern long-eared bat is one of the species of bats most affected by the disease white-nose syndrome. White-nose syndrome is the main threat to this species and has caused an extensive decline in bat numbers (in many cases, 90–100 percent of hibernacula populations) where the disease has occurred. Declines in the numbers of northern long-eared bats are expected to continue as white-nose syndrome extends across the species' range (USFWS 2016b). Other sources of decline include disturbance to hibernacula (such as recreationists or gates or other structures on caves and mines), loss or degradation of summer habitat, wind farm operations, and climate change stressors.

Status and Distribution

Due to declines caused by white-nose syndrome and the continued spread of the disease, the northern long-eared bat was listed as threatened under the Endangered Species Act on April 2, 2015 (USFWS 2016b).

The northern long-eared bat is found across much of the eastern and north-central United States and all Canadian provinces from the Atlantic coast west to the southern Northwest Territories and eastern British Columbia. The species' range includes 37 states, including Nebraska, Kansas, and Oklahoma. The northern long-eared bat's range does not include Texas (NatureServe 2019).

Of the approximately 809,117,500 acres of this species' total range, approximately 8,975,200 acres (10 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

3.2.2 Plants

Table 3-2
Plant Species and Critical Habitat Considered and Evaluated – Multiple State ESFOs

Common and Scientific Name	Status[1]	Critical Habitat	ESFOs	Assessed/Rationale for Exclusion
Western prairie fringed orchid *Platanthera praeclara*	T	No	KS, NE	Analyzed in detail; see *Plants* species assemblage

Source: USFWS IPaC, April 22, 2019
[1]Status codes:
T—Federally listed threatened

Western Prairie Fringed Orchid

Species Description

The western prairie fringed orchid is a terrestrial member of the orchid family (Orchidaceae) and is a smooth, erect, perennial herb growing up to 4 feet tall. The open, spike-like flowering stalk bears up to 24 showy, 1-inch wide, white flowers that are notable for the fringed lower petal from whence the common name is derived (USFWS 1996a).

Life History

Plants bloom from mid-June in the southern portion of the range to late July in the northern portion. Individual flowers last up to 10 days, and inflorescences produce flowers for up to 3 weeks. Pollination is required for seed production, and this species may have developed reproductive structures adapted for pollination by prairie hawkmoths. Seeds mature on the plant and are released in early fall with each seed capsule containing thousands of seeds, which the wind disperses. Continued growth of the seedling in natural conditions requires association with a compatible soil-inhabiting mycorrhizal fungus; after infection with this symbiont fungus, orchids may persist in an underground stage until or beyond the second year before the first green foliage leaves appear (USFWS 1996a).

Threats

Published accounts and herbarium records suggest that western prairie fringed orchid was widespread and perhaps locally common prior to European settlement (NatureServe 2019). Declines are due to the extensive and ongoing conversion of the tallgrass prairie to agricultural uses throughout the range (NatureServe 2019).

Status and Distribution

The western prairie fringed orchid was classified as threatened under the ESA on September 28, 1989 (54 *Federal Register* 39857).

The western prairie fringed orchid is endemic to the North American tallgrass prairie and is found most often on unplowed, calcareous prairies and sedge meadows. Tallgrass prairies within which the orchid occurs are usually dominated by big bluestem (*Andropogon gerardii*), little bluestem (*A. scoparius*), and Indiangrass (*Sorghastrum nutans*), with tufted hairgrass (*Deschampsia caespitosa*) and switchgrass (*Panicum virgatum*) common associates in wetter sites (USFWS 1996a).

The western prairie fringed orchid is known from 172 extant occurrences and is restricted to west of the Mississippi River. It is known or believed to occur in Colorado, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wyoming (NatureServe 2019; USFWS 2019c). The western prairie fringed orchid has experienced over a 60 percent decline, with about 37 populations remaining in 7 states (USFWS 1989a).

Of the approximately 118,702,800 acres of this species' total range, approximately 364,800 acres (less than 1 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

3.3 SPECIES UNDER THE JURISDICTION OF THE OKLAHOMA ESFO

3.3.1 Wildlife

Table 3-3
Wildlife Species and Critical Habitat Considered and Evaluated – Oklahoma ESFO

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Fishes	Ozark cavefish *Amblyopsis rosae*	T	No	Analyzed in detail; see *Cave-dwelling Fishes* species assemblage
	Leopard darter *Percina pantherina*	T	Designated	Analyzed in detail; see *Benthic-spawning Fishes* species assemblage
Mollusks	Ouachita rock pocketbook *Arkansia wheeleri*	E	No	Analyzed in detail; see *Freshwater Mollusks* species assemblage
	Scaleshell *Leptodea leptodon*	E	No	Analyzed in detail; see *Freshwater Mollusks* species assemblage
	Winged mapleleaf *Q. fragosa*	E	No	Analyzed in detail; see *Freshwater Mollusks* species assemblage
Insects	Rattlesnake-master borer moth *Papaipema eryngii*	C	No	Analyzed in detail

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Mammals	Ozark big-eared bat *Corynorhinus townsendii ingens*	E	Proposed	Analyzed in detail; see *Bats* species assemblage. There is no proposed critical habitat in the action area; thus, the proposed action would have **no effect** on proposed critical habitat.
	Indiana bat *M. sodalis*	E	Designated	Analyzed in detail; see *Bats* species assemblage. There is no designated critical habitat in the action area; thus, the proposed action would have **no effect** on designated critical habitat.
Reptiles	American alligator *Alligator mississippiensis*	T[2]	No	The 1987 rule downlisting this species from endangered to threatened due to similarity in appearance, formally recognized that the American alligator is no longer biologically threatened or endangered, but that a need for continued federal controls on taking and commerce is needed to protect the American crocodile (C*rocodylus acutus*; USFWS 1987a). Since the proposed action does not involve commerce or direct harvest of American alligators, the proposed action would have **no effect** on American alligators or American crocodiles.

Source: USFWS IPaC, April 22, 2019
[1]Status codes:
E—Federally listed endangered; T—Federally listed threatened; C—Candidate for federal listing
[2] Threatened due to similarity of appearance

Ozark Cavefish

Species Description

The Ozark cavefish lives in caves, sinkholes, and underground springs and aquifers that are untouched by light. They have only vestigial eyes, with no optic nerve, a flattened head, and a slightly protruding lower jaw. Ozark cavefish grows to approximately 2 inches in length. The species lacks pigment cells and appears pinkish-white (USFWS 1989b).

Life History

Ozark cavefish is carnivorous, consuming crayfish, salamanders and their eggs, arthropods, isopods, and at times, newly hatched or juvenile cavefish (Graening and Brown 2003). Only about 20 percent of sexually mature females develop

ova each year; this reproductive limitation may come about from limited food availability in the cave environment (Poulson 1963; Romero 2001).

In general, Ozark cavefish biology and life history are poorly understood with little data available to suggest life span, spawning season, number of eggs, egg survival, mouth brooding or not, population genetics, and various other aspects of its ecology (USFWS 2011a).

Threats

Threats include human entry to suitable habitat areas, agriculture with the associated loss of canopy cover and groundwater quality impacts, and urbanization and development (USFWS 2011a).

Status and Distribution

Ozark cavefish was listed as threatened in 1984 (49 *Federal Register* 43965). A recovery plan was finalized in 1989 (USFWS 1989b). The USFWS conducted a 5-year review in 1991 (56 *Federal Register* 56882), in which the status of many species were simultaneously evaluated with no in-depth assessment of the five factors or threats as they pertain to the individual species. No change in the fish's listing classification was recommended. A second 5-year review was completed in 2011 (USFWS 2011a) that recommended the status remain threatened.

Ozark cavefish distribution is restricted to the Springfield plateau geologic province of Arkansas, Missouri, and Oklahoma. The Springfield plateau is drained by the White, Neosho, and Osage Rivers. There are 41 Ozark cavefish caves and wells in Arkansas, Missouri, and Oklahoma that are considered active. These are distributed throughout ten counties, including Benton County in Arkansas; Greene, Jasper, Lawrence, Newton, Christian, Barry, and Stone Counties in Missouri; and Delaware and Ottawa Counties in Oklahoma. Arkansas has 9 caves, Missouri has 22 caves and wells, and Oklahoma has 10 caves (USFWS 2011a).

Of the approximately 4,901,600 acres of this species' total range, approximately 565,800 acres (12 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Leopard Darter

Species Description

Leopard darters grow to approximately 3 inches in length, are olive to tan in color, with a distinctive pattern of 11 to 14 round black spots along their sides (USFWS 1993a).

Life History

Leopard darters are predominantly pool dwellers, with a preference for water depths of 10 to 39 inches, substrates of rubble or boulder, and no detectable current. Leopard darters migrate upstream from pools to riffle tailwater areas, where spawning occurs from March to April. Eggs are buried in fine gravel and hatch in about 7 days, and larvae drift back downstream to the pool habitat (USFWS 1993a).

Leopard darters feed mainly on microcrustaceans as juveniles, and on immature aquatic insects as adults (USFWS 1993a).

Threats

Habitat loss and degradation are the principal factors affecting survival of the leopard darter. The single most important factor resulting in leopard darter habitat destruction has been the development and operation of impoundments; water quality deterioration due to agricultural and industrial activities was also identified as a major threat to the survival of the leopard darter (USFWS 2012b).

Status and Distribution

Leopard darter was listed as threatened in 1978 (43 *Federal Register* 3711). A recovery plan was issued in 1984 and revised in 1993 (USFWS 1993a). The most recent 5-year review was completed in 2012 (USFWS 2012b) and recommended the status remain threatened.

This species is endemic to the Little River basin of southeast Oklahoma and southwest Arkansas. The species currently occupies portions of the Little River upstream of Pine Creek Reservoir; Glover River upstream of the vicinity of the community of Glover, Oklahoma; Mountain Fork River upstream of Broken Bow Reservoir; Robinson Fork River upstream of its confluence with Rolling Fork River; and Cossatot River upstream of Gillham Reservoir. Populations have also been found in some of the larger tributaries of these rivers (USFWS 2012b).

Of the approximately 1,429,100 acres of this species' total range, approximately 349,100 acres (24 percent) occur in the action area.

Critical Habitat

Critical habitat for leopard darter was designated in 1978 (43 *Federal Register* 3711). Critical habitat units are found in Oklahoma and Arkansas, as shown in **Figure D-9**. In Oklahoma, they include portions of the Little River, Black Fork Creek, Glover Creek (including the East Fork and West Fork), and Mountain Fork Creek. In Arkansas they include portions of Mountain Fork Creek.

Of the 2,800 acres of critical habitat designated, approximately 900 acres (32 percent) occur in the action area.

Critical habitat PCEs are not identified in the proposed (41 *Federal Register* 27735) or final rulemaking; however, "these areas were found to have environmental elements necessary for successful reproduction and growth" of leopard darter (43 *Federal Register* 3714).

Ouachita Rock Pocketbook

Species Description

Ouachita rock pocketbook is a freshwater mussel, with a chestnut brown to black, thickened, moderately heavy shell, up to 4.4 inches in length (USFWS 2004a).

Life History

Fertilization of females occurs in the late summer or early fall. Glochidia[4] may parasitize one of several suitable fish species, and may remain attached to hosts for between 6 and 57 days before detaching as juveniles (USFWS 2018b).

Threats

Threats identified at listing included construction and operation of large impoundments, river channelization, flow modifications, water quality degradation from point sources and nonpoint sources of pollution, gravel excavation, and operation of land vehicles in streams (USFWS 2004a). These threats continue to limit the species' success (USFWS 2018b).

Status and Distribution

Ouachita rock pocketbook was listed as endangered in 1991 (56 *Federal Register* 54950). A recovery plan was completed in 2004 (USFWS 2004a). The most recent 5-year review was completed in 2018 (USFWS 2018b) and recommended the status remain endangered.

Ouachita rock pocketbook occurs in several river systems in southeast Oklahoma and southern Arkansas. In Oklahoma, it occurs in the Kiamichi, Little, and Mountain Fork Rivers. It occurs in the Ouachita River in Arkansas (USFWS 2018b).

Of the approximately 5,594,100 acres of this species' total range, approximately 1,089,100 acres (19 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

[4] A parasitic larva of certain freshwater bivalve mollusks, which attaches itself by hooks and suckers to the fins or gills of fish

Scaleshell

Species Description

Scaleshell is a freshwater mussel. Shells are yellow-green to brown, elongate, very thin, compressed, and rhomboidal. The shell reaches a length of approximately 4 inches, although old individuals may reach 4.7 inches. Shells of male and female individuals vary markedly (USFWS 2010a).

Life History

Relatively little is known of the life history of the scaleshell. Its general biology is believed to be similar to other bivalved mollusks belonging to the family Unionidae. The scaleshell must complete a parasitic phase on the fish species freshwater drum (*Aplodinotus grunniens*) to complete its life cycle. The scaleshell's complex life cycle and extreme rarity hinders its ability to reproduce (USFWS 2010a).

Threats

The major causes of habitat loss are still present in streams throughout its range, including water quality degradation, sedimentation, channelization, sand and gravel mining, dredging, and impoundments (USFWS 2010a). New information has been discovered with respect to water quality. In studies since 2001, mussels have been found to be very sensitive to ammonia, a common stream pollutant in the scaleshell's range resulting from agricultural activities (USFWS 2011b).

Status and Distribution

Scaleshell mussel was listed as endangered in 2001 (66 *Federal Register* 51322). A recovery plan was completed in 2010 (USFWS 2010a). A 5-year review was completed in 2011 (USFWS 2011b) and recommended the status remain endangered.

The scaleshell occurs in medium to large rivers with low to medium gradients. It inhabits a variety of substrate types, but is primarily found in stable riffles and runs with slow to moderate current velocity (USFWS 2010a). The scaleshell mussel once occurred in 56 rivers in the Mississippi River drainage. The species has undergone a dramatic reduction in range. While the species has been documented from 18 streams in the last 25 years, including the Kiamichi River in Oklahoma, it can only be found consistently in three streams in Missouri where it is still very rare (USFWS 2010a).

The Kiamichi River in Oklahoma supports a detectable population, as three fresh-dead shells have been found since 2001; but the species is extremely rare in this river (USFWS 2011b).

Of the approximately 17,345,500 acres of this species' total range, approximately 1,788,300 acres (1 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Winged Mapleleaf

Species Description

The winged mapleleaf is a freshwater mussel found in medium to large rivers of the midwestern United States.

Life History

Females produce a large number of eggs (500,000 to several million), which are fertilized by siphoning water containing sperm that has been released into the water column. They store their eggs on specialized marsupia on the gills (USFWS 1997b). This mussel species is a short-term brooder that likely broods for approximately 6 weeks between late August and early October (USFWS 2015f).

Developing larvae (glochidia) are released into the water and passively infect a vertebrate host, typically a fish. The glochidia attach to the gill or fin of a host fish to complete development. Channel catfish (*Ictalurus punctatus*) and blue catfish (*I. furcatus*) are the only known host fish for this mussel. After glochidia transform into juveniles, then they drop off and land on the river bottom where they mature into adults. The life span of the winged mapleleaf is not known, but the oldest known individual in the St. Croix River is 22 years old (USFWS 2009b).

Winged mapleleaf inhabits riffles with clean gravel, sand, or rubble substrates and with clear, high-quality water. In the past, it also may have been found in large rivers and streams on mud, mud-covered gravel, and gravel bottoms. It is typically found in relatively dense and diver mussel beds, which may increase substrate stability and reduce the likelihood of displacement by high flows (USFWS 2015f).

Threats

Threats identified include water impoundments, drought and water withdrawals, sedimentation, and potential vulnerability to stochastic disturbances due to a small population size (USFWS 2015f).

Status and Distribution

Winged mapleleaf was listed as an endangered species under the ESA in 1991 due to a severely reduced and restricted range and small population size (USFWS 1997b).

The winged mapleleaf historically inhabited at least 34 rivers in 12 states. All historic records are from tributaries of the upper Mississippi River or from the

Mississippi River itself. At most sites, the species was reported to be sporadically distributed and uncommon (USFWS 1997b).

At the time of listing, the winged mapleleaf was thought to be extirpated from its entire historical range except for one remnant population in the St. Croix River between Minnesota and Wisconsin. Since then, four additional populations have been discovered in four different rivers within the Mississippi River basin: the Ouachita River and Saline River in Arkansas, the Bourbease River in Missouri; and the Litter River in Oklahoma and Arkansas (USFWS 2015f).

Of the approximately 10,367,300 acres of this species' total range, approximately 1,897,600 acres (18 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Rattlesnake-Master Borer Moth

Species Description

Rattlesnake-master borer moth is a large, chocolate-colored moth with bold white disk markings on the wings. Nearly all the larvae in the genus are purplish brown and have a pattern of longitudinal white stripes (USFWS 2013d).

Life History

Moth larvae rely on the plant rattlesnake master (*Eryngium yuccifolium*), which is the sole host plant for this species; a population of 100 to 1,000 rattlesnake master plants are needed for the moth to persist. The host plant is generally sparsely distributed and has been found to have relative frequencies in restored and relict prairies of less than 1 percent (USFWS 2013d).

Rattlesnake-master borer moths emerge as adults from mid-September to mid-October, flying through mid- to late October. Their nocturnal habits make them hard to observe. Based on their short adult flight span, their underdeveloped mouth parts, and the large amount of stored fat, researchers postulate that they likely use dew or oozing sap for imbibing moisture (USFWS 2013d). Adults are believed to spend their days attached to host plants or on the bottom of leaves, where their presence is camouflaged.

Mating and egg laying are strictly nocturnal. Females deposit 200 or more eggs in the duff (ground litter) on or near host plants, where eggs overwinter. Larvae emerge from overwintered eggs in late May and immediately begin to bore into the rattlesnake master host. Larvae enter stems near the ground and slowly eat their way into the root of the plant. They continue to feed through early August, at which time mature larvae cease all activity and lie dormant for approximately 1 week. Pupation appears to take place either in the root of the

host plant or in the soil and lasts from 2 to 3 weeks. The boring activities of the moth generally result in failed reproduction or death of the host plant.

Rattlesnake-master borer moths are considered relatively sedentary and do not disperse widely (USFWS 2013d).

Threats

The following threats to the rattlesnake-master borer moth have been identified (USFWS 2013d):

- Pesticide application
- Habitat loss or alteration
- Flooding
- Agricultural and grazing practices
- Noxious weeds and invasive plant species

Status and Distribution

Rattlesnake-master borer moth is a candidate for listing under the ESA. In August 2013, the USFWS (78 *Federal Register* 49422) found that listing the rattlesnake-master borer moth under the ESA was warranted but precluded by actions on higher priority species (USFWS 2013d).

Rattlesnake-master borer moths are obligate residents of undisturbed prairie and woodland openings that contain their only food plant, rattlesnake master. The moths occur in a low density over a range that includes most of the eastern United States, from Minnesota to Texas and east to Florida. An estimated 82 to 99 percent of tallgrass prairie habitat in that area has been lost, and most remnants are small and discontinuous. Currently, populations are known to occur in Illinois, Arkansas, Kentucky, North Carolina, and Oklahoma. Suitable habitat is found across 26 states for the host plant.

Of the approximately 12,127,900 acres of this species' total range, approximately 1,544,200 acres (13 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Ozark Big-eared Bat

Species Description

Ozark big-eared bats are medium-sized, insectivorous bats with long ears and distinct facial glands on both sides behind the nostrils. Their fur is light to dark brown on the back and paler underneath.

Life History

This species is an obligate cave user year-round and is known to use and roost in limestone and sandstone talus caves located in oak-hickory hardwood forests. Hibernating bats tend to occur in the coldest regions of the coldest caves (USFWS 2008c). This bat is known to move among caves during both the maternity season and winter, but generally it returns to the same maternity caves and hibernacula each year (USFWS 2011c).

Ozark big-eared bats mate in the fall. Both sexes hibernate together in clusters over winter. Females store the sperm through the winter and become pregnant after emerging from hibernation in the spring. The formation of maternity colonies usually occurs between late April and early June. Females give birth to a single offspring in May or June. Maternity colonies usually begin to break up in August. Males are solitary during the summer maternity period (USFWS 2011c).

Threats

The Ozark Highlands and Boston Mountains ecoregions are under considerable development pressure. Due to current and future human growth resulting in habitat fragmentation and loss, vandalism, and increased human activity at known and undiscovered maternity roosts and hibernacula, significant threats remain (USFWS 2008c).

Status and Distribution

The Ozark big-eared bat was originally listed as endangered on November 30, 1979 (44 *Federal Register* 69206). The Ozark Big-Eared Bat *(Plecotus townsendii ingens)* Revised Recovery Plan was issued on March 28, 1995 (USFWS 1995).

The Ozark big-eared bat is endemic to the Ozark Highlands and Boston Mountains ecoregions. This bat currently is known to use caves in northeastern Oklahoma and northwestern Arkansas near the state line, and in north-central Arkansas. In Oklahoma, Ozark big-eared bats are currently known to occur in Adair, Cherokee, and Sequoyah Counties (USFWS 2008c; NatureServe 2019). In Oklahoma, 12 essential caves have been identified with eight being protected; the remaining four are located on private lands (NatureServe 2019).

Apparent Ozark big-eared bat population declines in Oklahoma may be attributable to movement among caves, including sites not known, and not an actual decrease in bat numbers. Several other caves currently considered limited-use sites occur within close proximity to essential sites. A portion of the colony could be using these sites and are is counted when the exit counts are conducted at the primary site (USFWS 2008c).

Of the approximately 9,818,100 acres of this species' total range, approximately 1,326,500 acres (14 percent) occur in the action area.

Critical Habitat

Critical habitat for Ozark big-eared bat was proposed in 1977; however, none has been proposed or designated in the action area (USFWS 1977a).

Indiana Bat

Species Description

The Indiana bat is a medium-sized Myotis. Its fur is a dull grayish chestnut, with the basal portion of the hairs on the back a dull-lead color. This bat's underparts are pinkish to cinnamon, and its hind feet are small and delicate (USFWS 2006b).

Life History

The Indiana bat is a very social species; large numbers cluster together during hibernation. Indiana bats hibernate during winter in caves with cool, humid conditions with stable temperatures under 50°F but above freezing; they rarely hibernate in abandoned mines. Very few caves within the range of the species have these conditions (USFWS 2006b). The Indiana bat is a temperate, insectivorous, migratory bat.

After hibernation, Indiana bats migrate to their summer habitat in wooded areas where they usually roost under loose tree bark on dead or dying trees. During summer, males roost alone or in small groups, while females roost in larger groups of up to 100 bats or more. Indiana bats also forage in or along the edges of forested areas.

Indiana bats mate during fall before hibernation. Females store the sperm through winter and become pregnant in spring in maternity colonies under peeling bark. Females give birth to only one pup per year, and the young stay with the maternity colony throughout their first summer (USFWS 2006b).

Threats

White-nose syndrome has had devastating effects on Indiana bat populations in the eastern United States (USFWS 2009c). Factors that may exacerbate the bats' vulnerability include energetic impacts of significant disruptions to roosting areas (both in hibernacula and maternity colonies), availability of hibernation habitat, and connectivity and conservation of roosting-foraging and migration corridors (USFWS 2007a).

Status and Distribution

The Indiana bat was first listed as endangered on March 11, 1967 (USFWS 1967). A draft recovery plan was completed in April 2007 (USFWS 2007a). It is state listed in Oklahoma.

The 2017 range-wide population was estimated at 559,781 bats occurring within 229 hibernacula in 17 states (USFWS 2017a). In Oklahoma, five Indiana bats

were detected and represent less than 0.1 percent of the total population. There are no recovery units in the action area.

Of the approximately 310,964,000 acres of this species' total range, approximately 1,710,900 acres (1 percent) occur in the action area.

Critical Habitat

Critical habitat for Indiana bat was proposed in 1977; however, none has been proposed or designated in Texas, Oklahoma, Kansas, or Nebraska. No critical habitat, therefore, is in the action area (USFWS 1977b).

3.3.2 Plants

Table 3-4
Plant Species and Critical Habitat Considered and Evaluated – Oklahoma ESFO

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Harperella *Ptillium nodosum*	E	No	Analyzed in detail; see *Plants* species assemblage

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

E—Federally listed endangered

Harperella

Species Description

Harperella is an annual herb with slender, erect stems, up to 47 inches high with shallow roots that grows on rocky shoals, in crevices in exposed bedrock, and, rarely, along sheltered muddy banks (USFWS 1988).

Life History

Harperella is a rare plant native to seasonally flooded rocky streams and coastal plain ponds (USFWS 1990c). In both its riverine and pond environments, the plant occurs only in a narrow range of water depths; it is intolerant of deep water or conditions that are too dry (USFWS 1990c). The riverine form is found in microsites that are sheltered from rapidly moving water. Harperella is always found on saturated substrates and readily tolerates periodic, moderate flooding (USFWS 1988). Harperella reproduces both vegetatively and by seed (NatureServe 2019). Harperella produces broad clusters of small white flowers that bloom mostly in July and August; the seeds germinate in shallow, rocky areas and complete their life cycle by later summer or fall before the water source dries out (USFWS 1988).

Threats

The plant is threatened by small population sizes and hydrological manipulations of the habitat. Factors that alter the hydrology of the aquatic habitat, such as

ditching or draining for irrigation, can lead to extirpation from an area (USFWS 1988). Ponds could also eliminate this species. Additional threats facing Harperella include siltation of its stream habitat from construction and mining activities upstream, habitat loss resulting from bank stabilization and landowner access to the waterfront, and water quality degradation from excessive nutrient loading of streams (USFWS 1988).

Status and Distribution

This species was listed as endangered in September 28, 1988 (USFWS 1990c).

This species consists of 13 known populations in 7 southeastern states, down from 26 historical populations. Throughout its range, over 50 percent of the known Harperella populations have been destroyed (USFWS 1988).

Of the approximately 9,417,200 acres of this species' total range, approximately 181,100 acres (2 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

3.4 SPECIES UNDER THE JURISDICTION OF THE KANSAS ESFO

3.4.1 Wildlife

Table 3-5
Wildlife Species and Critical Habitat Considered and Evaluated – Kansas ESFO

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Fishes	Topeka shiner *Notropis topeka*	E	Designated	Analyzed in detail; see *Benthic-spawning Fishes* species assemblage. There is no designated critical habitat in the action area; thus, the proposed action would have **no effect** on designated critical habitat.
Mollusks	Spectaclecase mussel *Cumberlandia monodonta*	E	No	Portions of the action area, including Marais des Cygnes NWR and other split-estate, overlap the species' range in Linn County, Kansas. BIA surface in Richardson County, Nebraska, overlaps with the historical range (Butler 2002); however, the USFWS considers the species extirpated from both Kansas and Nebraska (Butler 2002). Because the species is considered extirpated from the action area, the proposed action would have **no effect** on spectaclecase mussel.

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

E—Federally listed endangered

Topeka Shiner

Species Description

The Topeka shiner is a small minnow native to small prairie streams of the eastern and central Great Plains.

Life History

Topeka shiners are a short-lived species, rarely surviving to their third summer (USFWS 2004b). Spawning occurs in pools, often over orange-spotted sunfish (*Lepomis humilis*) and/or green and longear sunfish (*L. cyanellus, L. megalotis*) nests. The male sunfish cares for the nest, effectively caring for both the sunfish and Topeka shiner. The species is an opportunistic omnivore, feeding on aquatic insects, microcrustaceans, larval fish, algae, and detritus (USFWS 2017b).

The Topeka shiner typically inhabits small prairie streams, primarily pools with relatively cool water temperatures, generally good though variable water quality, and gravel, cobble, or coarse sand substrate. It is also found in pools with bedrock and clay hardpan substrates, often overlain by silt and detritus. The species is generally tolerant of acute periods of harsh conditions (such as elevated temperatures and low dissolved oxygen) that can occur seasonally in some streams across its range and during periods of drought (USFWS 2017b).

Threats

The Topeka shiner is threatened by habitat destruction, degradation, modification, and fragmentation resulting from siltation, reduced water quality, tributary impoundment, stream channelization, stream dewatering, and nonnative predaceous fishes (USFWS 1998b).

Status and Distribution

The USFWS listed the shiner as an endangered species under the ESA in 1998 across its range and designated final critical habitat in 2004 (USFWS 1998b; USFWS 2004b).

The Topeka shiner continues to occur in portions of its historical range, though the occupied range has been greatly reduced. Extant populations occur in the Boone and North Raccoon River watersheds in Iowa; portions of the upper Cottonwood and the Kansas/Big Blue River watersheds in Kansas; portions of the Rock and Big Sioux River watersheds in Minnesota; portions of the Missouri and Grand River watersheds in Missouri; one stream in the Elkhorn and one localized area in the upper Loup River watersheds in Nebraska; and portions of the Big Sioux, Vermillion, and James River watersheds in South Dakota (see Maps 1 and 2, pages 4 and 9 in USFWS 2017b).

Of the approximately 30,365,300 acres of this species' total range, approximately 592,300 acres (2 percent) occur in the action area.

Critical Habitat

Designated critical habitat for the Topeka shiner consists of 83 stream segments, representing 836 miles of stream in Iowa, Minnesota, and Nebraska (USFWS 2004b). There is no designated critical habitat for Topeka shiner in the action area.

3.4.2 Plants

Table 3-6
Plant Species and Critical Habitat Considered and Evaluated – Kansas ESFO

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Mead's milkweed *Asclepias meadii*	T	No	Analyzed in detail; see *Plants* species assemblage

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

T—Federally listed threatened

Mead's Milkweed

Species Description

Mead's milkweed is a long-lived, tallgrass prairie, perennial herb belonging to the milkweed family (Asclepiadaceae).

Life History

Mead's milkweed is a long-lived, perennial rhizomatous herb. This species has low reproductive rates, and studies suggest that it may take 15 years or more to mature from a germinating seed to a flowering plant. For this reason, the species' longevity is an important life-history strategy. Seedling establishment may be infrequent, but it is probably required for long-term population maintenance and is necessary for population establishment (USFWS 2003b).

Mead's milkweed begins flowering from late May in the south and mid-June in the north. Most milkweeds are either self-incompatible and require outcrossing by insects, such as bumblebees (*Bombus* sp.) and miner bees (*Anthophora* sp.), for production of viable seeds. Young, green fruit pods appear by late June and reach their maximum length of 1.5 to 4 inches by late August or early September. The hairy seeds in these pods mature by mid-October. Wind is the main mechanism for seed dispersal. Mead's milkweed also spreads through underground stems called rhizomes, which produce new roots and stems from their nodes (USFWS 2003b).

Mead's milkweed's primary habitat is mesic to dry mesic, upland tallgrass prairie with a late successional bunch-grass structure. It also occurs in hay meadows and in thin soil glades or barrens. This plant is essentially restricted to sites that

have never been plowed and only lightly grazed, and hay meadows that are cropped annually for hay (USFWS 2003b).

Threats

Mead's milkweed is threatened by the destruction and alteration of tallgrass prairie due to intense agricultural use, urbanization, recreational use of sites, and hay mowing that disrupts the species' reproductive cycle. Many populations also are experiencing habitat loss due to the lack of appropriate prairie management, such as prescribed fire and herbicide or pesticide application (USFWS 2013e).

Predation; pathogens; intrinsic biological factors, such as reproductive self-incompatibility; and stochastic events also may threaten small populations that have been isolated by fragmentation. Climate change may threaten Mead's milkweed by causing changes in the timing of blooming, loss of suitable habitat, loss of interspecific relationships with pollinators, and increased threats from invasive species (USFWS 2013e).

Status and Distribution

Mead's milkweed was listed as a threatened species under the ESA in 1988 due to fragmentation and destruction of prairie habitat (USFWS 2003b).

Mead's milkweed was historically distributed throughout the eastern tallgrass prairie region of the central United States, from Kansas through Missouri and Illinois, and north to southern Iowa and northwest Indiana. Historically, the species is known from a total of 46 counties in Illinois, Indiana, Iowa, Kansas, Missouri, and Wisconsin (see Figure 2 in USFWS 2003b).

Mead's milkweed has been extirpated from Wisconsin and Indiana. Field surveys for new population occurrences resulted in the discovery of 160 formerly unknown populations in Kansas, Missouri, and Iowa. Introductions of Mead's milkweed plants have occurred at 19 sites; therefore, Mead's milkweed currently is known from 330 sites in Kansas, Missouri, south-central Iowa, and southern Illinois (see Appendix 2 in USFWS 2013e). Most populations occur on hay meadows on private land and are, therefore, not protected from habitat destruction, the primary threat to this species (USFWS 2013e).

Of the approximately 20,970,700 acres of this species' total range, approximately 441,600 acres (2 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for Mead's milkweed.

3.5 SPECIES UNDER THE JURISDICTION OF MULTIPLE TEXAS ESFOS

3.5.1 Wildlife

Table 3-7
Wildlife Species and Critical Habitat Considered and Evaluated – Multiple Texas ESFOs

	Common and Scientific Name	Status[1]	Critical Habitat	ESFOs[2]	Assessed/Rationale for Exclusion
Birds	Golden-cheeked warbler *Dendroica chrysoparia*	E	No	Arl, Aus	Analyzed in detail
	Northern aplomado falcon *Falco femoralis septentrionalis*	E	No	Aus, Coast	Analyzed in detail
Fishes	Smalleye shiner *Notropis buccula*	E	Designated	Arl, Aus	This species' current range, and designated critical habitat, is the upper Brazos River and its tributaries from southern Crosby County, Texas, downstream to Possum Kingdom Lake in Palo Pinto County (USFWS 2015g). The nearest portion of the action area, Fort Wolters, is approximately 22 miles from the downstream portion of the current range. Based on the distance between the action area and occupied and critical habitat, the proposed action would have **no effect** on smalleye shiner or its designated critical habitat.
	Sharpnose shiner *N. oxyrhynchus*	E	Designated	Arl, Aus	This species' current range, and designated critical habitat, is the upper Brazos River and its tributaries from southern Crosby County, Texas, downstream to Possum Kingdom Lake in Palo Pinto County (USFWS 2015g). The nearest portion of the action area, Fort Wolters, is approximately 22 miles from the downstream portion of the current range. Based on the

	Common and Scientific Name	Status[1]	Critical Habitat	ESFOs[2]	Assessed/Rationale for Exclusion
					distance between the action area and occupied and critical habitat, the proposed action would have **no effect** on sharpnose shiner or its designated critical habitat.
Mollusks	Golden orb *Quadrula aurea*	C	No	Aus, Coast	Analyzed in detail; see *Freshwater Mollusks* species assemblage
	Smooth pimpleback *Q. houstonensis*	C	No	Arl, Aus, Coast	Analyzed in detail; see *Freshwater Mollusks* species assemblage
	Texas fawnsfoot *Truncilla macrodon*	C	No	Arl, Aus, Coast	Analyzed in detail; see *Freshwater Mollusks* species assemblage

Source: USFWS IPaC, April 22, 2019
[1]Status codes:
E—Federally listed endangered; C—Candidate for federal listing
[2] Arl—Arlington Ecological Services Field Office; Aus—Austin Ecological Services Field Office; Coast—Texas Coastal Ecological Services Field Office

Golden-cheeked Warbler

Species Description

The golden-cheeked warbler is a small, brightly colored neotropical songbird. Males have yellow cheeks outlined in black with a thin black line through the middle. Its upper breast, throat, cap, and back are black, and the lower breast and belly are white with some side black spotting or streaking. Wings are blackish with two white wing bars. Tail feathers are black, except the outermost tail feather on each side is white with a black shaft line. Adult females are similar to adult males but less strikingly marked or bright (USFWS 2014d).

Life History

The species breeds in juniper-oak woodlands, where it depends on Ashe juniper (*Juniperus ashei*) bark for nesting material. This type of woodland generally grows in relatively moist areas, such as steep-sided canyons, slopes, and adjacent uplands. Reproductive success of golden-cheeked warbler is higher in large, unfragmented patches (greater than 37 acres) of habitat as compared with small, fragmented patches (less than 25 acres); reproductive success increases as the forest edge decreases (USFWS 2014d).

Threats

Nesting habitats are being cleared in the breeding grounds for land development, ranching, and agriculture; habitats are being lost in the wintering

grounds primarily due to deforestation for livestock grazing, fuel wood collection, forest fires, and beetle infestation (BirdLife International 2019).

Status and Distribution

The golden-cheeked warbler was emergency listed as endangered on May 4, 1990. The final rule was published on December 27, 1990. There is no proposed or designated critical habitat (USFWS 1992).

The golden-cheeked warbler has a restricted breeding range in mature Ashe juniper-oak woodlands in the Edwards Plateau, Lampasas Cut Plain, and Central Mineral Region in central Texas. This warbler winters mainly in the pine-oak forests of Central America.

Of the approximately 25,810,700 acres of this species' total range, approximately 1,228,000 acres (5 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Northern Aplomado Falcon

Species Description

The aplomado falcon is a medium-sized falcon, approximately 14 to 18 inches in length with a wingspan of 31 to 40 inches. Sexes are similar in appearance, but females tend to be larger than males. Adults have a steel-gray back, with a dark belly band or "cummerbund" separating a white to buffy upper breast and a cinnamon to rufous belly. Distinguishing adult field marks include bold face markings with a white streak over the eye and a long, narrow-banded tail.

Life History

Aplomado falcons occupy desert grasslands and savannas of Latin America, and desert grasslands and coastal prairies of Texas, New Mexico, and southeastern Arizona. The subspecies appears to be mainly nonmigratory throughout its range in the United States.

Falcon pairs remain together year-round and hunt cooperatively. Breeding and reproduction are variable, with egg laying recorded from January to September, mostly occurring during March to May (USFWS 2014e). Aplomados do not build their own nests, but take over old or even freshly constructed nests of other raptors or corvids. Young leave the nest about 4 to 5 weeks after hatching (USFWS 2007b).

Threats

The causes for decline have included widespread shrub encroachment resulting from control of range fires, intense overgrazing, and agricultural development in grassland habitats used by the falcon. The widespread use of dichloro-diphenyl-

trichloroethane (DDT) after World War II coincided with the falcon's disappearance and was likely a significant cause of the subspecies' extirpation from the United States (USFWS 2007b).

Status and Distribution

Northern aplomado falcon was listed as endangered on February 25, 1986. A nonessential experimental population was established in New Mexico and Arizona in July 2006 (USFWS 2014e).

Existing, nonexperimental populations of northern aplomado falcon are known only to occur in the action area in the jurisdiction of the Coastal Texas ESFO. Although their range occurs in the western portion of Texas, known occurrences do not overlap the action area within the Austin ESFO.

Of the approximately 66,613,500 acres of this species' total range, approximately 1,129,700 acres (2 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Golden Orb

Species Description

The golden orb is a small, round-shaped, freshwater mussel endemic to central Texas.

Life History

There is no specific information on age, size of maturity, or host fish use for this species. Other species in the genus *Quadrula* successfully parasitize catfish, and it is likely the golden orb does as well. Gravid females have been found from May through August. Mussels in the genus *Quadrula* are short-term brooders, holding fertilized eggs and glochidia for a short period, usually 3 to 6 weeks, before releasing glochidia (USFWS 2011d).

The golden orb primarily occurs in flowing waters of moderately sized rivers. It has been found in one reservoir in the lower Nueces River (Lake Corpus Christi), where wave action may simulate flowing water conditions. Golden orbs colonize firm mud, sand, and gravel substrates and do not appear to tolerate more unstable substrates such as loose sand or silt (USFWS 2011d).

Threats

The decline of mussels in Texas and across the United States is primarily the result of habitat loss and degradation. Chief among the causes of mussel decline in Texas is the effects of impoundments, sedimentation, dewatering, sand and gravel mining, and chemical contaminants (USFWS 2011d).

Status and Distribution

Golden orb has been a candidate for listing under the ESA since 2011 due to threats from habitat destruction and modification (USFWS 2011d).

The golden orb's historical distribution included rivers throughout the Nueces-Frio and Guadalupe-San Antonio River basins. The species has been extirpated from nearly the entire Nueces-Frio River basin, and only nine extant populations in four rivers are currently known. Four of these populations appear to be stable and reproducing, and the remaining five are small and isolated and show no evidence of recruitment. The populations in the middle Guadalupe and lower San Marcos Rivers are likely connected, while the remaining populations are highly fragmented and restricted to short reaches (USFWS 2016c).

Of the approximately 9,488,200 acres of this species' total range, approximately 389,500 acres (4 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Smooth Pimpleback

Species Description

The smooth pimpleback is a small, round-shaped freshwater mussel endemic to central Texas.

Life History

Mussels in the genus *Quadrula* are typically short-term brooders. During reproduction, males release sperm into the water column, which females draw in through their siphons. After internal fertilization, eggs develop for 4 to 6 weeks, and the resulting glochidia are broadcast into the water column where they attach to the gills or fins of a host fish. Channel catfish are a known host fish species. Currently, there is no specific information on age or size of maturity of the smooth pimpleback (USFWS 2016d).

The smooth pimpleback inhabits mixed mud, sand, and fine gravel substrate of medium to large rivers and sometimes reservoirs. Adult freshwater mussels are filter feeders, siphoning algae, bacteria, detritus, microscopic animals, and dissolved organic matter. Juvenile mussels use cilia on the foot to capture suspended and depositional material, such as algae and detritus (USFWS 2016d).

Threats

Identified threats are habitat loss and degradation, primarily from impoundments, sedimentation, dewatering, sand and gravel mining, and chemical contaminants (USFWS 2011d, 2016d).

Status and Distribution

Smooth pimpleback has been a candidate for listing under the ESA since 2011 due to habitat loss and degradation.

The smooth pimpleback is native to the Brazos and Colorado River basins of central Texas. In the Colorado River basin, the species was historically found throughout the length of the main stem Colorado River from Coleman County downstream to Wharton County. It also occurred in the Llano River, Onion Creek, and Skull Creek. In the Brazos River basin, the species historically occurred throughout the length of the main stem of the Brazos River. It was also found in the Clear Fork Brazos, Leon, Navasota, Little Brazos, San Gabriel, Lampasas, and Little Rivers and Yegua Creek. The smooth pimpleback was historically uncommon where it occurred (USFWS 2016d).

The smooth pimpleback has been eliminated from nearly the entire Colorado River and all but one of its tributaries, and has been limited to the central and lower Brazos River drainage. Five of the nine known populations are small and isolated, containing only a few individuals. Six of the existing populations appear to be relatively stable and recruiting (USFWS 2016d).

Of the approximately 17,954,400 acres of this species' total range, approximately 813,900 acres (5 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Texas Fawnsfoot

Species Description

The Texas fawnsfoot is a small, relatively thin-shelled freshwater mussel that is endemic to central Texas.

Life History

Information on the habitat preferences of Texas fawnsfoot is limited because living individuals were not discovered until recently. Shells and recently dead individuals have been found along rivers following dewatering events or high floods, indicating the species inhabits flowing waters. It may be intolerant of deep, low-velocity waters such as lakes and reservoirs. The recently discovered live population in the Brazos River occurs in soft, sandy sediment with moderate water flow (USFWS 2015h).

During reproduction, males release sperm into the water column, which females draw in through their siphons. After internal fertilization, eggs develop for 4 to 6 weeks, and the resulting glochidia are broadcast into the water column where they attach to the gills or fins of a host fish (USFWS 2015h).

There is no specific information on age, size of maturity, or host fish use for Texas fawnsfoot. Other species in the genus *Truncilla* parasitize freshwater drum (*Aplodinotus grunniens*). As this fish is ubiquitous throughout the range of Texas fawnsfoot, it may also serve as a host fish for Texas fawnsfoot (USFWS 2015h).

Adult freshwater mussels are filter feeders, siphoning algae, bacteria, detritus, microscopic animals, and dissolved organic matter. Juveniles use cilia on the foot to capture suspended and depositional material, such as algae and detritus (USFWS 2015h).

Threats

Identified threats are habitat destruction and modification, primarily from impoundments, sedimentation, dewatering, sand and gravel mining, and chemical contaminants (USFWS 2011d, 2015h).

Status and Distribution

Texas fawnsfoot has been a candidate for listing under the ESA since 2011 due to habitat destruction and modification (USFWS 2011d).

The Texas fawnsfoot is endemic to the Brazos and Colorado Rivers of central Texas. Historical records suggest the Texas fawnsfoot inhabited much of the Colorado River, from Wharton County upstream as far as the North Fork Concho River in Sterling County, as well as throughout the Concho, San Saba, and Llano Rivers and Onion Creek within the Colorado River basin. In the Brazos River, the species occurred from Fort Bend County upstream to the lower reaches of the Clear Fork Brazos River in Shackelford County, as well as in the Leon River, Little River, San Gabriel River, Deer Creek, and Yegua Creek (USFWS 2015h).

Relatively few Texas fawnsfoot have been documented since the species was first described in 1859, and few live individuals have been found in recent decades. The first live population of Texas fawnsfoot was discovered in 2008 in the Brazos River near its confluence with the Navasota River. A second larger population was found in 2009 in the Colorado River. Evidence of other remnant populations has also been found in the Clear Fork Brazos River, San Saba River, and Deer Creek (USFWS 2015h).

Of the approximately 11,627,200 acres of this species' total range, approximately 310,700 acres (3 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

3.5.2 Plants

Table 3-8
Plant Species and Critical Habitat Considered and Evaluated – Multiple Texas ESFOs

Common and Scientific Name	Status[1]	Critical Habitat	ESFOs[2]	Assessed/Rationale for Exclusion
Neches River rose-mallow *Hibiscus dasycalyx*	T	Designated	Arl, Coast	Analyzed in detail; see *Plants* species assemblage
Navasota ladies'-tresses *S. parksii*	E	No	Aus, Coast	Analyzed in detail; see *Plants* species assemblage

Source: USFWS IPaC, April 22, 2019
[1]Status codes:
E—Federally listed endangered; T—Federally listed threatened
[2] Arl—Arlington Ecological Services Field Office; Aus—Austin Ecological Services Field Office; Coast—Texas Coastal Ecological Services Field Office

Neches River Rose-mallow

Species Description

Neches River rose-mallow is a nonwoody perennial in the mallow (Malvaceae) family that is endemic to the East Texas Pineywoods ecoregion. It grows to be 1.9 to 7.5 feet tall and produces a single creamy white (rarely pink) flower at the base of the leaf stalk along the uppermost branches or stems (USFWS 2018c).

Life History

The Neches River rose-mallow is a perennial plant and may be long lived, but its life expectancy is unknown. Cross-pollination occurs. The species may have high reproductive potential as it produces about 50 fruits per plant (USFWS 2018c).

Flowering is rain dependent, spanning a few weeks in June and July. Seeds are set in August. Seed viability and survivorship are unknown. Potential pollinators may include the American bumblebee (*Bombus pensylvanicus*), Hibiscus bee (*Ptilothrix bombiformis*), moths, and the scentless plant bug (*Niesthrea louisianica*) (USFWS 2018c).

This species is endemic to the open, wetland habitats of the East Texas Pineywoods ecoregion, where the canopy is open and allows direct sunlight; the average annual rainfall ranges from 40 to 60 inches. Plants grow along sloughs, oxbows, terraces, and sand bars of depressional or low-lying areas in the Neches River floodplains, Mud Creek, or Tatanbogue Creek. Soils associated with these wetlands are hydric alluvial or sandy loams (USFWS 2018c).

Proximity to a floodplain provides seasonal inundation of water in the winter months and may be the key mechanism for seed dispersal. At a minimum, the soil surface dries out during the summer months (USFWS 2018c).

Threats

The principal threats include habitat loss, habitat modification through the encroachment of nonnative and native plants species, hydrologic changes, and construction and development projects. These significant threats, coupled with a restricted species' range and potential hybridization with other related hibiscus species (*H. leavis* and *H. moscheutos*), constitute a high level of threat (USFWS 2018c).

Status and Distribution

The USFWS listed the species as a threatened species under the ESA in 2013 (USFWS 2018c).

The natural geographic range of the rose-mallow is within Trinity, Houston, Harrison, and Cherokee Counties in Texas. To date, there are eight natural, extant sites in the species' geographic range with planned introductions on federal and private property. The species has also been introduced on federal, private, and county property, both within and outside the species' natural geographic range. Sites in Harrison County, Champion, and Camp Olympia have not been observed in the last 20 to 30 years; however, they are considered extant as they still contain the physical and biological features essential to the rose-mallow (USFWS 2018c).

Of the approximately 3,142,000 acres of this species' total range, approximately 214,300 acres (7 percent) occur in the action area.

Critical Habitat

The USFWS designated 11 units of critical habitat for the Neches River rose-mallow in Nacogdoches, Houston, Trinity, Cherokee, and Harrison Counties in Texas (USFWS 2013f). There is no critical habitat in the action area.

Navasota Ladies'-tresses

Species Description

Navasota ladies'-tresses is a small, white-flowered orchid endemic to Brazos, Robertson, and Burleson Counties in Texas.

Life History

Navasota ladies'-tresses is a perennial, but ephemeral species. The appearance of observable portions of the plant (leaf rosettes and flowering stalks) fluctuates widely from year to year. The perennial tubers develop leaf rosettes that are most often observed from January to June, although rosettes have been observed in every month of the year. In any given year, some proportion of tubers produce rosettes, while others remain dormant. Leaf rosettes usually senesce during the hot, dry summer months (USFWS 2009d).

Flowering typically occurs from October 15 to November 7, when the basal rosette of leaves is no longer present. In most years, only a small percentage of the total population flowers. Rainfall during the month of August may be the strongest factor to correlate with the number of flowering plants (USFWS 2009d).

Flowers are pollinated by bumblebees and other insects, but produce polyembryonic seeds even when the flowers have not been pollinated. Agamospermy,[5] with rare instances of sexual reproduction, is the predominant means of reproduction in the species; therefore, a clonal population may have hundreds of individual plants, but the effective genetic population size is one individual (USFWS 2009d).

The species is an edaphic endemic dependent on ephemeral seeps with sandy soils, and found mainly in small clearings within post oak savanna in central east Texas. Areas supporting the highest abundance are lightly wooded, lightly grazed stream banks of minor tributaries associated with the Navasota and Brazos drainages (USFWS 1984).

Threats

The primary threats to the continued existence of Navasota ladies'-tresses are habitat loss and modification, primarily from mines, a landfill, pipelines, highway construction, and various private development projects. Even where the species' habitat remains secure, habitat quality is declining as a result of a dense woody understory replacing the herbaceous component of the post oak savanna. Other threats are herbivory, limited protection to populations on private land, and climate change (USFWS 2009d).

Status and Distribution

The USFWS listed the species as endangered under the ESA in 1982 (USFWS 1984, 2009d).

When Navasota ladies'-tresses was listed in 1982, it was known only from Brazos County. The species is currently found in 13 Texas counties and is protected in 24 small reserves, 21 of which resulted from Section 7 consultation with the USFWS. Five of these reserves may be sold after 2015, and as such, are not permanently protected. The most recent surveys indicate that the plant has a potential population of 3,207 individuals (USFWS 2009d).

Of the approximately 6,900,300 acres of this species' total range, approximately 188,500 acres (3 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

[5] Asexual reproduction in which seeds are produced from unfertilized ovules

3.6 SPECIES UNDER THE JURISDICTION OF THE TEXAS COASTAL ESFO

3.6.1 Wildlife

Table 3-9
Wildlife Species and Critical Habitat Considered and Evaluated – Texas Coastal ESFO

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Birds	Attwater's greater prairie chicken *Tympanuchus cupido attwateri*	E	No	Analyzed in detail
Mammals	Jaguarundi *Herpailurus yaguarondi*	E	No	The last confirmed sighting in the US was in April 1986, when a road-killed specimen was collected 2 miles east of Brownsville, Texas, and positively identified as a jaguarundi. Numerous unconfirmed sightings have been reported since then, some with unidentifiable photographs, but no reports have been confirmed as jaguarundi since 1986, despite significant camera-trapping efforts and live-trapping efforts. Because this species is assumed to not be present in the action area, the proposed action would have **no effect** on jaguarundi.
	Ocelot *Leopardus pardalis*	E	No	Analyzed in detail
	West Indian manatee *Trichechus manatus*	T	Designated	West Indian manatee is a rare summer visitor to coastal Texas marine habitats. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. In other split-estate, leasing would be subject to no surface occupancy (NSO) stipulations, and water quality BMPs would protect water quality and prevent indirect effects. The nearest critical habitat is in Florida. Based on the protections provided by the leasing restrictions, and the distance between the action area and suitable marine habitat and designated critical habitat, the proposed action would have **no effect** on West Indian manatee or its designated critical habitat.

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Reptiles	Loggerhead sea turtle *Caretta caretta* (Northwestern Atlantic Ocean distinct population segment [DPS])	T	Designated	The Northern Gulf of Mexico Recovery Unit population may nest on coastal and estuarine beaches in Texas (NMFS and USFWS 2008). Portions of the action area, including the Laguna Atascosa, Aransas, and San Bernard NWRs, and several scattered split-estate parcels, overlap the species' range along the Texas coast. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. In other split-estate, leasing would be subject to NSO stipulations, and water quality BMPs would protect water quality and prevent indirect effects. The nearest designated critical habitat is in Mississippi. Based on the protections provided by leasing restrictions, and the distance between the action area and designated critical habitat, the proposed action would have **no effect** on loggerhead sea turtle or its critical habitat.
	Green sea turtle *Chelonia mydas* (North Atlantic DPS)	T	No	The North Atlantic DPS may nest on coastal and estuarine beaches in Texas; however, this is not considered an important nesting area (NMFS and USFWS 1991, 2007). Portions of the action area, including the Laguna Atascosa, Aransas, and San Bernard NWRs, and several scattered split-estate parcels, overlap the species' range along the Texas coast. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. In other split-estate, leasing would be subject to NSO stipulations, and water quality BMPs would protect water quality and prevent indirect effects. Based on the protections provided by leasing restrictions, the proposed action would have **no effect** on green sea turtle.

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Leatherback sea turtle *Dermochelys coriacea*	E	Designated	Leatherback sea turtle may nest on coastal and estuarine beaches in Texas; however, this is not considered an important nesting area (NMFS and USFWS 1992, 2013a). Portions of the action area, including the Laguna Atascosa, Aransas, and San Bernard NWRs, and several scattered split-estate parcels, overlap the species' range along the Texas coast. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. In other split-estate, leasing would be subject to NSO stipulations, and water quality BMPs would protect water quality and prevent indirect effects. The nearest designated critical habitat is in the US Virgin Islands. Based on the protections provided by leasing restrictions, and the distance between the action area and designated critical habitat, the proposed action would have **no effect** on leatherback sea turtle or its critical habitat.
Hawksbill sea turtle *Eretmochelys imbricata*	E	Designated	Hawksbill sea turtles are unlikely to nest on coastal and estuarine beaches in Texas, but they forage in these areas (NMFS and USFWS 1993, 2013b). Portions of the action area, including the Laguna Atascosa, Aransas, and San Bernard NWRs, and several scattered split-estate parcels, overlap the species' range along the Texas coast. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. In other split-estate, leasing would be subject to NSO stipulations, and water quality BMPs would protect water quality and prevent indirect effects. The nearest designated critical habitat is in Puerto Rico. Based on the protections provided by leasing restrictions, and the distance between the action area and designated critical habitat, the proposed action would have **no effect** on hawksbill sea turtle or its critical habitat.

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
	Kemp's ridley sea turtle *Lepidochelys kempii*	E	Proposed	Kemp's ridley sea turtles nest on Padre Island and elsewhere in Texas, and also forage in waters near these areas (NMFS, USFWS, and SEMARNAT 2011; NMFS and USFWS 2015). Portions of the action area, including the Laguna Atascosa, Aransas, and San Bernard NWRs, and several scattered split-estate parcels, overlap the species' range along the Texas coast. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. In other split-estate, leasing would be subject to NSO stipulations, and water quality BMPs would protect water quality and prevent indirect effects. The nearest proposed critical habitat is in Florida. Based on the protections provided by leasing restrictions, and the distance between the action area and proposed critical habitat, the proposed action would have **no effect** on Kemp's ridley sea turtle or its proposed critical habitat.
	Louisiana pine snake *Pituophis ruthveni*	T	No	Analyzed in detail

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

E—Federally listed endangered; T—Federally listed threatened

Attwater's Greater Prairie Chicken

Species Description

Attwater's greater prairie chicken is a brown bird about 17 inches long weighing approximately 2 pounds. It has a short, rounded, dark tail. Males have large orange air sacs on the sides of their necks that they use during mating season (USFWS 2010b; TPWD 2019a).

Life History

Attwater's greater prairie chicken uses coastal prairie grasslands year-round, with a variety of tall and short grasses present. Home range estimates vary from 456 acres for males to 1,796 acres for hens (USFWS 2010b).

The breeding season is between February and July. Courtship behavior involves vocalizations made by displaying males on booming grounds, which are communal display areas, to attract hens (USFWS 2010b). Hens build their nest

in tallgrass and usually lay 12 eggs during nesting season. The eggs hatch in April or May. Small green leaves, seeds, and insects form the diet of the Attwater's greater prairie chicken (TPWD 2019a).

Threats

Current threats include small populations, habitat and population fragmentation resulting in genetic isolation, diseases and parasites, low success of captive bred individuals, poor brood survival, and possibly global climate change (USFWS 2010c).

Status and Distribution

Attwater's greater prairie chicken was listed as endangered in March 1967 (32 *Federal Register* 4001). The USFWS's 5-year review in 2010 determined that no change to its status was warranted (USFWS 2010c).

The species is limited to Colorado, Galveston, and Goliad Counties in the coastal prairie region of southeastern Texas; birds reared in captivity have been released in these locations since 1996. Approximately 90 individuals have been estimated in the wild at the Attwater's Prairie Chicken National Wildlife Refuge and Texas City Prairie Preserve, and at a private ranch in Goliad County (USFWS 2010b).

Of the approximately 2,841,600 acres of this species' total range, approximately 77,900 acres (3 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Ocelot

Species Description

The ocelot is a medium-sized cat, weighing from 15 to 35 pounds. The upper parts of the body are pale gray to cinnamon, while the underparts are whitish, spotted with black. The ocelot's body has elongated black spots, while the tail has dark bars or incomplete rings (USFWS 2016e).

Life History

The ocelots uses a variety of habitats throughout its range, including a variety of grassland and forest types, from semiarid vegetation to tropical rain forests. Estimates of home ranges vary from approximately 500 to over 4,000 acres for males and 500 to 2,700 acres for females.

Ocelot breeding peaks in autumn in Texas, but it is known to occur year-round. The species first produces young at 18 to 30 months of age; females reproduce approximately every 2 years, but some adult females may never produce litters. A study on subadult dispersal distances in Texas found ocelots dispersed from 1.5 miles up to 5.6 miles from their natal ranges to establish an independent

home range, using narrow (15- to 300-foot-wide) corridors of brush during dispersal (USFWS 2016e).

Threats

Habitat conversion, fragmentation, and loss comprise the primary threats to the ocelot today. In Texas, over 95 percent of the dense thorn shrub habitat in the Lower Rio Grande Valley has been converted to agriculture, rangelands, or urban land uses. Related threats include lack of population connectivity, small population sizes, and loss of genetic diversity, which contribute to an increased risk of extinction (USFWS 2016e).

Status and Distribution

The ocelot was listed as endangered on July 21, 1982 (47 *Federal Register* 31670). The first recovery plan was completed in 1990 and revised in 2016 (USFWS 2016e).

Currently, the Texas ocelot population is estimated at 80 ocelots, which are found in two separated populations in southern Texas (one in Willacy and Kenedy Counties and the other primarily on the Laguna Atascosa NWR). This estimate is based on a combination of 55 known individuals, identified by their unique coat patterns, and the extrapolation of an additional 25 ocelots based on existing suitable habitat on private lands near or adjacent to existing ocelot-occupied habitat. A third and much larger population of the Texas/Tamaulipas ocelot (*L. p. albescens*) occurs in Tamaulipas, Mexico; but it is geographically isolated from ocelots in Texas (USFWS 2016e).

Of the approximately 24,484,200 acres of this species' total range, approximately 1,101,700 acres (4 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Louisiana Pine Snake

Species Description

The Louisiana pine snake is a nonvenomous constrictor of the Colubridae family. It is large, usually 4 to 5 feet long. Its snout is pointed, and it has a large scale on the tip of its snout, presumably contributing to the snake's good burrowing ability. The Louisiana pine snake has a buff to yellowish background color with dark brown to russet dorsal blotches covering its total length (USFWS 2018d).

Life History

The Louisiana pine snake is generally associated with sandy, well-drained soils; open pine forests, especially longleaf-pine savannah; moderate to sparse mid-story; and a well-developed herbaceous understory dominated by grasses. Its

activity appears to be heavily concentrated on low, broad ridges overlain with sandy soils. Its annual home range varies from 12 acres to 195 acres in size, and averages 69 acres (USFWS 2018d).

Louisiana pine snakes appear to be most active March through May and September through November, and least active December through February and during the summer. During winter hibernation, Louisiana pine snakes use Baird's pocket gopher burrows. The snakes use these burrow systems as refuges and hibernacula, and to escape from fire. Pocket gophers appear to be their primary food source, but other reported food items include other rodents, cottontails, amphibians, and ground-nesting birds and eggs. Louisiana pine snakes have low reproductive rates; they are reported to have the smallest clutch size of any North American colubrid snake (USFWS 2018e).

Threats

The primary threat to this snake is modification and curtailment of its habitat and range due to a variety of human-induced effects, particularly habitat loss (forest conversion, degradation, and fragmentation), vehicle-caused mortality, and isolation of small populations with questionable genetic robustness. This species' small, isolated populations; low genetic diversity; and reduced range also increase its vulnerability to catastrophic events (USFWS 2018e).

Status and Distribution

The Louisiana pine snake was listed as threatened on April 6, 2018 (83 *Federal Register* 14958; USFWS 2018d). A recovery plan was also published in April 2018 (USFWS 2018e).

The Louisiana pine snake originally occurred in at least 9 Louisiana parishes and 14 Texas counties, coinciding with the longleaf pine ecosystem west of the Mississippi River. Currently, it is known from only six isolated sites in Louisiana and Texas (USFWS 2018e).

Of the approximately 7,894,700 acres of this species' total range, approximately 578,900 acres (7 percent) occur in the action area.

Critical Habitat

There are no critical habitat rules for Louisiana pine snake.

3.6.2 Plants

Table 3-10
Plant Species and Critical Habitat Considered and Evaluated – Texas Coastal ESFO

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
South Texas ambrosia *Ambrosia cheiranthifolia*	E	No	Analyzed in detail; see *Plants* species assemblage
Star cactus *Astrophytum asterias*	E	No	Analyzed in detail; see *Plants* species assemblage
Texas ayenia *Ayenia limitaris*	E	No	Analyzed in detail; see *Plants* species assemblage
Black lace cactus *E. reichenbachii* ssp. *fitchii (E. r.* var. *albertii)*	E	No	This species' range is Refugio, Jim Wells, and Kleberg Counties in Texas. All known populations occur on private land. The Refugio and Jim Wells populations are outside the action area, while the Kleberg County population occurs along Jaboncillos Creek (USFWS 2006c), which is approximately 0.5 miles from BLM-administered mineral estate on Naval Air Station Kingsville. Based on the proximity of known populations to the action area, the proposed action would have **no effect** on this species.
Slender rush-pea *Hoffmannseggia tenella*	E	No	Analyzed in detail; see *Plants* species assemblage
Texas prairie dawn *Hymenoxys texana*	E	No	Analyzed in detail; see *Plants* species assemblage
Texas golden gladecress *Leavenworthia texana*	E	Designated	Analyzed in detail; see *Plants* species assemblage
Walker's manioc *Manihot walkerae*	E	No	Analyzed in detail; see *Plants* species assemblage
Texas trailing phlox *Phlox nivalis* ssp. *texensis*	E	No	The historical range for this species includes Polk, Tyler, and Hardin Counties in Texas. Extant populations are known only from one population in Hardin County and one population in Tyler County. These populations are not in the action area. The proposed action would have **no effect** on this species.

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
White bladderpod *Physaria pallida (Lesquerella p.)*	E	No	This species occurs in San Augustine County, Texas and is known from six populations that occupy less than 30 acres. There are no populations in the action area. The proposed action would have **no effect** on this species.
Zapata bladderpod *P. thamnophila (Lesquerella t.)*	E	Designated	This species occurs on the Lower Rio Grande Valley NWR in the action area; it also occurs on private lands in Zapata and Starr Counties in Texas, which are outside the action area. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats in accordance with 43 CFR 3101.5. Further, the NWR is a signatory on a comprehensive conservation plan for Zapata bladderpod. Given these protections, the proposed action would have **no effect** on this species or its designated critical habitat.
Ashy dogweed *Thymophylla tephroleuca*	E	No	This species occurs in Zapata, Webb, and Starr Counties in Texas. There are no populations in the action area. The proposed action would have **no effect** on this species.

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

E—Federally listed endangered

South Texas Ambrosia

Species Description

South Texas ambrosia is a perennial, herbaceous plant in the sunflower (Asteraceae) family that is endemic to the Texas Coastal Bend. It grows to 4 to 12 inches in height and has grayish-green leaves with green-, pink-, or cream-colored flowers.

Life History

South Texas ambrosia is thought to mainly reproduce by rhizomatous regrowth in the upper portion of the soil; therefore, a single individual may be represented by several to hundreds of stems, depending on the age of the plant. Patches may represent several separate individual members of a larger metapopulation. Genetic studies have suggested that some ambrosia patches also reproduce sexually (USFWS 2018f).

Reproduction occurs in late summer/fall, dependent on rainfall, and lasts until the lack of water or cold temperatures curtails growth. Female and male flowers are separate but found on the same plant and bloom in late summer and fall. The inflorescence and floral structure of the Asteraceae family are suited for wind pollination; however, insect pollination also may occur (USFWS 2010d).

South Texas ambrosia occurs in low-elevation, subtropical woodland communities in openings of coastal prairies, savannas, and grasslands scattered with mesquite. Most of the sites where the species is found contain only remnants of shortgrass prairie and are typically unplowed but mowed. Common plant associates include slender rush pea (*Hoffmannseggia tenella*), honey mesquite (*Prosopis glandulosa*), huisachillo (*Acacia schaffneri*), bluewood (*Condalia hookeri*), and lotebush (*Ziziphus obtusifolia*) (USFWS 2018f).

The species is known to occur on various soils derived primarily from the Beaumont clay series, ranging from heavy clays to lighter-textured sandy loams typical of the Texas Coastal Plain (USFWS 2018f).

Threats

The primary threat to South Texas ambrosia throughout its range at the time of listing was habitat loss. Other historic, as well as ongoing, threats are invasion of short-grass prairie by nonnative grasses, conversion of native prairie to agricultural land, development, restricted geographic distribution and abundance, climate change-related effects, and use of pesticides or herbicides (USFWS 2010d).

Status and Distribution

The USFWS listed this species as endangered without critical habitat under the ESA in 1994 due to land conversion, habitat loss, and encroachment of nonnative grasses (USFWS 2018f).

Historically, South Texas ambrosia occurred in Cameron, Jim Wells, Kleberg, and Nueces Counties in south Texas, and in the state of Tamaulipas in Mexico (USFWS 2010d). As of 2014, there are seven extant, or presumed extant, South Texas ambrosia populations from north-central Kleberg County through north-central Nueces County (see Table 9 in USFWS 2018f). Several occurrences consist of scattered sites or subpopulations that are located in close proximity to one another (USFWS 2018f).

Of the approximately 2,817,700 acres of this species' total range, approximately 472,400 acres (17 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for South Texas ambrosia.

Star Cactus

Species Description

Star cactus is a small, spineless, disk- or dome-shaped member of the cactus family (Cactaceae) that is endemic to south Texas and Mexico.

Life History

Star cactus flowers from March through May, with fruiting occurring from April through June; it is possible for flowering to occur after adequate rainfall in summer months. It is an obligate xenogamous species, meaning fruits and seeds form only when pollen is transferred to a flower from a different plant (USFWS 2013g).

Pollinator limitation appears to limit the species' reproductive capacity. The cactus specialist bee *Diadasia rinconis* is the most effective observed pollinator. Studies suggest the species takes 15 to 25 years to reach reproductive maturity (USFWS 2013g).

Herbivory from desert cottontails (*Sylvilagus audubonii*), Mexican ground squirrel (*Ictidomys mexicanus*), Southern plains woodrat (*Neotoma micropus*), and hispid cotton rats (*Sigmodon hispidus*) has been documented as a main cause of mortality (USFWS 2013g).

The species is found within the Tamaulipan biotic province, which includes south Texas and Mexico. In the United States, star cactus occurs at low elevations in sparse, open thorn shrub and grassland habitats in a warm-temperate, subtropical steppe climate. In Mexico, it is found in dry, hot thorn shrub. Plants typically occur within the partial shade of other plants or rocks (USFWS 2003c).

Threats

Threats to star cactus are habitat destruction and modification through conversion of native vegetation to rangeland and row crop, possible competition with exotic grasses introduced for cattle forage, urban development, collection of wild plants for the cactus trade, and genetic vulnerability due to low population numbers (USFWS 2003c). All populations in Starr County, Texas, are located on private property, the majority of which have not signed conservation agreements (USFWS 2013g).

Status and Distribution

The USFWS listed star cactus as an endangered species under the ESA in 1993 due to threats from habitat destruction and modification, collection, and decreased population numbers (USFWS 2003c).

The historical range of star cactus included Hidalgo, Starr, Zapata, and possibly Cameron Counties in south Texas and the States of Nuevo Leon and

Tamaulipas in Mexico. The Nuevo Leon site near Linares was probably extirpated by collectors; the same collection threat may be reducing other populations (USFWS 2003c).

As of 2011, 24 privately owned properties in Starr County, Texas, covering 56 square miles, have been identified as supporting 5,125 individuals (see Table 2a and Figure 2 in USFWS 2013g). Nine populations in Mexico contain a total of 1,275 plants with population numbers ranging in size from 10 to 701 individuals (see Table 2b in USFWS 2013g). Recent research on five subpopulations in Texas found that four of the five were genetically diverse but not genetically distinct, indicating that star cacti occurring in the border region of Texas are likely a single population (USFWS 2018g).

Reintroduction may be a viable strategy for achieving fully protected star cactus sites; however, long-term success of reintroduced plants is unknown. As of 2018, the star cactus does not occur on refuge tracts in Starr County, but refuge land may provide fully protected sites in the future using reintroduced plants (USFWS 2018g).

Of the approximately 1,800,100 acres of this species' total range, approximately 208,300 acres (12 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for star cactus.

Texas Ayenia

Species Description

Texas ayenia is a spineless shrub whose canopy reaches up to 6.6 feet in height and 9.2 feet in width. Older woody stems are reddish-brown; flowers are yellow to cream colored and kidney shaped.

Life History

The reproduction biology of Texas ayenia has not yet been investigated. Most members of the genus *Ayenia*, including *A. limitaris*, do not self-fertilize. Insects are probable pollinators of *Ayenia* species. In pilot reintroduction sites, spontaneous progeny of propagated plants have been observed up to 70 feet from the nearest planted seedling. Propagated plants from these sites have lived at least 10 years and began flowering and producing viable seeds at 1 to 2 years of age. Plants flower most often in June, July, September, October, and November, coinciding with the bimodal rainfall pattern in the Rio Grande delta (USFWS 2016f).

Habitat has been described as open ground, the edges of thickets, or within thickets, on dry, alluvial clay soils. Associated shrubs appeared to favor partially

shaded niches, rather than under either dense or open canopy cover (USFWS 2016f).

Threats

Threats to Texas ayenia are the loss of habitat to agricultural and urban development, habitat fragmentation and isolation, pesticide drift and runoff, competition from introduced invasive grasses, trampling, oil and gas development, altered vegetation structure and composition, and loss of pollinators (USFWS 2016f).

Status and Distribution

The USFWS listed Texas ayenia as endangered without critical habitat under the ESA in 1994 due to threats from habitat loss, habitat alteration, and competition with introduced invasive grasses (USFWS 2016f).

The few reported extant and historical populations of Texas ayenia are widely distributed over a geographic range of about 96,525 square miles (see Figure 2 in USFWS 2016f).

Historic records for Texas ayenia have been reported at seven sites in Cameron and Hidalgo Counties, Texas, between 1888 and 1963. These populations have not been observed for more than 40 years and are presumed extirpated. There are also historic records from two sites in Mexico, but one was extirpated and the status of the other is unknown (USFWS 2016f).

Five extant populations in Cameron, Hidalgo, and Willacy Counties, Texas, have been monitored since 2009. These are at the Methodist Camp Thicket in Hidalgo County; the Rudman Tract of the Lower Rio Grande Valley National Wildlife Refuge; C.B. Wood Municipal Park in Harlingen; and on private property in North Rio Hondo and Northwest Willacy County. Four of these populations range from 100 to 200 individuals, and the fifth site has at least 1,000 individuals. There are also several credible reports of other small populations at undisclosed locations near Brownsville and Olmito, and along the Arroyo Colorado, in Cameron and Willacy Counties. Three pilot reintroductions were successfully established at the Lower Rio Grande Valley NWR in 1999 (USFWS 2016f).

Of the approximately 2,332,100 acres of this species' total range, approximately 535,800 acres (23 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for Texas ayenia.

Slender Rush-pea

Species Description

Slender rush-pea is a perennial plant growing to 3 to 8 inches tall, with horizontal stems that fan out from a woody taproot. Two to three pairs of short stems arise opposite one another from a longer, main stalk. Five to seven pairs of leaflets, less than 0.1 inch long, sprout from these shorter stems. The underside of the oval leaflets is coated with a sparse layer of hair. The straight, bean-like fruit pods contain two to four green-black seeds (TPWD 2019b).

Life History

Slender rush-pea occurs in historically fire-dependent, short-grass coastal prairie remnants, typically in openings among mesquite and other woody plants that have invaded (TPWD 2019b; USFWS 2018f).

Each winter the spineless, nonsticky stems die back, and the taproot goes dormant. Flowering occurs from April to November. Flowers are only open midday for a few hours (TPWD 2019b).

Threats

Threats to the species include habitat loss resulting from conversion of native prairie to row crops, improved pastures, residential development, commercial development, and federal installations. In addition, alterations or abatement in current vegetation management strategies (fire, herbicide, and mowing) have caused encroachment of nonnative grasses to the few remaining shortgrass prairies within this region. Drought conditions associated with climate change may exacerbate these impacts (USFWS 2018f).

Status and Distribution

Slender rush-pea was listed as endangered on November 1, 1985 (50 *Federal Register* 45614-45618). The species only occurs within Nueces and Kleberg Counties in Texas. Only eight slender rush-pea populations remain extant with few numbers of individuals, and most exist on private lands and/or have not been revisited in over 20 years (USFWS 2018f).

Of the approximately 1,445,100 acres of this species' total range, approximately 147,300 acres (10 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for slender rush-pea.

Texas Prairie Dawn

Species Description

Texas prairie dawn is a delicate, 1.3- to 7-inch-tall annual. The plant has two types of leaves: green to reddish rosette leaves, which persist on the plant after

flowers close, and a few smaller leaves on the floral stalks. The flat-topped flower head is composed of a tight disc of 40 to 75 or more very small, yellow flowers, less than a tenth of an inch long. The fruits that develop from this disc are cylindrical to pyramidal and are a similar size (TPWD 2019c).

Life History

Texas prairie dawn occurs at the base of small mounds in grasslands in poorly drained, sparsely vegetated areas. It is also found in almost barren areas on slightly salty soils (TPWD 2019c).

The species flowers from early March through mid- to late April. The early flowering period is a result of specific wet conditions available on the bare and saline slick spots where the plant is found. These spots tend to dry out to almost desert-like conditions during the hot summer months. Drought conditions or excessively prolonged wet winters can reduce the number of plants present (USFWS 2015i).

Threats

The main threat to Texas prairie dawn is habitat destruction. Expanding urbanization, paved roadways, trampling and soil disturbance from feral hogs, alteration of watershed drainages, development of natural resources, heavy grazing, and agricultural development contribute to the continued loss of suitable habitat (USFWS 2015i).

Status and Distribution

The species was listed as endangered on March 13, 1986 (51 *Federal Register* 8681-8683).

There are known occurrences in Fort Bend, Gregg, Harris, Trinity, and Waller Counties, with the largest populations in Harris County. No sites have been delineated sufficiently to assess whether the downlisting recovery criterion has been met. This criterion is a minimum of 50 separate populations of approximately 2.5 acres (USFWS 2015i).

Of the approximately 2,161,700 acres of this species' total range, approximately 131,500 acres (6 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for Texas prairie dawn.

Texas Golden Gladecress

Species Description

Texas golden gladecress is a small (4 inches), tall herbaceous annual with a basal rosette of leaves. The leaves are toothed to shallowly lobed with the side lobes smaller than the middle lobe at the leaf tip. The four egg-shaped to tongue-

shaped petals are bright yellow (less than 0.5 inches long and less than 0.1 inch wide). The pod-like fruits are held erect and are slightly constricted between the 5 to 11 circular seeds (TPWD 2019d).

Life History

Texas golden gladecress occurs in the Pineywoods ecoregion of easternmost Texas, only on outcrops of the Weches Geologic Formation in shallow, calcium-rich soils (USFWS 2013h). Flowering occurs from February to May (TPWD 2019d).

Threats

Threats to the species include habitat loss and degradation of herbaceous glade plant communities supporting the gladecress. Activities or factors negatively affecting the habitat of the gladecress include glauconite quarrying; natural gas and oil exploration, production, and distribution; invasion of open glades by nonnative and native shrubs, trees, and vines, and other weedy species; pine tree plantings in close proximity to occupied glades; herbicide applications that have potential to kill emerging seedlings; and the installation of service improvements, including water and sewer lines, domestic gas lines, or electric lines (USFWS 2013h).

Status and Distribution

Texas golden gladecress was listed as endangered on September 11, 2013 (78 *Federal Register* 176).

The species is known from seven locations in northern San Augustine and northwest Sabine Counties, and one introduced population in Nacogdoches County in Texas. The introduced population was reportedly extirpated in 2011 by placement of a pipeline through the site (USFWS 2013h).

Of the approximately 748,100 acres of this species' total range, approximately 316,500 acres (42 percent) occur in the action area.

Critical Habitat

Critical habitat for the species was designated on September 11, 2013 (USFWS 2013i). It spans approximately 1,353 acres in San Augustine and Sabine Counties. Of these, approximately 100 acres occur in the action area (see **Figure D-10**).

Designated critical habitat PCEs include (USFWS 2013i):

1. Exposed outcrops of the Weches Formation. Within the outcrop sites, there must be bare, exposed bedrock on top-level surfaces or rocky ledges with small depressions where rainwater or seepage can collect. The openings should support Weches glade native herbaceous plant communities.

2. Thin layers of rocky, alkaline soils, underlain by glauconite clay (greenstone, ironstone, and bluestone) that are found only on the Weches Formation. Appropriate soils are in the series classifications Nacogdoches clay loam, Trawick gravelly clay loam, or Bub clay loam, ranging in slope 1–15 percent.

3. The outcrop ledges should occur within the glade such that Texas golden gladecress plants remain unshaded for a significant portion of the day, and trees should be far enough away from the outcrop(s) that leaves do not accumulate within the Texas golden gladecress habitat. The habitat should be relatively clear of nonnative and native invasive plants, especially woody species, or with only a minimal level of invasion.

Walkers Manioc

Species Description

Walker's manioc, a member of the spurge family (Euphorbiaceae), is a spindly, almost vine-like perennial herb endemic to the Lower Rio Grande Valley of Texas and northeastern Tamaulipas, Mexico.

Life History

Walker's manioc is self-fertile and does not appear to require specialized pollinators. Fruit capsules contain up to three seeds, which are dispersed a distance of several meters when the capsules dry and rupture. Ants are also involved in seed dispersal. Seeds may remain dormant for a year or more, but germination can be induced by exposure to heat and moisture or the naturally occurring plant hormone, gibberellic acid. Under ambient conditions in the soil, seeds may begin germinating in as little as 9 months (USFWS 2009e).

Plants begin producing tubers when less than 1 year old. Individual plants have produced up to 20 rounded tubers after about 3 years' growth, demonstrating that the species reproduces through both seeds and tuber (USFWS 2009e).

Walker's manioc is an understory species that inhabits open brushlands in the Lower Rio Grande Valley of Texas and adjacent Mexico. It is found in open brushlands in close association with various species of short native grasses and herbaceous plants, and low shrubs and sub-shrubs (USFWS 2009e).

All known Walker's manioc populations, with one exception, occur in close association with exposed outcrops of caliche pertaining to the Goliad geological formation; a single population from Aldama, Tamaulipas, Mexico, occurs in shallow sandy soil overlying limestone (USFWS 2009e).

Threats

The primary threats to Walker's manioc are habitat loss, particularly from extensive surface mining of caliche, and competition from invasive grasses (USFWS 2009e).

Status and Distribution

The USFWS listed the species as endangered without critical habitat under the ESA in 1991 due to habitat decline from brush clearing for agriculture and pasture improvement (USFWS 1993b, 2009e).

When Walker's manioc was listed in 1991, only one extant site, consisting of a single individual, was known in the US. After the recovery plan was published in 1993, extensive surveys documented 9 Walker's manioc sites in Texas, including the single plant the USFWS discovered in 1990, and 25 sites in Tamaulipas, Mexico. The number of individuals at the Texas sites ranges from a single plant to about 90 plants at two sites (see Table 1 in USFWS 2009e).

Three viable Walker's manioc populations occur on protected tracts of the Lower Rio Grande Valley NWR. The Texas Department of Transportation manages one small site along a state highway ROW. A landowner conservation agreement has been signed to protect one small site on private land in Texas. Two landowner conservation agreements have been signed to protect populations in Tamaulipas (USFWS 2009e).

Of the approximately 2,949,300 acres of this species' total range, approximately 208,500 acres (7 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

3.7 SPECIES UNDER THE JURISDICTION OF THE TEXAS ARLINGTON ESFO

3.7.1 Wildlife

There are no wildlife species solely under the jurisdiction of the USFWS Texas Arlington ESFO. See Section 3.5, Species Under the Jurisdiction of Multiple Texas ESFOs.

3.7.2 Plants

Table 3-11
Plant Species and Critical Habitat Considered and Evaluated – Arlington ESFO

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Sneed pincushion cactus *Coryphantha sneedii* var. *sneedii*	E	No	Analyzed in detail; see *Plants* species assemblage
Earth-fruit (Geocarpon) *Geocarpon minimum*	T	No	Analyzed in detail; see *Plants* species assemblage

Source: USFWS IPaC, April 22, 2019

[1]Status codes:

E—Federally listed endangered; T—Federally listed threatened

Sneed Pincushion Cactus

Species Description

The Sneed pincushion cactus is a succulent perennial that grows multi-branched stems in clumps of up to over 100. It is endemic to New Mexico and Texas.

Life History

Most Sneed pincushion cacti bloom after 3 to 4 years. Plants bud from March to April with the principal blooming period in April. Flowers open in midday, usually between 10:00 a.m. and 4:00 p.m., and blooms last 2 to 4 days. Some have an uncharacteristic second blooming season in July and August, after summer rains (USFWS 1986).

Fruits form from August to November, with 90 percent of fruit set under natural conditions. Rodents and birds are likely dispersal agents. Seeds remain viable for at least 10 years. The best seedling survival is under rocks or deep in the cracks of rocks where seedlings are protected (USFWS 1986).

The Sneed pincushion cactus grows in semidesert grasslands at elevations of 3,900 to 7,700 feet. It is restricted to limestone and grows in cracks on vertical cliffs or ledges (USFWS 1986).

Common plant communities associated with the cactus include creosote (*Larrea tridentata*), Torrey yucca (*Yucca torreyi*), gramma grasses (*Bouteloua* spp.), sotol (*Dasylirion wheeleri*), ocotillo (*Foquieria spledens*), and lechugilla (*Agave lechugilla*). Several other cactus species may also be found within the range of Sneed's pincushion cactus (USFWS 1986).

Threats

At the time of listing, the main threats to the species were collection, destruction or modification of habitat, and natural limiting factors and threats such as seed predation, grazing, competition for space, or special edaphic requirements. In the 5-year review, the USFWS noted that all previously identified threats are still continuing, including wild and prescribed fire, and climate change and drought. There is an increased level of impacts from threats due to its restricted distributional range (USFWS 2015j).

Status and Distribution

The USFWS listed the Sneed pincushion cactus as endangered without critical habitat under the ESA in 1979 due to threats from collection and habitat destruction (USFWS 1986).

The Sneed pincushion cactus was historically known only from the Anthony Gap area of the Franklin Mountains in Doña Ana County, New Mexico (USFWS 1986).

Currently, there are major known populations (more than 50 individuals) in the southern Organ Mountains in Doña Ana County, New Mexico; northern Franklin Mountains in Doña Ana County, New Mexico; Franklin Mountains State Park in El Paso County, Texas; and Guadalupe Mountains in Eddy County, Texas (USFWS 2019d).

The Guadalupe Mountains' population needs further genetic study to confirm it is this taxon. Populations at monitoring sites in southern Organ and the northern Franklin Mountains showed a declining trend in abundance from 1997 to 2011, while those at monitoring sites in the southern Organ and northern Franklin Mountains were stable from 1989 to 2001 (USFWS 2019d).

Of the approximately 5,777,200 acres of this species' total range, approximately 174,300 acres (3 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Earth-fruit (Geocarpon)

Species Description

Earth-fruit or geocarpon is a low, diminutive annual in the Caryophyllaceae family that occurs in Arkansas, Louisiana, Missouri, and Texas.

Life History

Earth-fruit is an annual that is usually easily visible for only 3 to 6 weeks during the spring. The flowering and fruiting period ranges from late February to early June, with peak flowering in March and April (USFWS 2016g).

Temperature and weather are likely the two primary factors affecting the timing and success of germination. The pollination and seed dispersal mechanisms and vectors are unknown; however, surface flow of rainwater may be a dispersal mechanism in Missouri (USFWS 1993c). Seeds remain viable for several years or more (USFWS 2016g).

In Missouri, Earth-fruit occurs only on Pennsylvanian-age sandstone glades or outcrops in upland prairies. Elsewhere it occurs in habitats known as "slick spots," "saline prairies," or "barrens," which are sparsely vegetated soils with high concentrations of magnesium and sodium (USFWS 2016g).

Threats

Loss of microhabitats, such as thin soils within sandstone glades and the margins of slick spots within saline prairies, appears to be the biggest threat to the long-term survival of Earth-fruit. Another main threat to the species is competition from other vegetation due to a lack of disturbance and soil development. Some level of disturbance is necessary to maintain the preferred habitats for this

species. Over-disturbance in the form of feral hog rooting may also be a significant threat to some populations (USFWS 2016g).

Status and Distribution
The USFWS listed the species as threatened without critical habitat under the ESA in 1987 (USFWS 1993c).

Populations are currently documented to occur at 40 sites, including 3 plantings in Missouri, within 19 counties in Arkansas, Louisiana, Missouri, and Texas (USFWS 2016g).

There is large annual variation in the number and location of subpopulations and individual plants within each population due to variations in winter and spring rainfall, as well as competition with native and/or invasive plants. Long-term monitoring of known sites indicates that aside from annual variations due to weather, populations appear resilient if the appropriate microhabitats are maintained (USFWS 2016g).

Of the approximately 9,225,100 acres of this species' total range, approximately 43,600 acres (less than 1 percent) occur in the action area.

Critical Habitat
Critical habitat has not been designated or proposed for this species.

3.8 SPECIES UNDER THE JURISDICTION OF THE TEXAS AUSTIN ESFO

3.8.1 Wildlife

Table 3-12
Wildlife Species and Critical Habitat Considered and Evaluated – Austin ESFO

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Amphibians	Houston toad *Anaxyrus houstonensis*	E	Designated	Analyzed in detail
	Salado salamander *Eurycea chisholmensis*	T	Proposed	Analyzed in detail; see *Aquatic salamanders* species assemblage
	San Marcos salamander *E. nana*	T	Designated	Analyzed in detail; see *Aquatic salamanders* species assemblage
	Georgetown salamander *E. naufragia*	T	Proposed	Analyzed in detail; see *Aquatic salamanders* species assemblage

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
	Barton Springs salamander *E. sosorum*	E	No	Analyzed in detail; see *Aquatic salamanders* species assemblage
	Jollyville Plateau salamander *E. tonkawae*	T	Designated	Analyzed in detail; see *Aquatic salamanders* species assemblage
	Austin blind salamander *E. waterlooensis*	E	Designated	Analyzed in detail; see *Aquatic salamanders* species assemblage
	Texas blind salamander *Typhlomolge rathbuni*	E	No	Analyzed in detail; see *Aquatic salamanders* species assemblage
Birds	Western yellow-billed cuckoo *Coccyzus americanus occidentails*	T	Proposed	Analyzed in detail; see *Riparian birds* species assemblage
	Southwestern willow flycatcher *Empidonax traillii extimus*	E	Designated	Analyzed in detail; see *Riparian birds* species assemblage
	Mexican spotted owl *Strix occidentalis lucida*	T	Designated	This species requires mature forest habitat. The nearest known location of Mexican spotted owl to the action area is in the Guadalupe Mountains in western Texas. BLM-administered mineral estates are over 70 miles away from the Guadalupe Mountains. Based on the distance between the action area and the nearest suitable habitat, the proposed action would have **no effect** on Mexican spotted owl (eBird 2019; USFWS 2013j).

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Fishes	Devils River minnow *Dionda diaboli*	T	Designated	This species' current range is Devils River and San Felipe Creek in Val Verde County, Texas (USFWS 2008d). It is extirpated from lower Devils River, now the Amistad Reservoir SMA, which is in the action area. San Felipe Creek, including critical habitat there, is approximately 2 miles from the nearest portion of the action area at Laughlin Air Force Base. It also occurs in Pinto Creek in Kinney County, Texas, but this is approximately 7 miles from the action area. Mineral development in these areas would be subject to stipulations to protect water resources and listed species. Based on the distance between the action area and occupied and critical habitat, the proposed action would have **no effect** on Devils River minnow and its critical habitat.
	Fountain darter *E. fonticola*	E	Designated	Analyzed in detail; see *Benthic-spawning Fishes* species assemblage
	Rio Grande silvery minnow *Hybognathus amarus*	E	No	The USFWS established a nonessential experimental population (NEP) in its historical range in the Rio Grande River between Hudspeth County, Texas, and the Amistad Dam (USFWS 2008e). Thus, a portion of the NEP occurs in the Amistad Reservoir, which is in the action area; however, this is unsuitable habitat, and this species is not expected to occur there. Thus, the proposed action would have **no effect** on the Rio Grande silvery minnow NEP.
	Mexican Blindcat (catfish) *Prietella phreatophila*	E	No	Analyzed in detail
Mollusks	Texas fatmucket *Lampsilis bracteata*	C	No	Analyzed in detail; see *Freshwater Mollusks* species assemblage

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
	Texas hornshell *Popenaias popeii*	C	No	The Texas hornshell's current range includes the Pecos River and Devils River in Val Verde County, Texas, including the lower reaches that flow into Amistad Reservoir in the action area. It is extirpated from the Amistad Reservoir (USFWS 2016h). Future mineral development there would be subject to stipulations to protect water resources and listed species; further, should water quality effects occur, they would not be felt upstream of the reservoir in occupied habitat. The proposed action, therefore, would have **no effect** on Texas hornshell.
	Texas pimpleback *Q. petrina*	C	No	Analyzed in detail; see *Freshwater Mollusks* species assemblage
Insects	Coffin Cave mold beetle *Batrisodes texanus*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Helotes mold beetle *B. venyivi*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Comal Springs riffle beetle *Heterelmis comalensis*	E	Designated	Analyzed in detail; see *Aquatic Invertebrates* species assemblage
	A ground beetle *Rhadine exilis*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	A ground beetle *R. infernalis*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Tooth Cave ground beetle *R. persephone*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Comal Springs dryopid beetle *S. comalensis*	E	Designated	Analyzed in detail; see *Aquatic Invertebrates* species assemblage
	Kretschmarr Cave mold beetle *Texamaurops reddelli*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
Arachnids	Robber Baron Cave meshweaver *Cicurina baronia*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage

	Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
	Madla Cave meshweaver *C. madla*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Bracken Bat Cave meshweaver *C. venii*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Government Canyon Bat Cave meshweaver *C. vespera*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Government Canyon Bat Cave spider *Neoleptoneta microps*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Tooth Cave spider *Neoleptoneta myopica*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Tooth Cave pseudoscorpion *Tartarocreagris texana*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Cokendolpher Cave harvestman *Texella cokendolpheri*	E	Designated	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Bone Cave harvestman *Texella reyesi*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
	Bee Creek Cave harvestman *Texella reddelli*	E	No	Analyzed in detail; see *Karst Invertebrates* species assemblage
Crustaceans	Peck's Cave amphipod *Stygobromus pecki*	E	Designated	Analyzed in detail; see *Aquatic Invertebrates* species assemblage

1 Source: USFWS IPaC, April 22, 2019

2 [1]Status codes:

3 E—Federally listed endangered; T—Federally listed threatened; C—Candidate for federal listing

Houston Toad

Species Description

The Houston toad is a small- to medium-sized toad, 2 to 3.5 inches long. Its general coloration varies from light brown to gray or purplish gray, sometimes with green patches. The pale undersides often have small, dark spots. Males have a dark throat, which appears bluish when distended (TPWD 2019e).

Life History

Houston toad depends on native forest ecosystems for feeding, breeding, and sheltering. The target forest ecosystem conditions for Houston toads include a mixed plant species composition, canopy cover (ideally 80 percent), an open understory with a diverse herbaceous component, and breeding pools with shaded edges (USFWS 2017c).

The Houston toad's breeding and emergence period lasts from January 1 through June 30. The species breeds and reproduces in small pools of water, ephemeral ponds, and permanent water bodies. After tadpoles emerge as juvenile toads, they stay within 10 to 16 feet of the pond for about 3 weeks, and remain within a 164-foot radius for at least 13 weeks (USFWS 2017c).

Threats

Threats to the species include habitat loss due to conversion to urbanization or agriculture, fragmentation, long-term habitat degradation, disease caused by chytrid fungus, and predation by red-imported fire ants on newly metamorphosed juveniles (USFWS 2017c; TPWD 2010).

Status and Distribution

The Houston toad was listed as endangered on October 13, 1970 (35 *Federal Register* 16047).

Five populations have been confirmed within the last 5 years in five counties in Texas (Austin, Bastrop, Colorado, Leon, and Milam); the species also may persist in Robertson County, but this is not confirmed (TPWD 2010). The largest population is within Bastrop County. Data regarding population sizes and trends are inadequate. The USFWS estimated the total population to be 1,000 to 1,500 individuals in their critical habitat designation, though subsequent research indicates these numbers may be much lower (Forstner et al. 2007).

Of the approximately 4,976,400 acres of this species' total range, approximately 99,700 acres (2 percent) occur in the action area.

Critical Habitat

Critical habitat for the species was designated on January 31, 1978 (43 *Federal Register* 4022). It includes portions of Bastrop and Burleson Counties, which were the areas supporting the largest known populations at the time. The

population within critical habitat in Burleson County has not been seen since 1983 (USFWS 2019e).

Of the 84,500 acres of total designated critical habitat, approximately 3,200 acres (4 percent) occur in the action area (see **Figure D-11**).

Determination of critical habitat for the Houston toad predates the USFWS's 1984 regulations and procedures for designating critical habitat; therefore, the PCEs of the species' habitat were not detailed at the time critical habitat was listed.

Species Assemblage: Aquatic Salamanders

The aquatic salamanders species assemblage comprises seven aquatic salamander species that depend on water from the Edwards Aquifer in sufficient quantity and quality to meet their life history requirements for survival, growth, and reproduction. These species are analyzed as a species assemblage because the biology, threats, and conservation needs of these species and the karst ecosystems they occur in share numerous similarities.

The assemblage includes the two species addressed in the San Marcos and Comal Springs and Associated Aquatic Ecosystems Revised Recovery Plan (USFWS 1996b), the two species addressed in the Barton Springs Salamander and Austin Blind Salamander Recovery Plan (USFWS 2016i), and the three additional salamander species addressed in a 2013 USFWS conservation needs technical white paper (USFWS 2013k). Species in the aquatic salamander species assemblages, and their designated and proposed critical habitats, are:

- Austin blind salamander and designated critical habitat
- Barton Springs salamander
- Georgetown salamander and proposed critical habitat
- Jollyville Plateau salamander and designated critical habitat
- Salado salamander and proposed critical habitat
- San Marcos salamander and designated critical habitat
- Texas blind salamander

Species Assemblage Description

Texas species within the genus *Eurycea* inhabit springs, spring-runs, and water-bearing karst formations of the Edwards Aquifer. Additional details on life history, distribution, and threats for these species are included below.

Life History

Texas species within the genus *Eurycea* are aquatic and neotenic, meaning they retain larval, gill-breathing morphology throughout their lives (Chippindale et al. 2000). Neotenic salamanders do not metamorphose and leave water. Instead,

they live in water throughout their life cycle where they become sexually mature and eventually reproduce.

Neotenic salamanders do not have lungs, but breathe through their gills and skin. Primary respiration in neotenic salamanders is through the gills; however, a substantial amount of gas exchange occurs through the skin. They require water moving across their gills and bodies for respiration (USFWS 2013k, 2016i).

Unobstructed interstitial space is critical to salamander habitat because it provides hiding space from predators and habitat for macroinvertebrate prey items (USFWS 2013k). When these spaces are filled with fine sediment or become compacted, the amount of available foraging habitat and protective cover is reduced. Aquatic mosses, algae, and other vegetation also provide cover for some *Eurycea* species, as well as harbor a variety and abundance of the aquatic invertebrates that salamanders eat (USFWS 2016i).

Predation on these species in the wild is probably minimal when adequate cover is available. Potential and documented predators are generally opportunistic feeders, making predation unlikely unless salamanders become exposed. Crayfish (*Procambarus clarkii*) and other large predatory invertebrates, as well as predatory fish such as mosquitofish (*Gambusia affiinis*), may prey on salamanders or salamander larvae and eggs (USFWS 2016i).

Some of the aquatic salamander species are adapted to periodic surface flow loss and can retreat underground. These salamanders apparently spend some portion of their life history below ground when subsurface aquatic habitats are available and have the ability to retreat there when surface flows decline (USFWS 2013k). The relative importance of surface and subsurface habitats to salamander populations is not fully understood, but the best available evidence suggests that surface habitats are important for prey availability and individual growth (USFWS 2013k).

Status and Distribution

The Austin blind salamander was federally listed as endangered throughout its range on September 9, 2013 (78 *Federal Register* 51277). The Barton Springs salamander was federally listed as an endangered species on May 30, 1997 (62 *Federal Register* 23377-23392). The Barton Springs salamander has only been documented at four spring outlets (collectively known as Barton Springs) within the City of Austin's Zilker Park in Travis County, Texas. The Barton Springs salamander occurs in the same range as the Austin blind salamander (USFWS 2016i).

The Georgetown salamander and Salado salamander were federally listed as threatened on March 26, 2014 (79 *Federal Register* 10236), with an associated 4(d) rule for the Georgetown salamander. These species occur in the northern

segment of the Edwards Aquifer, in portions of Travis, Williamson, and Bell Counties, Texas.

The San Marcos salamander was listed as threatened in 1980 (45 *Federal Register* 47355). Its entire known range includes Spring Lake and its outflow, the San Marcos River, downstream approximately 165 feet from the Spring Lake Dam, in Hays County, Texas.

The Jollyville Plateau salamander was listed as threatened in September 13, 2013 (78 *Federal Register* 51278). The Jollyville Plateau salamander occurs in the Jollyville Plateau and Brushy Creek areas of the Edwards Plateau in northern Travis and southern Williamson Counties in Texas.

The Texas blind salamander was listed as endangered in 1967 (32 *Federal Register* 4001). Texas blind salamander is restricted in distribution to the Edwards Aquifer artesian and recharge zone in the vicinity of San Marcos in Hays County, Texas.

Threats

The most significant threat to the species assemblage is degradation of their aquatic habitat in the form of reduced water quality and quantity and disturbance of spring sites (USFWS 1996b, 2013k, 2016i). The Edwards Aquifer is at risk from a variety of sources of pollutants (Ross 2011), including pesticides, fertilizers, and the spillage of hazardous materials, resulting in contamination of both surface and groundwater resources.

Rapid population growth in the Edwards Aquifer area is likely to be accompanied by rapid growth in demand for groundwater (TWDB 2003). Although decreases in water quantity and spring flows have previously been cited as threats to salamanders (Bowles et al. 2006), some of these species are adapted to periodic surface flow loss and can temporarily retreat underground.

Other described threats for this species assemblage include restricted ranges that increase vulnerability to both acute and chronic groundwater contamination, hazardous materials spills, increased water withdrawals from the Edwards Aquifer, and impacts on surface habitat (USFWS 2016i).

Critical Habitat

Critical habitat is summarized in **Table 3-13** and briefly described for each species below. Critical habitat for this assemblage is depicted in **Figure D-12**.

Final critical habitat for the Austin blind salamander was designated in 2013 (78 *Federal Register* 51328). Critical habitat includes 120 acres of city and private land around three springs in the City of Austin in Travis County, Texas. Most of the unit consists of landscaped areas managed as Zilker Park, which the City of Austin owns.

Table 3-13
Karst Salamander Critical Habitat

Species	Critical Habitat in Planning Area (acres)	Critical Habitat in Action Area (acres)
Austin blind salamander	120	0
Georgetown salamander	1,031	609
Jollyville Plateau salamander	4,934	0
Salado salamander	372	0
San Marcos salamander	Acres unavaialble[1]	0

Sources: BLM GIS 2015; BIA GIS 2015; USFWS GIS 2019

[1]Critical habitat includes Spring Lake and its outflow, the San Marcos River, downstream approximately 165 feet from the Spring Lake Dam, in Hays County, Texas

Proposed critical habitat for the Georgetown salamander and Jollyville Plateau salamander includes 14 units and 33 units, respectively, in Travis, Williamson, and Bell Counties, Texas (78 *Federal Register* 5385). Proposed critical habitat for the Salado salamander includes 4 units in Bell County, Texas (78 *Federal Register* 5385).

Final critical habitat for the San Marcos salamander was designated at the time of listing in 1980 (45 *Federal Register* 47355). Critical habitat includes Spring Lake and its outflow, the San Marcos River, downstream approximately 165 feet from the Spring Lake Dam, in Hays County, Texas. Critical habitat includes the entire known range of the species.

Critical habitat surface and subsurface PCEs for the species assemblage generally include water from the Edwards Aquifer; a rocky substrate with interstitial spaces; subsurface spaces large enough to provide cover, shelter, and foraging habitat; aquatic invertebrates for food; and a subterranean aquifer (78 *Federal Register* 51328).

Western Yellow-billed Cuckoo

Species Description

Western yellow-billed cuckoo is a medium-sized bird, approximately 12 inches long and weighing about 2 ounces. Its plumage is grayish-brown above and white below, with rufous primary flight feathers. The tail feathers are boldly patterned with black and white below (USFWS 2011e).

Life History

During migration and foraging, yellow-billed cuckoos may be found in a variety of vegetation types, including coastal scrub, secondary growth woodland, hedgerows, humid lowland forests, and forest edges from sea level to 8,125 feet in elevation (Hughes 2015). The average home range of yellow-billed cuckoos is

225 acres on the Rio Grande River in New Mexico (Sechrist et al. 2013) and 126 acres on the San Pedro River in Arizona. Yellow-billed cuckoos are primarily foliage gleaners, although they can catch flying and ground-dwelling prey, such as grasshoppers or tree frogs (Wiggins 2005).

During the nesting season, the western yellow-billed cuckoo occupies large patches of multilayered riparian habitats, most often cottonwood-willow forests (*Populus* spp.-*Salix* spp.). Yellow-billed cuckoos typically breed from early to mid-June until late August. Females lay clutches of two to three eggs, and young develop in approximately 17 days, from egg laying to fledging. After fledging, the young depend on the parents for another 3 weeks (USFWS 2011e).

Threats

Range-wide threats to the western yellow-billed cuckoo are riparian habitat destruction, modification, and degradation caused by alteration of hydrology from dams, water diversions, management of river flow that differs from natural hydrological patterns, channelization, and levees and other forms of bank stabilization that encroach onto the floodplain. Conversion of floodplains for agriculture, such as crops and livestock grazing, further exacerbate these losses. In combination with altered hydrology, these threats promote the conversion of primarily native habitats to monotypic stands of nonnative vegetation, which reduces the suitability of riparian habitat for the western yellow-billed cuckoo. Other threats to riparian habitat are long-term drought and climate change (USFWS 2014f).

Status and Distribution

The USFWS categorized the western DPS of the yellow-billed cuckoo as a candidate species for listing under the ESA and proposed it to be listed as threatened in 2013. The USFWS published the final rule for listing the western DPS of the yellow-billed cuckoo as threatened on November 3, 2014 (USFWS 2014f).

The species occurs in Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Texas, Utah, Washington, and Wyoming. In Texas, the DPS boundary is the line of mountain ranges that form a southeastern extension of the Rocky Mountains to the Big Bend area of west Texas, and that form the western boundary of the Pecos River drainage. Population trend information is lacking from west Texas, but surveys from New Mexico, Arizona, and California indicate an estimated 52 percent decline since 1980 (USFWS 2011e).

Of the approximately 298,835,100 acres of this species' total range, approximately 174,300 acres (less than 1 percent) occur in the action area.

Critical Habitat

The USFWS published the final rule for proposed critical habitat on November 12, 2014. Critical habitat for the western yellow-billed cuckoo is proposed on

546,335 acres in 80 separate units in Arizona, California, Colorado, Idaho, Nevada, New Mexico, Texas, Utah, and Wyoming. Two units occur in west Texas: an 8-mile long segment along the Rio Grande upstream and downstream from Arroyo Caballo in Hudspeth County, and a 45-mile long segment in Big Bend National Park (USFWS 2014g). No critical habitat occurs in the action area.

Southwestern Willow Flycatcher

Species Description

Southwestern willow flycatcher is a small bird, approximately 5.75 inches long and weighing about 0.4 ounces. It has a grayish-green back and wings, whitish throat, light grey-olive breast, and pale yellowish belly (USFWS 2002b).

Life History

All willow flycatcher subspecies spend time migrating in the United States from April to June and from July through September. Willow flycatchers, like most small, migratory, insect-eating birds, require stopover areas to replenish energy reserves and continue migration. Many migrating willow flycatchers are detected in riparian habitats or patches that would be unsuitable for nest placement. In these habitats, migrating flycatchers may use a variety of riparian habitats, including ones dominated by native or nonnative plant species, or mixtures of both (USFWS 2017d).

The breeding season for this species is from approximately May to September. Southwestern willow flycatchers establish nesting territories, reproduce, and forage in relatively dense and expansive clusters of trees and shrubs, near or adjacent to water. Nests are typically placed in trees where the plant growth is most dense, where trees and shrubs have vegetation near ground level, and where there is a low-density canopy. Generally, flycatchers are not found nesting in areas without willows, tamarisk, or both, though some exceptions occur. The subspecies eats a wide range of terrestrial and aquatic invertebrates (USFWS 2017e).

Threats

Primary threats to southwestern willow flycatcher are habitat loss and modification caused by dams and reservoirs, diversion and groundwater pumping, invasive plants and beetles, river management, urbanization, agricultural development, livestock grazing and management, fire and fire management, cowbird parasitism, recreation, and tamarisk leaf beetle (*Diorhabda elongate*). Other factors include drought and the effects of climate change, vulnerability of small or isolated populations, and genetic effects (USFWS 2017e).

Status and Distribution

The southwestern willow flycatcher was listed as an endangered species on February 27, 1995. A 12-month finding to review the status of southwestern willow flycatcher as a result of a petition to delist the species was released in December 2017. Based on a review of the best available science, the USFWS determined delisting of southwestern flycatcher is not warranted (USFWS 2013l).

The extent of the flycatcher's current known breeding range is similar to its historical range of southern California, southern Nevada, southern Utah, southern Colorado, Arizona, New Mexico, western Texas, and extreme northwestern Mexico, but the quantity and distribution of breeding habitat within that range are reduced. The most current reports estimate the number of territories range-wide, as of the end of the 2012 breeding season, was 1,629 (USFWS 2017e).

Of the approximately 119,886,600 acres of this species' total range, approximately 174,300 acres (less than 1 percent) occur in the action area.

Critical Habitat

Final critical habitat for southwestern willow flycatcher was designated on January 3, 2013, and includes stream segments in California, Nevada, Utah, Colorado, Arizona, and New Mexico (USFWS 2013l). As such, no designated critical habitat occurs within the action area.

Fountain Darter

Species Description

The fountain darter is the smallest species of darter, generally less than 1 inch in length. It is mostly reddish brown, with broadly-margined scales on its sides with dusky pigment. A series of horizontal, stitch-like, dark lines occur along the middle of the sides, forming an interrupted lateral streak (USFWS 1996c).

Life History

The fountain darter appears to spawn year-round, but most spawn in spring or early summer. Females deposit eggs on low, dense vegetation such as moss or algae. The fountain darter matures in about 8 to 12 months. Its diet mainly consists of microcrustaceans, shifting to slightly larger prey as its grows (USFWS 1996c).

Habitat requirements for fountain darters are undisturbed stream floor habitats, including runs, riffles, and pools; a mix of submergent vegetation (algae, mosses, and vascular plants) in part for cover; clear and clean water; a food supply of living organisms; constant water temperatures within the natural and normal river gradients; and most importantly, adequate springflows. They are often

associated with filamentous green algae (*Rhizoclonium* sp.) and the moss *Riccia* (USFWS 1996c).

Threats

A primary threat is loss of springflows from groundwater use in the Edwards Aquifer. Water quality declines, habitat modification, nonnative species, and recreational activities are other identified threats (USFWS 1996c).

Status and Distribution

The USFWS listed the fountain darter as an endangered species under the ESA in 1970 (USFWS 1970b).

The fountain darter is found only in the San Marcos and Comal River headwaters in Hays and Comal Counties in Texas. The San Marcos and Comal Rivers are spring-fed streams deriving from the Edwards Aquifer. The original population in the Comal River was extirpated in the mid-1950s, likely due to extreme temperature fluctuations when the Comal Springs ceased to flow from June to November 1956. A population from San Marcos was reintroduced into Comal Springs during the early 1970s. There are currently only two known populations, one in the San Marcos River watershed and the other in the upper Comal River (USFWS 1996c).

Of the approximately 790,100 acres of this species' total range, approximately 56,400 acres (7 percent) occur in the action area.

Critical Habitat

The USFWS determined final critical habitat for the species in 1980. It consisted of the species' entire known range, as "Texas, Hays County; Spring Lake and its outflow, the San Marcos River, downstream approximately 0.5 miles below Interstate Highway 35 bridge" (USFWS 1980). Critical habitat is not in the action area.

Mexican Blindcat

Species Description

The Mexican blindcat is a small species of catfish with no eyes. It was originally described in 1954 after being discovered in wells and springs near Melchor Múzquiz in the northern Mexican state of Coahuila.

Life History

Under laboratory conditions, Mexican blindcats were incapable of perceiving light, but showed strong sensitivity to sound and scent. They were capable of persisting without food for long periods of time (up to 44 months in a laboratory). Larger individuals and those under some form of stress have been observed to display periods of inactivity. Efforts to induce reproduction in captivity have been unsuccessful (Hendrickson et al. 2001).

The species lives only in subterranean waters of wells, springs, caves, and mines. Blindcats are primarily found in still pools, in habitats well into the dark zone and with little short-term fluctuations in environmental parameters. They occasionally occur in high-flow systems. They are often associated with silty substrate, but this may be a correlate of their preference for still water. All documented blindcat localities are at relatively low elevations relative to surrounding mountain ranges. At occupied blindcat sites, water temperature ranges from 69.8 to 88.7 °F, pH from 7.45 to 7.9, and dissolved oxygen from 0.75 to 5.4 milligrams per liter (Hendrickson et al. 2001).

Status and Distribution

The USFWS listed Mexican blindcat as an endangered species in 1970 (USFWS 1970b).

This species is known from caves in areas supported by the Edwards-Trinity Aquifer that underlies the Rio Bravo basin in Coahuila, Mexico, and, as of 2016, near Del Rio, Texas, where the first US population was discovered (UT News 2016). It is unusual to see more than six blindcats on any given visit to an occupied site. Cave entrances that serve as energy input points support higher abundances (Hendrickson et al. 2001).

Of the approximately 2,069,400 acres of this species' total range, approximately 203,400 acres (10 percent) occur in the action area.

The San Antonio Zoo maintains a captive colony. Efforts to survey for suitable habitat at Amistad National Recreation Area and at sites along the Devil's River and to establish a breeding population in captivity are underway (San Antonio Zoo 2019).

Critical Habitat

Critical habitat has not been designated or proposed for the Mexican blindcat.

Texas Fatmucket

Species Description

The Texas fatmucket is a large, elongated freshwater mussel that is endemic to central Texas.

Life History

The Texas fatmucket inhabits moderately sized rivers with relatively shallow waters (usually less than 4.9 feet deep). Populations occur in mud, sand, or gravel, or mixtures of these substrates and sometimes in narrow crevices between bedrock slabs. This species typically favors rivers with bedrock characterized by very low water capacity and rapid water permeability that quickly dry during low water and drought events. This species also has been found in quiet, slow-moving waters with fine silt substrate along the perimeter

of impounded waters and in rivers primarily made up of bedrock and pool habitat (USFWS 2016j).

There is no specific information on age and size of maturity of the Texas fatmucket; however, it is likely similar to a related species, the Louisiana fatmucket (*L. hydiana*), which reaches sexual maturity around 1.4 inches. Gravid Texas fatmucket females have been found from July through October, although brooding may continue throughout much of the year (USFWS 2016j).

Like most freshwater mussels, males release sperm into the water column, which females draw in through their siphons. After internal fertilization, eggs develop for 4 to 6 weeks, and the resulting glochidia are broadcast into the water column where they attach to the gills or fins of a host fish. Host fish may include bluegill (*Lepomis macrochirus*) and green sunfish (*L. cyanellus*), which are common, widely distributed species that occur in an array of habitat types in Texas (USFWS 2016j).

Adult freshwater mussels are filter feeders, siphoning algae, bacteria, detritus, microscopic animals, and dissolved organic matter. Juveniles use cilia on the foot to capture suspended and depositional material, such as algae and detritus (USFWS 2016j).

Threats

Identified threats are habitat destruction and modification, primarily from impoundments, sedimentation, dewatering, sand and gravel mining, and chemical contaminants (USFWS 2016c).

Status and Distribution

Texas fatmucket has been a candidate for listing under the ESA since 2011 (USFWS 2011d).

This species historically occurred in at least 18 rivers in the Colorado and Guadalupe-San Antonio River basins in the Texas Hill Country and east-central Edwards Plateau region of central Texas. In the Colorado River, it ranged from Travis County upstream approximately 200 miles to Runnels County. It also was found in many tributaries of the Colorado River, including the Pedernales, Llano, San Saba, and Concho Rivers, and Jim Ned, Elm, and Onion Creeks.

In the Guadalupe-San Antonio River basin, the Texas fatmucket occupied approximately 150 miles of the Guadalupe River, from Gonzales County upstream to Kerr County, including the North Guadalupe River, Johnson Creek, and the Blanco River. In the San Antonio River, it ranged from its confluence with the Medina River in Bexar County upstream to the City of San Antonio, as well as in the Medina River and Cibolo Creek (USFWS 2016j).

The Texas fatmucket has declined significantly across its range. It is now known from only nine streams in the Colorado and Guadalupe River systems. Most existing populations are represented by only one or two individuals and are likely not stable or recruiting. Extant populations are highly fragmented and restricted to short reaches with few exceptions (USFWS 2016j).

Of the approximately 11,972,400 acres of this species' total range, approximately 98,400 acres (1 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Texas Pimpleback

Species Description

The Texas pimpleback is a large freshwater mussel that typically reaches 2.4 to 3.5 inches.

Life History

The Texas pimpleback typically inhabits moderately sized rivers. It is usually found in mud, sand, gravel, and cobble, and occasionally in gravel-filled cracks in bedrock slab bottoms. It has not been found in water depths over 6.6 feet or in reservoirs, indicating intolerance of deep, low-velocity waters created by artificial impoundments. The Texas pimpleback appears to tolerate faster water velocities more than many other mussel species (USFWS 2015k).

There is little specific information on age or size of maturity for Texas pimpleback. It is probably a short-term brooder, as is typical for mussels in the genus *Quadrula*. Gravid females have been found from June through August, and the smallest documented gravid female was a 1.8-inch-long species (USFWS 2015k).

During reproduction, males release sperm into the water column, which females draw in through their siphons. After internal fertilization, eggs develop for 4 to 6 weeks, and the resulting glochidia are broadcast into the water column where they attach to the gills or fins of a host fish. Channel catfish are a known host fish species (USFWS 2015k).

Adult freshwater mussels are filter feeders, siphoning algae, bacteria, detritus, microscopic animals, and dissolved organic matter. Juvenile mussels use cilia on the foot to capture suspended and depositional material, such as algae and detritus (USFWS 2015k).

Threats

Identified threats are habitat destruction and modification, primarily from impoundments, sedimentation, dewatering, sand and gravel mining, and chemical contaminants (USFWS 2011d, 2016c).

Status and Distribution

The Texas pimpleback has been a candidate for listing under the ESA since 2011 (USFWS 2011d, 2016c).

The Texas pimpleback is endemic to the Colorado and Guadalupe-San Antonio River basins of central Texas. In the Colorado River basin, Texas pimpleback historically occurred throughout nearly the entire main stem, as well as numerous tributaries, including the Concho, North Concho, San Saba, Llano, and Pedernales Rivers, and Elm and Onion Creeks. Within the Guadalupe-San Antonio River basin, it historically occurred throughout most of the length of the Guadalupe River, as well as in the San Antonio, San Marcos, Blanco, and Medina Rivers (USFWS 2015k).

The Texas pimpleback has declined significantly range-wide. Only five extant populations are known: in the lower Colorado River, San Saba River, Concho River, Guadalupe River, and San Marcos River. Half of these populations are disjunct, small, and isolated. The species has been extirpated from the remainder of its historical range (USFWS 2015k).

Of the approximately 19,312,300 acres of this species' total range, approximately 122,000 acres (1 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Species Assemblage: Karst Invertebrates

The karst invertebrates species assemblage includes the nine species in the Bexar County Karst Invertebrates Recovery Plan (USFWS 2011f) and the seven species in the Endangered Karst Invertebrates of Travis and Williamson Counties, Texas, Recovery Plan (USFWS 1994). These species are analyzed as a species assemblage because the biology, threats, and conservation needs of these species and the karst ecosystems they occur in are very similar (USFWS 2011f).

Species in the Bexar County Karst Invertebrates Recovery Plan (USFWS 2011f) include:

- A ground beetle (*Rhadine exilis*)
- A ground beetle (*Rhadine infernalis*)
- Helotes mold beetle (*Batrisodes venyivi*)

- Cokendolpher Cave harvestman (*Texella cokendolpheri*)
- Government Canyon Bat Cave spider (*Neoleptoneta microps*)
- Robber Baron Cave meshweaver (*Cicurina baronia*)
- Madla Cave meshweaver (*C. madla*)
- Bracken Bat Cave meshweaver (*C. venii*)
- Government Canyon Bat Cave meshweaver (*C. vespera*)

Species in the Endangered Karst Invertebrates of Travis and Williamson Counties, Texas, Recovery Plan (USFWS 1994) include:

- Bee Creek Cave harvestman (*Texella reddelli*)
- Bone Cave harvestman (*Texella reyesi*)
- Tooth Cave pseudoscorpion (*Tartarocreagris texana*)
- Tooth Cave spider (*Neoleptoneta myopica*)
- Tooth Cave ground beetle (*Rhadine persephone*)
- Kretschmarr Cave mold beetle (*Texamaurops reddelli*)
- Coffin Cave mold beetle (*Batrisodes texanus*)

Species Assemblage Description

This species assemblage includes the insects *Rhadine exilis* and *R. infernalis* (no common names), which are small, essentially eyeless ground beetles. Helotes mold beetle, Kretschmarr Cave mold beetle, and Coffin Cave mold beetle are small, eyeless beetles. Tooth Cave ground beetle is a relatively large beetle with relatively large eye rudiments.

This species assemblage also includes the following arachnids: Cokendolpher Cave harvestman, Bee Creek Cave harvestman, and Bone Creek Cave harvestman (daddy-longlegs); Robber Baron Cave meshweaver, Madla Cave meshweaver, Bracken Bat Cave meshweaver, and Government Canyon Bat Cave meshweaver; Government Canyon Bat Cave spider; and Tooth Cave spider. All are small, eyeless or essentially eyeless spiders. Tooth Cave pseudoscorpion is a relatively large, eyeless pseudoscorpion.

Taxonomic verification of these species is usually not possible in the field and usually requires examination of adult specimens under a microscope. Identification often requires dissection of the genitalia by a taxonomic expert. These species range in size from 0.039 inches to 0.39 inches (USFWS 2011f).

Life History

All of these invertebrates are troglobites[6], spending their entire lives underground. They are characterized by small or absent eyes and pale coloration. Their habitat includes caves and mesocavernous voids in karst limestone (landforms and subsurface features, for example, sinkholes and caves produced by dissolution of bedrock). In this habitat, these animals depend on high humidity, stable temperatures, suitable substrates (for example, spaces between and underneath rocks), and surface-derived nutrients. Examples of nutrient sources include leaf litter that has fallen or washed in, animal droppings, and animal carcasses. While these species spend their entire lives underground, their ecosystem is dependent on the overlying surface habitat.

In some cases, the most important source of nutrients for a troglobite may be the fungi or microbes that grow on the leaves or troglophile[7] feces rather than the original material itself. Tree roots can penetrate into caves and may also provide direct nutrient input to shallow caves. In deeper cave reaches, nutrients enter through water containing dissolved organic matter percolating vertically through karst fissures and solution features. For predatory troglobites, accidental species of invertebrates (those that wander in or are trapped in a cave) may be an important nutrient source in addition to other troglobites and troglophiles found in the cave (USFWS 1994, 2011f, 2018i).

The cave cricket (*Ceuthophilus* spp.) is a particularly important nutrient component and is found in most caves in Texas. As a troglophile, cave crickets forage on the surface at night, and generally return to the cave during the day, where they lay eggs and roost. A variety of troglobites are known to feed on cave cricket eggs, feces and on the adults and nymphs directly (USFWS 1994, 2011f, 2018i).

Threats

The primary threat to these species is habitat destruction. Caves and karst habitat are destroyed or affected in several ways, including but not limited to:

- Completely filling the cave with cement during development
- Quarrying activities
- Capping or sealing cave entrances

Other causes of habitat degradation include altering drainage patterns, altering native surface plant and animal communities, reducing or increasing nutrient flow, contamination, excessive human visitation, and threats from red-imported fire ants. Red-imported fire ants affect karst invertebrates by competing with the beneficial cave crickets, feeding directly on karst invertebrates, and by

[6] a species that lives entirely in the dark parts of subterranean habitats.
[7] a species that uses subterranean and surface habitats

competing with karst invertebrates for habitat resources (USFWS 1994, 2011f, 2018i).

Status and Distribution

These species are only known from karst areas in Bexar, Travis, and Williamson Counties in Texas. Potentially suitable karst areas also may occur in neighboring counties, such as Medina County, so these species may be found in other areas during future inventory efforts. Their historical ranges are unknown, but they were likely similar to their present ranges with the exception of caves that have been destroyed or severely affected.

Population estimates are unavailable for any of these species due to lack of adequate techniques, their cryptic behavior, inaccessibility of mesocavern habitat, and difficulty accessing cave and karst habitats.

Karst habitats in Bexar County occur in one of six Karst Fauna Regions, geographic areas delineated based on gaps in karst habitat that may reduce or limit interaction between populations. Additionally, five karst zones within the regions facilitate assessment of the probability of the presence of rare or endangered karst species. These zones, which are shown in **Figure D-13**, are:

- Zone 1. Areas known to contain listed karst invertebrate species
- Zone 2. Areas having a high probability of containing habitat suitable for listed karst invertebrate species
- Zone 3. Areas that probably do not contain listed karst invertebrate species
- Zone 4. Areas that require further research but are generally equivalent to Zone 3, although they may include sections that could be classified as Zone 2 or Zone 5 as more information becomes available
- Zone 5. Areas that do not contain listed karst invertebrate species

Critical Habitat

Critical habitat for seven of the nine karst invertebrates in the Bexar County Karst Invertebrates Recovery Plan (all except *N. microps* and *C. vespera*) was designated on April 8, 2003 (68 *Federal Register* 17156). On February 14, 2012, the USFWS revised critical habitat designations, which included designating critical habitat for *N. microps* and *C. vespera* (77 *Federal Register* 8450). Critical habitat for this species assemblage is shown in **Figure D-14** and summarized in **Table 3-14**.

Table 3-14
Listed Karst Invertebrate Critical Habitat

Species	Critical Habitat in Planning Area (acres)	Critical Habitat in Action Area (acres)
A ground beetle (*Rhadine exilis*)	2,372	89
A ground beetle (*R. infernalis*)	2,965	73
Helotes mold beetle (*Batrisodes venyivi*)	601	0
Cokendolpher Cave harvestman (*Texella cokendolpheri*)	247	0
Government Canyon Bat Cave spider (*Neoleptoneta microps*)	100	0
Robber Baron Cave meshweaver (*Cicurina baronia*)	347	11
Madla Cave meshweaver (*C. madla*)	1,892	0
Bracken Bat Cave meshweaver (*C. venii*)	217	0
Government Canyon Bat Cave meshweaver (*C. vespera*)	100	0

Sources: BLM GIS 2015; BIA GIS 2015; USFWS GIS 2019

Critical habitat PCEs are:

- Karst-forming rock containing subterranean spaces (caves and connected mesocaverns) with stable temperatures, high humidity (near saturation), and suitable substrates (for example, spaces between and underneath rocks for foraging and sheltering) that are free of contaminants
- Surface and subsurface sources, such as plants and their roots, fruits, leaves, and animal (e.g., cave cricket) eggs, feces, and carcasses, that provide nutrient input into the karst ecosystem

Critical habitat has not been designated or proposed for the seven karst invertebrates in the Travis and Williamson Counties, Texas, Recovery Plan (USFWS 1994).

Species Assemblage: Aquatic Invertebrates

The aquatic invertebrates species assemblage consists of three aquatic invertebrates—the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod—that depend on water from the Edwards Aquifer, and designated critical habitat for these species. These species are restricted in distribution to springs in Comal and Hays Counties, Texas, and the associated aquifer (USFWS 1997c). They are analyzed as a species assemblage because the biology, threats, and conservation needs of these species and the aquatic ecosystems they occur in share numerous similarities.

Species Description

Peck's cave amphipod is a subterranean, aquatic crustacean in the family Crangonyctidae. The Comal Springs riffle beetle is an aquatic, surface-dwelling species in the family Elmidae. The Comal Springs dryopid beetle is the only known subterranean member of the beetle family Dryopidae. These species are primarily associated with spring orifices that are supplied with water from the Balcones Fault Zone—San Antonio Region of the Edwards Aquifer (USFWS 1997c).

Life History

The Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod are all spring-adapted, aquatic species. They depend on unpolluted groundwater with low levels of salinity and turbidity. The two beetle species require sufficient levels of dissolved oxygen for respiration. Unpolluted, high-quality discharge water from springs and adjacent subterranean areas is necessary to sustain suitable habitat conditions (USFWS 2013m).

These three species complete their life cycle functions within the relatively narrow temperature ranges of spring water emerging from the Edwards Aquifer at Comal and San Marcos Springs (approximately 72 to 75°F) and Hueco Springs and Fern Bank Springs (approximately 68 to 71°F) (USFWS 2013m).

Potential food sources for the three aquatic invertebrate species include detritus, leaf litter, decaying roots, and microorganisms such as bacteria and fungi associated with decaying riparian vegetation (USFWS 2013m).

There is little information known about the life history requirements of Peck's cave amphipod. It is eyeless and un-pigmented, indicating that it primarily inhabits permanently dark areas (EARIP 2012).

The Comal Springs dryopid beetle is also adapted to subterranean environments, as indicated by its vestigial eyes and weakly pigmented skin. It is probably restricted to headwaters of springs and spring runs due to its inability to swim. This species maintains a mass of small hydrophobic hairs on its underside where it retains a thin air bubble through which gas exchange occurs during respiration. This method of respiration becomes less effective as water flow, and thus dissolved oxygen levels, decrease. This species, therefore, requires flowing, uncontaminated waters for survival (EARIP 2012).

Unlike the other two species in this assemblage, the Comal Springs riffle beetle is not a subterranean species. It occurs in the gravel substrate and shallow riffles in spring runs, typically in water depths of 1 to 4 inches. Populations are reported to reach their greatest densities from February to April (USFWS 1997c). Water flow appears to be important to respiration and survival (EARIP 2012).

Threats

The primary threat to these aquatic invertebrate species is a reduction in water quantity and quality as a result of water withdrawal and other human activities throughout the San Antonio segment of the Edwards Aquifer (USFWS 1997c).

Status and Distribution

Peck's cave amphipod is known from Comal Springs and Hueco Springs, both in Comal County. The Comal Springs riffle beetle is known from Comal Springs and San Marcos Springs (Hays County). The Comal Springs dryopid beetle is known from Comal Springs and Fern Bank Springs (Hays County). The water flowing out of each of these spring orifices comes from the Edwards Aquifer (Balcones Fault Zone—San Antonio Region), which extends from Hays County west to Kinney County (USFWS 1997c; EARIP 2012).

The Comal Springs dryopid beetle and the Comal Springs riffle beetle both have a range of approximately 790,100 acres; of these, approximately 56,400 acres (7 percent) occur in the action area. The Peck's cave amphipod's total range is approximately 366,300 acres; of these, approximately 56,400 acres (15 percent) occur in the action area.

Critical Habitat

The USFWS designated critical habitat for these three aquatic invertebrate species in 2007; it was revised in 2013 to include the following (USFWS 2013m). No critical habitat is in the action area.

- Comal Springs dryopid beetle: 39.4 acres of surface and 139 acres of subsurface critical habitat. The original designation was surface critical habitat of 39.5 acres without subsurface critical habitat.
- Comal Springs riffle beetle: 54 acres of surface critical habitat only. The original designation was surface critical habitat of 30.3 acres.
- Peck's cave amphipod: 38.4 acres of surface and 138 acres of subsurface critical habitat in Comal County, Texas. The original designation was surface critical habitat of 38.5 acres without subsurface critical habitat.

The PCEs of designated critical habitat for Peck's Cave amphipod, Comal Springs dryopid beetle, and Comal Springs riffle beetle are as follows (USFWS 2013m):

- Springs, associated streams, and underground spaces immediately inside of or adjacent to springs, seeps, and upwellings that include:
  - High-quality water with no or minimal pollutant levels of soaps, detergents, heavy metals, pesticides, fertilizer nutrients, petroleum hydrocarbons, and semivolatile compounds such as industrial cleaning agents

  - Hydrologic regimes similar to the historical pattern of the specific sites, with continuous surface flow from the spring sites and in the subterranean aquifer
- Spring system water temperatures that range from approximately 68 to 75°F
- Food supply that includes, but is not limited to, detritus (decomposed materials), leaf litter, living plant material, algae, fungi, bacteria, other microorganisms, and decaying roots

3.8.2 Plants

Table 3-15
Plant Species and Critical Habitat Considered and Evaluated—Austin ESFO

Common and Scientific Name	Status[1]	Critical Habitat	Assessed/Rationale for Exclusion
Tobusch fishhook cactus *Sclerocactus brevihamatus* ssp. *tobuschii (Ancistrocactus t.)*	T	No	Analyzed in detail; see *Plants* species assemblage
Bracted twistflower *Streptanthus bracteatus*	C	No	Analyzed in detail; see *Plants* species assemblage
Texas snowbells *Styrax platanifolius* spp. *texanus (S. t.)*	E	No	Analyzed in detail; see *Plants* species assemblage
Texas wild-rice *Zizania texana*	E	Designated	Analyzed in detail; see *Plants* species assemblage

Source: USFWS IPaC, April 22, 2019
[1]Status Codes: E—Federal-listed Endangered, T—Federal-listed Threatened, C—Candidate for federal listing

Tobusch Fishhook Cactus

Species Description
Tobusch fishhook cactus normally has solitary stems up to 3.5 inches in diameter and nearly as tall.

Life History
Tobusch fishhook cactus reproduces sexually through seeds and is almost completely self-incompatible. It flowers once per year, from late January or early February to mid-March. Flowering lasts 2 to 3 weeks. Up to eight or more yellow to yellow-green flowers per plant arise from the axils of previous year tubercles. The green to greenish-pink fruits ripen in mid-May and split open when dry. Each fruit produces from 20 to 40 papillate seeds that are 1.5 mm long by 1 to 1.5 mm wide. Common pollinators are several species of Halictid bees (USFWS 2010e).

This species normally grows slowly, with a stem diameter growth rate of several mm/year. Like many cactus species, the stems swell and shrink, depending on

the amount of water they store. Plants are estimated to take at least 9 years to reach reproductive size and 25 years to reach a diameter of 30 mm. The largest plants, measuring 40 mm to 60 mm in diameter, could be over 50 years old (USFWS 2010e).

Parasites, such as two Coleopteran cactus parasites, *Moneilema armata* LeConte (Cerambycidae), and an undescribed species of *Gerstaeckeria* (Curculionidae) are common causes of mortality. Mammalian herbivory may be a relatively minor cause (USFWS 2010e).

Habitat consists of discontinuous patches of shallow, moderately alkaline, rocky loams or clays over massive, fractured limestone bedrock (usually the Edwards formation or an equivalent formation). Plants typically grow on level to slightly sloping hills or ridgetops that are open and receive full sunlight. The understory consists of a thin herbaceous cover of grasses and other herbaceous species in the live oak-juniper woodland community. Pinyon pine-oak is found in the western part of the range, and the species is occasionally found in little bluestem grasslands or ceniza shrublands. The plants regularly grow in a thin layer of soil, gravel, rock cracks, or spikemoss (USFWS 2010e).

Tobusch fishhook cactus grows in limestone and limestone-derived soils of the eastern Edwards Plateau of Texas. Plants are found in the Ashe juniper-oak vegetation association and typically grow near streams and in river canyons. The cacti occur on higher streambanks and are periodically disturbed by the floods that are common in the area (USFWS 1987b).

Threats

The recovery plan lists four threats to the continued survival of Tobusch fishhook cactus (USFWS 1987b): real estate development, livestock damage, habitat modification by natural factors, and collection.

Status and Distribution

The USFWS listed the species as endangered without critical habitat under the ESA in 1979 and reclassified it as threatened in 2018 (USFWS 1987b).

When the species was federally listed as endangered in 1979, there were fewer than 200 individuals documented in Bandera and Kerr Counties, Texas. The Tobusch Fishhook Recovery Plan states that the original populations in Bandera and Kerr Counties had been extirpated, but new populations had been found since 1985 in Real, Kimble, and Uvalde Counties (USFWS 1987b). By 1999, 3,395 extant individuals had been documented in eight counties of the Edwards Plateau: Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde.

Currently, 3,836 Tobusch fishhook cactus individuals have been documented in 10 protected natural areas. The maximum numbers detected at each site range from 17 to 1,090; however, several large populations have been decimated by

insect parasites, including cactus weevils (*Gerstaeckeria* spp.) and cactus longhorn beetles (*Moneilema* spp.). Periodic outbreaks of insect parasitism appear to be an unavoidable natural cycle (USFWS 2018i).

Of the approximately 9,043,700 acres of this species' total range, approximately 206,200 acres (2 percent) are in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Bracted Twistflower

Species Description

Bracted twistflower is an annual herbaceous plant of the mustard family (Brassicaceae). It is endemic to a small portion of the Edwards Plateau of Texas.

Life History

Bracted twistflower is primarily an outcrossing species, although 6.3 percent of self-pollinated flowers set fruit. A locally common species of leafcutter bee, *Megachile comate*, is an effective pollinator (USFWS 2016k).

Seeds germinate in response to fall and winter rainfall, forming basal rosettes. Flower stalks emerge the following spring, bearing showy lavender-purple flowers. Thin seed pods, known as siliques, mature and dry during the summer, finally splitting open to release flattened seeds with narrow wings. The foliage withers as the fruits mature, and the plants die during the heat of summer (USFWS 2016k).

Bracted twistflower occurs most often under a tree canopy of Ashe juniper (*Juniperus ashei*), Texas live oak (*Quercus fusiformis*), Texas persimmon (*Diospyros texana*), Texas mountain laurel (*Sophora secundiflora*), and Texas red oak (*Q. buckleyi*). It often occurs in a dense understory of small trees and shrubs, including evergreen sumac (*Rhus virens*), Roemer acacia (*Acacia roemeriana*), agarita (*Mahonia trifoliolata*), Lindheimer silk-tassel (*Garrya ovata* ssp. *lindheimeri*), thoroughwort (*Ageratina havanensis*), and oreja de raton (*Bernardia myricifolia*) (USFWS 2016k).

Plants may occur in areas with less dense woody plant cover when sites are protected from white-tailed deer. Research has shown that the species is best adapted to sites with less than 50 percent cover of woody plants and that severe herbivory by dense populations of white-tailed deer has largely extirpated the plant from its optimal habitats (USFWS 2016k).

Threats

The main threats to the species are habitat destruction from urban development, severe herbivory from white-tailed deer and other herbivores,

and increased density of woody plant cover. Additional ongoing threats are erosion and trampling from those using foot and mountain-bike trails, a pathogenic fungus of unknown origin, and insufficient protection by existing regulations. Furthermore, small population size and isolation has caused a lack of gene flow, which may lead to insufficient genetic diversity for long-term survival (USFWS 2015l).

Status and Distribution

This species was added as a candidate for federal listing in 2011 and was petitioned for listing in 2014. The USFWS published a substantial 90-day finding and a warranted but precluded 12-month petition finding for the species in 2015 (USFWS 2015l).

There are 16 bracted twistflower element occurrences (EOs) that have been observed since 1989. The populations are in Travis, Hays, Bexar, Medina, and Uvalde Counties. Nine of these EOs remain with intact habitat, two are partially intact, two are on managed rights-of-way, and three have been developed and the populations are presumed extirpated (USFWS 2016k).

Only seven of the intact EOs and portions of two EOs, representing 2,502 individuals (33 percent of the maximum populations observed since 1989), are on protected natural areas. Four EOs, with 3,708 individuals (48 percent of the maximum populations), are intact but vulnerable to development and other impacts. Five EOs have been partially or completely developed, resulting in the loss of 1,449 individuals (19 percent of the maximum populations). Two EOs (32 and 02) were destroyed in 2012 and 2013, respectively (USFWS 2016k).

Of the approximately 7,585,000 acres of this species' total range, approximately 246,300 acres (3 percent) occur in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Texas Snowbells

Species Description

Texas snowbells is a shrub or small tree that reaches up to 20 feet tall and is endemic to the Edwards Plateau of Texas.

Life History

Texas snowbells usually flowers in April. If fertilized, flowers produce a typically single-seeded dry fruit that matures in August (USFWS 2017f). This subspecies is an obligate out-crosser; sexual fertilization requires the transfer of pollen between genetically compatible individuals that are within the foraging range of suitable pollinators, such as the honey bee (*Apis mellifera*), American bumblebee (*Bombus pensylvanicus*), and California carpenter bee (*Xylocopa californica*).

Effective pollination probably occurs most often between individuals that are not more than 0.3 miles apart. Closely related individuals may be genetically incompatible, and small populations may not have sufficient genetic diversity for sexual reproduction to occur (USFWS 2018j).

Browsing by dense populations of native white-tailed deer (*Odocoileus virginianus*) and introduced ungulates is largely responsible for high mortality of seedlings and juveniles. Plants begin reproducing at about 10 years and, if not severely browsed, may live for many decades (USFWS 2018j).

Habitat is described as "limestone bluffs, boulder slopes, cliff faces, and gravelly stream-beds, usually along perennial streams or intermittent drainages in canyon bottoms, in full sun or in partial shade of cliffs and/or sycamore-little walnut woodlands, oak-juniper woodlands, or mixed oak-shrublands" (USFWS 2017f).

Suitable habitats are narrow, discontinuous patches distributed along ravines and watercourses (USFWS 2018j). Texas snowbells populations occupy a very small portion of the landscape within these parameters. Two additional features that are common to all known populations are their proximity to watercourses and to slopes (USFWS 2017f).

Threats

Texas snowbells were listed as a federally endangered species, based on the following threats:

- Only 25 plants were known to exist, 24 of which were privately owned and 1 was owned by the State of Texas
- Stream bank erosion
- The possibility that browsing cattle or deer were reducing seedlings and young plants
- The lack of reproduction due to small population sizes

By the time the recovery plan was published, threats to the species were as follows:

- Browsing by deer, goats, cattle, sheep, and exotic ungulates
- Flooding and erosion
- Diseases of fungal or bacterial origin
- Alteration of groundwater

Status and Distribution

The USFWS listed Texas snowbells as endangered under the ESA in 1984 (USFWS 2018j).

The subspecies has been found only along canyons and ravines of 1st-, 2nd-, and 3rd-order streams in the upper Nueces, West Nueces, and Devils Rivers in the Edwards Plateau of Texas. Naturally occurring populations could also persist in the Sycamore Creek, Frio River, West Frio River, or other adjacent watersheds, but none have been documented. The subspecies' range extends 75 miles east to west and 22 miles north to south (USFWS 2018j).

By 2013, 400 mature and 452 immature Texas snowbells plants had been documented in 22 naturally occurring sites in Real, Edwards, and Val Verde Counties. Fifteen of the documented sites had fewer than 10 individuals and two sites had at least 100. Fifteen naturally occurring populations are on private land, five are on private conservation land (Dolan Falls Preserve and conservation easements managed by The Nature Conservancy), and two are on public conservation land (Devils River State Natural Area). The subspecies has also been reintroduced in 22 sites on private land and 2 sites at Dolan Falls Preserve (USFWS 2018j).

Of the approximately 6,255,500 acres of this species' total range, approximately 203,400 acres (3 percent) are in the action area.

Critical Habitat

Critical habitat has not been designated or proposed for this species.

Texas Wild-Rice

Texas wild-rice is an aquatic perennial grass found only in the upper two miles of the San Marcos River in San Marcos, Texas. It grows mostly submerged and has an emergent flowering head.

Life History

Texas wild-rice produces new plants either via seeds or stolons. When reproducing sexually, the long rigid stem bends upward at its nodes, emerges above the water surface, and produces an 8- to 12-inch flowering head. Asexual reproduction occurs where shoots arise at the ends of stolons (USFWS 1996c). It typically flowers from spring to summer, but flowering has been observed throughout the year (TDPW 2019f).

Texas wild-rice grows in gravelly or coarse sandy soils in clear, cool, fast-flowing waters of spring-fed rivers. In the upper portion of the San Marcos River, it occurs with pondweed (*Potarnogeton illinoensis*), wild celery (*Vallisneria americana*), arrowhead (*Sagittaria platyphylla*), hydrilla (*Hydrilla verticillata*), hornwort (*Ceratophyllum demersum*), elodea (*Egeria densa*), and water primrose (*Ludwigia repens*). In the lower portion of the river, Texas wild-rice is most often found in isolated clumps (USFWS 1996c).

Threats

This species is threatened by the factors associated with its urban location near the headwaters of the San Marcos River: habitat altering, nonnative species introductions, pollution, and recreation. Although the coverage of the Texas wild-rice populations has increased over the last 35 years, the population has simultaneously decreased in overall range (TPWD 2019f).

Status and Distribution

The USFWS listed the species as endangered in 1978, primarily due to habitat degradation and competition with nonnative species, and it designated critical habitat in 1980 (USFWS 1996c).

When first described in 1933, Texas wild-rice was abundant in the San Marcos River, including Spring Lake and its irrigation waterways. By 1967, only one plant was found in Spring Lake, none in the uppermost 0.5 mile of the San Marcos River, only scattered plants in the lower 1.5 miles, and none below this. These declines were caused by increased pumping and diversion of Edwards Aquifer groundwater that lowered water levels in the San Marcos River and exposed shallows where Texas wild-rice typically grew (USFWS 1996c).

Currently, Texas wild-rice is known only from the upper 2 miles of the San Marcos River in Hays County, Texas. The current distribution of wild rice extends from the uppermost part of the San Marcos River just below Spring Lake dam and throughout the critical habitat, down to an area slightly below the wastewater treatment plant; it is not found in the portion of the river between the Rio Vista railroad bridge and the dam above Cheatham Street (USFWS 1996c).

There has been an increase in Texas wild-rice coverage in recent years, and it is now abundant in the upper portion of its range, although it is still rare farther downstream. Populations are fragmented with large gaps between stands (CBD 2019).

Of the approximately 4,331,700 acres of this species' total range, approximately 158,000 acres (4 percent) are in the action area.

Critical Habitat

Because Texas wild-rice occupies an extremely restricted range and is, therefore, highly susceptible to changes in habitat, the USFWS designated the entire known ranges of the species as critical habitat in 1980; therefore, critical habitat is "Texas, Hays County; Spring Lake and its outflow, the San Marcos River, downstream to its confluence with the Blanco River" (USFWS 1980).

3.9 SPECIAL STATUS SPECIES

Species from the USFWS National 7-Year Listing Workplan (USFWS 2016a) with distributional ranges in states in the action area are summarized in the following sections.

3.9.1 Wildlife

Table 3-16
USFWS National Listing Workplan Wildlife Species

	Common and Scientific Name	Range (States)
Amphibians	Cascade Caverns salamander (*Eurycea latitans*)	TX
	Texas salamander (*E. neotenes*)	TX
	Blanco blind salamander (*E. robusta*)	TX
	Oklahoma salamander (*E. tynerensis*)	OK
	Comal blind salamander (*E. tridentifera*)	TX
	Comal Springs salamander (*E.* sp. 8)	TX
Birds	Eastern black rail (*Laterallus jamaicensis* ssp. *jamaicensis*)	TX
	Lesser prairie-chicken (*Tympanuchus pallidicinctus*)	KS, OK, TX
	Golden-winged warbler (*Vermivora chrysoptera*)	KS, NE, OK, TX
Mammals	Texas kangaroo rat (*Dipodomys elator*)	TX
	Little brown bat (*Myotis lucifugus*)	KS, NE, OK
	Eastern spotted skunk (*Spilogale putorius interrupta*)	NE, OK, TX
Fishes	Pecos pupfish (*Cyprinodon pecosensis*)	TX
	Saltmarsh topminnow (*Fundulus jenkinsi*)	TX
	San Felipe gambusia (*Gambusia clarkhubbsi*)	TX
	Chihuahua catfish (*Ictalurus* sp. 1)	TX
	Peppered chub (*Macrhybopsis tetranema*)	OK, TX
	Colorless shiner (*Notropis perpallidus*)	OK
	Longnose darter (*Percina nasuta*)	OK
	Widemouth blindcat (*Satan eurystomus*)	TX
	Toothless blindcat (*Trogloglanis pattersoni*)	TX
Mollusks	Western fanshell (*Cyprogenia aberti*)	KS, OK
	Salina mucket (*Disconaias salinasensis*)	TX
	Triangle pigtoe (*Fusconaia lananensis*)	TX
	False spike (*F. mitchelli*)	TX
	Alabama hickorynut (*Obovaria unicolor*)	OK
	Louisiana pigtoe (*Pleurobema plenum*)	TX
	Pink pigtoe (*P. pyramidatum*)	NE, OK
	Texas heelsplitter (*Potamilus amphichaenus*)	TX
	Mexican fawnsfoot (*Truncilla cognata*)	TX
Insects	Frosted elfin butterfly (*Callophrys irus*)	KS, OK, TX
	Monarch butterfly (*Danaus plexippus*)	KS, NE, OK, TX
	Edwards Aquifer diving beetle (*Haideoporus texanus*)	TX
	Texas troglobitic water slater (*Lirceolus smithii*)	TX
	Scott optioservus riffle beetle (*Optioservus phaeus*)	KS
	Texas emerald (*Somatochlora margarita*)	TX
	Regal fritillary (*Speyeria idalia*)	KS, NE, OK

	Common and Scientific Name	Range (States)
Snails	Mimic cavesnail (*Phreatodrobia imitate*)	TX
Reptiles	Western chicken turtle (*Deirochelys reticularia* ssp. *miaria*)	OK, TX
	Spot-tailed earless lizard (*Holbrookia lacerata*)	TX
	Snapping turtle (*Macrochelys temminckii*)	KS, OK, TX
	Rio Grande cooter (*Pseudemys gorzugi*)	OK
	Desert massasauga (*Sistrurus catenatus* ssp. *edwardsii*)	TX
Crustaceans	Oklahoma cave crayfish (*Cambarus aculabrum*)	OK
	Delaware County cave crayfish (*C. subterraneus*)	OK
	Kiamichi crayfish (*Orconectes saxatilis*)	OK

Source: USFWS 2016a

Peppered Chub

Species Description

The peppered chub is a small freshwater minnow (less than 3 inches in length) belonging to the Cyprinidae family (USFWS 2018k). It occurs in shallow channels of large, permanently flowing, sandy streams.

Life History

The peppered chub is a pelagic broadcast spawner. It may spawn multiple times during the reproductive season (May through August) under high and low river flows. Fish release eggs and sperm into the deeper part of the stream current, where fertilization occurs. The semibuoyant eggs drift in the water column for 24 to 48 hours before hatching. Larval fish drift in stream currents for about 3 days before becoming free swimming juvenile fish. Peppered chubs generally live for 2 years, and few fish survive past their third summer (USFWS 2018k).

Peppered chubs are generalist feeders that forage in sediments on the river bottom. Food items include aquatic and terrestrial invertebrates, plant materials, and detritus (USFWS 2018k).

Peppered chubs generally inhabit prairie streams with shallow waters, swift current, and sandy bottoms. They may prefer cobble substrate during the spring and gravel substrate during the summer. This species is better adapted for headwaters of streams relative to closely related chub species (USFWS 2018k).

Status and Distribution

The peppered chub was included in a petition to list 475 species in the southwestern United States as threatened or endangered under the ESA. In 2009, a 90-day finding determined there was substantial information to indicate that listing it as threatened or endangered may be warranted. The USFWS is currently evaluating the species' status (USFWS 2009f).

The peppered chub historically occurred in the Arkansas River, from Pueblo, Colorado, to Tulsa County Oklahoma. It has been found in the Ninnescah River, Salt Fork of Arkansas River, Cimarron River, and the North Canadian and South

Canadian River drainages in Kansas, New Mexico, Oklahoma, and Texas (USFWS 2018k).

The peppered chub is believed to occur in two widely disjunct areas: (1) the South Fork Ninnescah River in Kingman, Kansas, and an associated portion of the Arkansas River in Sumner County, Kansas, and (2) the South Canadian River between Ute and Meredith Reservoirs in New Mexico and Texas. The extent of its distribution in Kansas is unknown (USFWS 2018k).

Approximately 8,527,200 acres (11 percent) of this species' total range is in the action area.

3.9.2 Plants

Table 3-17
USFWS National Listing Workplan Plant Species

Common and Scientific Name	Range (States)
Navasota false foxglove (*Agalinis navasotensis*)	TX
Seaside alder (*Alnus maritima*)	OK
Tharp blue-star (*Amsonia tharpii*)	TX
Prostrate milkweed (*Asclepias prostrata*)	TX
Texas screwstem (*Bartonia texana*)	TX
Shinner's sunflower (*Helianthus occidentalis* ssp. *plantagineus*)	TX
Chisos coral-root (*Hexalectris revoluta*)	TX
Unnamed moss (*Donrichardsonia macroneuron*)	TX
Bushy whitlow-wort (*Paronychia congesta*)	TX
Chihuahua scurfpea (*Pediomelum pentaphyllum*)	TX
Big red sage (*Salvia penstemonides*)	TX
Hall's bulrush (*Schoenoplectiella hallii*)	KS, NE, OK, TX
Rough-stemmed aster (*Symphyotrichum puniceum* var. *scabricaule*)	TX

Source: USFWS 2016a

Chapter 4.
Environmental Baseline

As defined under the ESA, the environmental baseline includes the past and present effects of all federal, state, and private actions in the action area; the anticipated effects of all proposed federal actions in the action area that have already undergone formal or early Section 7 consultation; and the effects of state and private actions that are contemporaneous with the Section 7 consultation process. Future actions and their potential effects are not included in the environmental baseline.

This chapter, in combination with Chapter 3, defines the current status of the species and habitats in the action area and provides a baseline against which to assess the effects of the proposed action.

4.1 Previous Programmatic Consultations in the Action Area

Completed programmatic consultations in the action area are summarized in **Table 4-1**.

4.2 Other Past and Current Activities in the Action Area

The BIA decision area includes surface acres and mineral estate acres in the BIA Eastern Oklahoma Regional Office, including the mineral estate in Osage County, Oklahoma. Here only non-fluid minerals are included in the decision area for the BIA Integrated RMP and, thus, in the BIA proposed action analyzed in this BA. Fluid minerals are being addressed separately in the Osage County Oil and Gas EIS (see **Table 4-1**, and the project website: https://www.indianaffairs.gov/regional-offices/eastern-oklahoma/osage-agency/osage-oil-and-gas-eis).

The USFWS is proposing to downlist the American burying beetle from endangered to threatened. It is requesting comments or information from the public, other concerned governmental agencies, the scientific community, industry, and any other interested parties concerning the proposed downlisting and 4(d) rule, which would tailor ESA protections to only those that the beetle needs for recovery (USFWS 2019b).

Table 4-1
Completed Programmatic Consultations

Project or Consultation	Lead Agency	Project or Consultation Type	Species Addressed[1] and Effect Determinations[1]	Date
Plains and Eastern Clean Line Transmission Project	Department of Energy	Biological opinion for transmission line development	interior least tern, piping plover, American burying beetle, gray bat, Indiana bat, Northern long-eared bat, Ozark big-eared bat (LAA) rabbitsfoot, scaleshell, spectaclecase, Arkansas River shiner, pallid sturgeon, red knot, whooping crane, and earth-fruit (geocarpon) (NLAA)	November 20, 2015
Transportation projects in the range of the Indiana bat and northern long-eared bat	Federal Highway Administration	Programmatic biological opinion for transportation projects	Indiana bat, northern long-eared bat (LAA)	February 2018
Osage County Oil and Gas EIS	BIA	Programmatic biological opinion for oil and gas development	American burying beetle (LAA), whooping crane, interior least tern, piping plover, red knot, and Neosho mucket (NLAA)	July 12, 2018

Sources: As noted in table
[1]Includes only species that are also addressed in this BA.

The USFWS proposed an amendment to the American Burying Beetle Industry Conservation Plan (ICP; USFWS 2014h). Originally approved in 2014, the ICP provides the oil and gas industry in Oklahoma with a streamlined ESA permitting process for activities that may affect the American burying beetle. The ICP authorizes take of 32,234 acres of potential habitat; however, since its approval in 2014, the amount of take issued has been substantially lower (5,100 acres) than anticipated; therefore, the USFWS is proposing to amend the ICP by extending applications for 5 years, through May 20, 2024, so that industry can continue to use the ICP while conserving the American burying beetle and its habitat. The amendment does not change the amount of take authorized under the 2014 ICP, and no additional acreage will be affected as a result (see the project website at https://www.fws.gov/southwest/es/oklahoma/ABBICP.htm).

The USFWS is undertaking 26 draft recovery plan amendments for 42 endangered and threatened species (84 *Federal Register* 790), including several species considered in this analysis. Recovery criteria amendments are needed to better determine when an endangered species has recovered to the point that it may be reclassified or that the protections afforded by the ESA are no longer

necessary. The USFWS is requesting review and comment on these draft recovery plan amendments from local, state, tribal, and federal agencies, nongovernmental organizations, and the public. Draft recovery plan amendments for species considered in this analysis are the Coffin Cave mold beetle, Tooth Cave spider, Tooth Cave ground beetle, Tooth Cave pseudoscorpion, Kretschmarr Cave mold beetle, Bee Creek Cave harvestman, Bone Cave harvestman, Tobusch fishhook cactus, star cactus, and Zapata bladderpod.

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Chapter 5. Evaluated Species and Critical Habitat Effects

5.1 Analysis Methods and Assumptions

As described in Section 1.4, Programmatic Approach and Subsequent Consultation Process, the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP and this BA are programmatic, planning-level documents; site-specific proposals, projects, or authorized uses are not part of the proposed action. The scope of the effect analyses for listed species and critical habitats is commensurate with the level of detail in the proposed action and the availability or quality of data necessary to assess effects. Where data are limited, professional judgment was used to project or estimate effects.

This analysis focuses on the effects of the BLM and BIA program area allocations, as well as the associated BLM BMPs/SOPs, BIA BMPs, and BLM mineral leasing stipulations. Program area allocations, as well as the BMP/SOP and mineral leasing stipulation requirements attached to these allocations, would not directly affect listed species or critical habitats. As such, impacts are analyzed in the context of potential indirect effects[8] and cumulative impacts[9] that may occur at the site-specific project level.

As described in Chapter 3 of this BA, where the BLM and BIA determined that the types of potential effects from the proposed action would be substantially similar, those effects are described in terms of species assemblages.

Although data on known locations and habitats in the action area are available, they are neither complete nor comprehensive. Known and potential species and habitat locations were considered in the analysis; however, the potential for species to occur outside these areas was also considered. Effects were

[8] Those effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

[9] The impact on the environment that results from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions.

quantified when possible. In the absence of quantitative data, best professional judgment, based on scientific reasoning, was used.

GIS data (BLM GIS 2015; BIA GIS 2015; USFWS GIS 2019) were used to calculate acreages and to generate figures. Calculations depend on the quality and availability of data. Those in the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP and associated BA are rounded to the nearest 100 acres or 0.1 mile, when values are above these thresholds. For values below 100 acres, calculations are rounded to the nearest 10 acres.

Given the scale of the action area, the compatibility constraints between data sets, and the lack of data for some resources, all calculations are approximate and serve for comparison and analysis only. Likewise, figures used throughout the document are provided for illustrative purposes and are subject to the limitations of the GIS software applications used to develop the figures.

The analysis is based on the following assumptions:

- The Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP is a programmatic document, which does not include project-level actions. As a result, the proposed action would not result in direct effects on listed species or critical habitats analyzed in this BA. Management goals, objectives, actions, and allocations may result in implementation-level activities, with the potential to affect listed species and critical habitats. These would be indirect effects of the proposed action.
- All proponents of implementation- or project-level activities and authorized uses that could affect listed species or critical habitat will be required to undergo ESA Section 7 consultation with the USFWS. The activities will need to be mitigated to ensure that threatened or endangered species would not be jeopardized on a project-specific basis or at a cumulative level. implementation- or project-level activities and authorized uses would be further assessed on an appropriate spatial and temporal scale. Additional field inventories would likely be needed to determine whether any such species could be present in the action area.
- As described and defined in Appendix C, the BLM Authorized Officer can except, modify, or waive stipulations, including NSOs, controlled surface uses (CSUs), and TLs. This analysis assumes that no waiver, exception, or modification would be granted unless there were changed conditions or new information that leads to the conclusion that there would be no effect on listed species.
- No decision would be approved in the J Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP or authorized on BLM-administered lands that would jeopardize the continued existence of

species that are listed, proposed, or candidates for listing as threatened or endangered.

5.1.1 Species Assemblages

For certain groups of species, the BLM and BIA determined that the types of potential effects from the proposed action would be substantially similar. Typically, these are cases where groups of species exhibit similar life history strategies, habitat requirements, responses to certain stressors, or other similarities. In such cases, the BLM and BIA analyzed the effects of the proposed action on species assemblages.

The following assemblages are analyzed in this BA:

- Shorebirds
- Riparian birds
- Bats
- Pelagic broadcast-spawning fishes
- Benthic-spawning fishes
- Cave-dwelling fishes
- Aquatic salamanders
- Freshwater mollusks
- Karst invertebrates
- Aquatic invertebrates
- Plants

5.1.2 Plan Components with No Effect

Several components of the proposed action would not affect listed or candidate species or proposed or designated critical habitat considered in this BA. These components are summarized below and are not discussed further.

BLM Plan Components with No Effect

Paleontological resources—Management would promote conservation of paleontological resources by ensuring that fossils of scientific interest are not inadvertently damaged, destroyed, or removed from public ownership as a result of approved land uses. Actions under the proposed plan include implementing the Potential Fossil Yield Classification System to help identify significant resource areas and requirements to notify the BLM, should resources be encountered during approved land uses. These actions would have no effect on listed species or proposed or designated critical habitat.

Visual Resources—The goal of visual resources management (VRM) is to protect the visual values and scenic quality of landscapes, consistent with the

VRM class objectives. The program would assign four VRM class designations to all BLM-administered lands and would manage lands according to these class requirements. This program provides broad-scale guidance and does not itself prescribe actions; therefore, there would be no effect on listed species or proposed or designated critical habitat from VRM.

Areas of Critical Environmental Concern—These are managed to protect the important biological, cultural, paleontological, scenic, and historic resources that meet the criteria for relevance and importance and require special management attention; however, since no area of critical environmental concern would be managed under the proposed plan, there would be no effects on listed species or proposed or designated critical habitat.

Public health and safety—Management would provide for public health and safety, especially in areas of concern, in development sites and areas of concentrated use. Actions under the proposed plan include public education and implementing project-specific health and safety plans. These actions would have no effect on listed species or proposed or designated critical habitat.

BIA Plan Components with No Effect

Paleontological resources—Management would promote stewardship, conservation, and appreciation for paleontological resources. This program provides broad-scale guidance and does not itself prescribe actions other than to follow applicable laws, regulations, and policies; therefore, there would be no effect on listed species or proposed or designated critical habitat.

Visual resources—The goal of BIA visual resources management is to maintain the scenic quality and natural aesthetics of cultural landscapes and other areas with high-quality visual resources. This program provides broad-scale guidance and does not itself prescribe actions; therefore, there would be no effect on listed species or proposed or designated critical habitat.

Public health and safety—Management would protect the health and safety of individuals. Actions under the proposed plan include public education and implementing project-specific health and safety plans. These actions would have no effect on listed species or proposed or designated critical habitat.

5.1.3 Interrelated and Interdependent Actions and Effects

Interrelated actions are those that are part of the proposed action and that depend on the proposed action for their justification, and interdependent actions have no independent use, apart from the proposed action. There are no interrelated or interdependent activities associated with the proposed action; therefore, there are no anticipated adverse effects on any listed species or critical habitats analyzed below.

5.1.4 Cumulative Effects

Cumulative effects under the ESA are defined as follows: those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur in the action area of the federal action, subject to consultation (50 CFR 402.02). The cumulative effects analysis area used to analyze cumulative effects on listed species is the same as the action area. Unlike the direct and indirect effects analyses, the BLM and BIA cumulative impact assessment areas coincide; therefore, this analysis is combined for both agencies, unless stated otherwise. The time frame of this analysis is the life of the BLM RMP and BIA Integrated RMP, which encompasses a 20-year planning period.

5.2 Effects Common to All Listed Species and Critical Habitats

5.2.1 Surface Disturbance Summary

Because the Final Joint EIS/Proposed BLM RMP and BIA Integrated RMP is a programmatic level planning document, implementation- or project-level actions or authorized uses are not included in the proposed action; however, implementation- or project-level actions would be authorized and carried out in a step-down process, in accordance with the goals, objectives, and actions under the proposed action. In the absence of protective measures, surface disturbance associated with step-down implementation- or project-level actions or authorized uses can commonly result in the potential for adverse effects on listed species and critical habitats.

Table 5-1, below, identifies these potential sources of surface disturbance from the BLM proposed action and the acres where that disturbance could occur.

Unlike that of the BLM, the BIA proposed action does not, with few exceptions, include acreage allocations; therefore, there is no equivalent comparative summary table of allocation acres associated with the BIA proposed action. The BIA proposed action incorporates themes and federal responsibilities common to both agencies, yet includes elements that reflect the unique mission of the BIA.

Table 5-1
Surface Disturbance Summary—BLM Proposed Action

Decision or Program Area	Classification	Acres
Decision area	BLM surface	15,100*
	Coal mineral decision area	1,883,300
	BLM-administered surface land and split-estate	*501,600*
	State and other federal surface management agencies (SMAs)	*1,381,700*
	Mineral materials, nonenergy leasable, and fluids mineral decision area	4,438,100*
	BLM-administered surface land and split-estate	*447,000**
	Other federal SMAs	*3,991,100*
Resource uses—Coal acceptable for further consideration for leasing; all federal minerals with coal potential and subject to leasing	Acceptable: BLM-administered lands (BLM surface)	100
	surface and underground	*100*
	only underground	*0*
	Acceptable: other state and federal SMAs	1,206,900
	surface and underground	*2,400*
	only underground	*1,204,500*
	Acceptable: private surface estate overlying federal mineral estate	464,700
	surface and underground	*464,700*
	only underground	*0*
Resource uses—Mineral materials	Closed to mineral materials disposal	9,900
	BLM-administered surface land and split-estate	*9,900*
	Other federal SMAs	*0*
	Open for consideration for mineral materials disposal	4,428,200*
	BLM-administered surface land and split-estate	*5,200**
	Other federal SMAs	*4,423,000*
Resource uses—Nonenergy solid leasable minerals	Closed to nonenergy solid leasable minerals	9,900
	BLM-administered surface land and split-estate	*9,900*
	Other federal SMAs	*0*
	Open for consideration for nonenergy solid leasable minerals	4,428,200*
	BLM-administered surface land and split-estate	*5,200**
	Other federal SMAs	*4,423,000*
Resource uses—Fluid mineral leasing	Open to fluid mineral leasing, subject to existing laws, regulations, and formal orders	4,393,300*
	BLM-administered surface land and split-estate	*447,000**

Decision or Program Area	Classification	Acres
	Other federal SMAs	*3,946,300*
	Open to leasing, subject to standard terms and conditions (i.e., not subject to major or moderate constraints)	2,707,900*
	BLM-administered surface land and split-estate	*184,900**
	Other federal SMAs	*2,523,000*
	Open to leasing, subject to major constraints (NSO)[1]	1,550,600*
	BLM-administered surface land and split-estate	*126,900**
	Other federal SMAs[2]	*1,423,700*
	Open to leasing, subject to moderate constraints (CSU)[1]	191,500*
	BLM-administered surface land and split-estate	*191,500**
	Other federal SMAs	*0*
	Closed to fluid mineral leasing	44,800
	BLM-administered surface land and split-estate	*0*
	Other federal SMAs	*44,800*
Resource uses—Livestock grazing	Available for all classes of livestock grazing	15,100*
	Unavailable to all classes of livestock grazing	0
Resource uses—Recreation management areas	Cross Bar Special Recreation Management Area (SRMA)	9,900
Resource uses—Travel, transpiration management, and access	Off-road vehicle use	
	Open	0
	Closed	0
	Limited	15,100*
Resource uses—Lands and realty	Right-of-way (ROW) exclusion areas	200
	ROW avoidance areas	12,700*
	Identified as available for consideration for disposal	5,200*
	Identified for retention	9,900

Source: BLM GIS 2015

[1]Acreages subject to fluid minerals NSO and CSU stipulations may overlap; therefore, acreages do not add up to the mineral estate decision area. There are approximately 69,600 acres of overlap.

[2]NSO acreages for other SMAs are an estimate used for analysis only; the SMA will determine specific NSO stipulations at the time of lease sale.

*Plus any applicable federal lands along the 116-mile stretch of the Red River, between the North Fork of the Red River and the 98th Meridian, that will be more specifically identified and mapped when they are surveyed. No exact acreages of federal lands are available at this time because the full 116-mile stretch has not been surveyed; any such survey would be conducted in accordance with applicable law.

5.2.2 Effects from BLM-administered Surface Land Management

Land use allocations could result in implementation-level project authorizations on approximately 15,100 acres of BLM-administered surface lands plus any applicable lands along the Red River. Implementation-level projects could include vegetation treatments, fuels reduction treatments, livestock grazing management, recreation and travel and transportation projects, ROW authorizations, including renewable energy development and land tenure decisions, and mineral exploration and development. Many of these activities would have associated surface disturbance that could remove, degrade, or fragment listed species' habitat. Potential effects on listed wildlife and plant species from these activities are described below. The extent and duration of effects would depend on the authorized land use, local conditions, and protection measures or stipulations implemented at the project level. Implementation-level activities would be subject to additional NEPA and ESA analysis to evaluate site-specific effects.

Vegetation and weed treatments may be applied for wildfire or fuels management and livestock forage improvement, to improve ecosystem health, to benefit specific plant or wildlife species, or for some combination of these reasons for multiple benefits. Short-term, localized adverse effects typically occur, followed by long-term improvement in habitat values as the desired vegetation develops. Treatments could also disturb listed wildlife species in or near the treatment area. Over the long term, treatments would improve habitat and support species recovery.

The potential for adverse effects on ESA-listed wildlife and plant species from chemical treatments would be substantially reduced or avoided by implementing the conservation measures contained in the Biological Assessments for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (BLM 2007) and the 2016 Final PEIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Lands in 17 Western States (BLM 2016a). These include establishing chemical treatment buffer zones and specific formulation and application restrictions to protect listed species. These measures would reduce to a discountable level the potential for unintentional application to listed wildlife and plant species via drift, spill, or direct application.

Listed wildlife and plant species in areas open to livestock grazing could be affected by livestock grazing and associated infrastructure. Potential adverse effects are competition for forage, soil compaction, vegetation and habitat alterations, introduction of invasive plant species, degradation of riparian or wetland habitats, and physical damage to listed plant species from trampling or browsing.

Managing livestock grazing in accordance with 43 CFR 4180, including maintaining or improving ecosystem condition, sustaining forage, and adhering

to standards and guidelines, would reduce the potential for adverse effects on listed wildlife and plant species. Further, properly managing grazing and range improvements may also be used as a tool to maintain and enhance rangeland health, which could aid listed species' recovery.

Managing 9,900 acres of the Cross Bar Management Area as an SRMA would provide for public recreation, while continuing to restrict resource uses, such as off-road vehicle use and mineral leasing and development. Visitor use facility development or maintenance associated with SRMA management may affect listed species through localized vegetation removal, noise, and human presence; however, vegetation cover generally would be maintained, and effects would be minor, temporary, and localized.

Concentrated or increased recreation use could affect listed species through disturbance and displacement, attracting predator populations through trash introduction, and disrupting reproduction during sensitive breeding periods.

Lands and realty management on BLM-administered surface land may adversely affect listed wildlife and plant species and critical habitats. Surface disturbance and vegetation removal associated with ROW authorizations and development, including for roads, transmission lines, or renewable energy development, could fragment or reduce habitat quality, facilitate invasive plant establishment and spread, disturb or displace listed wildlife species, and directly remove listed plant species. Further, ROW development may increase collisions with vehicles, wind turbines, or transmission lines. Excluding ROWs from designated critical habitats would reduce the potential for adverse effects in these areas to a discountable level. Avoiding ROWs on 12,700 acres, plus lands in the Red River area, including riparian and wetland areas and floodplains, would reduce, but not avoid, the potential for adverse effects on listed aquatic species. Similarly, avoiding ROWs in special status species habitat and important bird areas would reduce the potential for effects on listed species.

Identifying approximately 5,200 acres of BLM-administered lands as available for consideration for disposal could result in land use changes and development. For example, if BLM-administered lands with these areas were disposed of, the potential for effects from subsequent development or resource use could increase. Threatened, endangered, and sensitive species habitat would be considered when evaluating surface lands for disposal. Because future land uses of parcels identified as available for consideration for disposal are unknown, the extent and magnitude of effects are also unknown.

Mineral exploration and development in open areas or in areas acceptable for further consideration for coal leasing could adversely affect listed species and critical habitats. The potential for adverse effects would be minimized or avoided by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral stipulations (Appendix C). This includes NSO

stipulations to protect such resources as floodplains, riparian and wetland areas, and water bodies, and CSU and TL stipulations for sensitive species.

Until it completes its obligations under the ESA, under LN-2, the BLM may not approve any ground-disturbing activity that could affect listed species or critical habitat. LN-1 would result in appropriately timed, special status plant clearance surveys on portions of leases with potential, suitable, or occupied habitat, and in a buffer around these areas. COAs may be applied to avoid or minimize effects, as appropriate, including avoiding or minimizing development in the area, implementing dust abatement, installing signs or fencing to prevent entry, adopting specialized reclamation procedures, instituting long-term monitoring, or implementing off-site mitigation measures.

Mineral development would be subject to additional NEPA analysis and ESA consultation at the leasing phase and again on exploration or development of a lease area. COAs based on site-specific conditions would further minimize the potential for adverse effects; however, the potential for adverse effects is not completely discountable. Potential adverse effects could come about from activities that disturb soils, remove or fragment vegetation, or increase the potential for noxious weed and invasive plant establishment and spread. This could result in listed species habitat loss, degradation, and fragmentation. In areas acceptable for further consideration for coal leasing, impacts from surface mining would generally be greater than in areas where underground mining is used.

Construction of minerals infrastructure, such as well pads, pipelines, and roads, and operations can cause effects, such as disturbance and displacement from noise (Radle 2007; Barber et al. 2009), vibrations, lighting, and human presence in both the short term and long term. Potential direct impacts could occur from avian species interaction with oil and gas project components or infrastructure, such as collision and electrocution, including mishaps with overhead transmission lines. Best practices for avian protection measures (e.g., APLIC 2006, 2012) would reduce the potential for direct effects from transmission infrastructure.

Mineral development may increase water use (BLM 2016b). Depending on the source of water and quantity used, water depletions may alter or cause habitat for listed fish or other aquatic species to be lost. Activities that affect stream channels, stream banks, or instream flow could also affect these species, creating unsuitable conditions for some species (Bonner and Wilde 2000; Matthews et al. 2004). Changes in water quantity may result in loss of physical habitat or habitat complexity. Reduced water levels can also increase water temperatures, change food supplies, and cause the loss of carrying capacity. Important microhabitats, such as spawning bars and pools, can be lost or altered (Matthews et al. 2004).

Surface-disturbing activities could affect listed fish and aquatic species by altering the hydrology and sediment regimes that can change channel form and sediment inputs (Dauwalter et al. 2008). Increasing sediment and turbidity in fish-bearing aquatic environments could result in stress, habitat alteration and loss, and population growth decrease. Increased sediment and turbidity would affect individual species differently, depending on their habitat needs and tolerance to turbidity. Increased sediment is more likely to affect species in the higher gradient stream reaches, which are generally less turbid than the lower gradient stream reaches (Dauwalter et al. 2008).

During oil and gas production, wastewaters are most often reinjected into deep water aquifers by means of designated disposal wells; however, there is a potential for accidental releases, which could result in water quality alterations, specifically increased concentrations of salts and total dissolved solids (Farag and Harper 2013). Similarly, environmental pollutants may result in direct lethal and sublethal impacts on fish and aquatic communities. Typically, the impacts occur through changes in water temperature, salinity, dissolved oxygen, nutrient loading, and pH (Scott and Sloman 2004; Farag and Harper 2013). Examples of sublethal impacts are physiological impacts, such as disruption of sensory, hormonal, neurological, and metabolic systems, and behavioral impacts, such as disruption of predator avoidance, reproduction, and social behaviors (Scott and Sloman 2004).

Mineral development could also adversely affect listed species in caves through noise disturbance or physical alteration of surface or subsurface habitats; however, site-specific surveys would be completed before any mineral development is authorized that may affect cave and karst habitat; operational constraints to protect cave habitats would be in effect (Appendix C).

Adverse effects would not occur in areas closed to fluid minerals and salable minerals and in areas with no coal leasing or development. NSO stipulations would minimize the potential for surface disturbance and would help maintain vegetation in the lease area.

The BLM's Proposed plan goals, objectives, and actions for fish and wildlife (Section 2.1.5) and special status species (Section 2.1.6) would avoid, reduce, or mitigate adverse planning-level effects on listed species and their habitats to discountable levels; thus, these allocations are not discussed further.

5.2.3 Effects from BLM-administered Split-Estate Management

The action area includes approximately 4,754,700 acres of BLM-administered federal mineral estate; thus, solid and fluid mineral leasing and development could occur on private surface and on surface lands managed by other state or federal agencies, where the BLM manages the subsurface mineral estate. In general, the potential for adverse effects on listed wildlife and plant species and critical habitats from BLM-administered split-estate management would be

similar to those described for minerals management in Section 5.2.2, Effects from BLM-administered Surface Lands Management.

On private surface land with BLM-administered mineral estate, the effects would be as described in Section 5.2.2; this is because the same BMPs, SOPs, and mineral stipulations would apply. On surface lands managed by other federal agencies with BLM-administered mineral estate, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance (see LN-1 in Appendix C). This could reduce the potential for effects on listed species and critical habitats, depending on the restriction and where it is applied. In general, resource values, including listed species and critical habitats, would be avoided.

The other SMA may apply special conditions to all or a portion of a lease, including no surface occupancy (NSO), no drilling (ND), or directional drilling (DD) only. This would lower the potential for adverse surface or subsurface effects on listed species.

Federal minerals beneath USFWS-managed national wildlife refuges are not subject to leasing, in accordance with 43 CFR 3400, so adverse effects would not occur in these areas.

5.2.4 Effects from BIA-managed Surface Land Management

The BIA decision areas include approximately 394,200 surface acres managed by the BIA Eastern Oklahoma Regional Office. Land use allocations could result in implementation-level project authorizations; this could include vegetation treatments, fuels reduction treatments, mineral exploration and development, livestock grazing, ROW development, and forest and woodland management. Many of these activities would have associated surface disturbance that could remove, degrade, or fragment listed species habitat.

The types of effects on listed wildlife and plants and critical habitats from most program areas would be the same as those described in Section 5.2.2, Effects from BLM-administered Surface Lands Management. As described, the extent and duration of effects would depend on the authorized land use, local conditions, and protection measures implemented at the project level; implementation-level activities would be subject to additional NEPA and ESA analysis to evaluate site-specific effects.

Mineral exploration and development, in accordance with 25 CFR 214, in Osage County and the Onshore Energy and Mineral Lease Management Interagency Standard Operating Procedures on other BIA-managed surface could adversely affect listed species and critical habitats. The potential for adverse effects would be minimized or avoided by incorporating BIA BMPs for minerals and energy (Appendix B).

5.2.5 Effects from BIA-managed Mineral Estate

The types of effects on listed species and their critical habitats from managing approximately 4,754,700 mineral estate acres under the BIA Eastern Oklahoma Regional Office would generally be the same as those described from managing minerals on BIA-managed surface lands. This is because leases for BIA-managed mineral estate would be subject to the same minerals and energy BMPs (Appendix B) and other restrictions as mineral leases on BIA-managed surface lands.

5.3 EFFECTS: SPECIES UNDER THE JURISDICTION OF MULTIPLE STATE ESFOS

5.3.1 Wildlife

Species Assemblage: Shorebirds

The shorebirds species assemblage analyzed are red knot, piping plover and its designated critical habitat, and interior least tern. These migratory shorebirds were included in a species assemblage because they share similar habitat requirements, as well as potential planning-level effects. The BLM and BIA RMP planning decisions could affect primarily migratory stopover and wintering habitat, as these are the typical habitats in the action area.

The ranges or critical habitats for these species overlap portions of the action area, this is summarized in **Table 5-2,** below. Percentages given are the proportion of the total range or critical habitat in each part of the action area.

Table 5-2
Shorebird Ranges and Critical Habitat in the Action Area—Multiple State ESFOs

Species or Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Red knot	446,000 (<1%)	5,562,200 (1%)	8,380,400 (2%)	9,619,300 (2%)	14,183,100 (3%)
Piping plover	447,100 (<1%)	7,398,400 (2%)	6,508,000 (2%)	9,602,200 (3%)	14,165,900 (4%)
Piping plover designated critical habitat	0	600 (1%)	76,700 (99%)	0	0
Interior least tern	336,200 (<1%)	5,141,700 (2%)	3,968,900 (2%)	6,252,500 (3%)	9,291,100 (4%)

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

Table 5-2 above summarizes shorebird ranges that overlap BLM-administered lands that could be subject to BLM-administered surface lands effects, as described in Section 5.2.2, above. These acreages are less than 1 percent of each species' respective total range.

Table 5-2 summarizes shorebird ranges that overlap BLM-administered mineral estates (excluding other SMAs) that could be subject to mineral development effects, as described in Section 5.2.3, above. Where ranges overlap BLM-administered mineral estates on other SMA lands, as summarized in **Table 5-2**, leasing would be subject to further requirements and stipulations imposed by those agencies.

The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A) that would indirectly protect migratory birds and water bird habitat in the action area. These include constructing power lines in accordance with avian protection best practices (APLIC 2006, 2012), avoiding constructing communication towers and power lines around wetlands, and avoiding tower designs featuring guy wires in known water bird concentration areas or major avian migration routes. If guy wires are absolutely necessary, project proponents would be required to place visual markers on the wires to prevent birds from colliding with them. Appropriate vegetation and riparian buffers around water bodies would be maintained to protect water quality and wildlife habitat suitability.

BLM fluid mineral stipulations (Appendix C) include a timing limitation for breeding least terns. No construction, drilling, completion, or workover activities would be allowed from April 1 to August 15 in least tern nesting and fledging habitat and in an area that extends 300 feet from the outside edge of suitable sandy riverbank nesting habitat. There can be Exceptions, modifications, or waivers, as determined by the BLM Authorized Officer.

As summarized in **Table 5-2**, above, designated critical habitat for wintering populations of piping plover overlaps the action area for BLM-administered mineral estates managed by other SMAs, along the Gulf Coast of Texas (see **Figure D-3)**. Potential mineral development in critical habitat could result in adverse effects on piping plover critical habitat PCEs, as described in Section 5.2.3; however, the BLM would not approve any activity that may affect listed species or critical habitat until it completes its obligations under the ESA. There is no critical habitat overlapping BLM-administered surface in the action area.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in occupied or suitable shorebird nesting, migration stopover, wintering habitat, or critical habitat authorized projects under the proposed action may affect, and is likely to adversely affect, the red knot, piping plover and its designated critical habitat, and interior least tern; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

The BLM timing limitation stipulation would reduce adverse effects on breeding least terns. Further, during additional review for programs or projects in the range of listed shorebirds or designated critical habitat, conservation measures would be identified or developed in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects at the planning level, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed shorebirds and piping plover designated critical habitat.

Effects of the BIA Proposed Action

Table 5-2, above, summarizes shorebird ranges that overlap BIA-managed surface. In these areas, shorebirds could be subject to BIA-managed surface land effects, as described in Section 5.2.4 above.

Table 5-2, above, summarizes shorebird ranges that overlap BIA-managed mineral estates. In these areas, shorebirds could be subject to mineral development effects as described in Section 5.2.5 above.

There is no piping plover critical habitat that overlaps BIA-managed surface lands or mineral estates.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable shorebird nesting, migration stopover, or wintering habitat, authorized projects under the BIA proposed action may affect, and are likely to adversely affect, the red knot, piping plover, and interior least tern; however, subsequent NEPA and ESA review would be done at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

During additional review for programs or projects in the range of listed shorebirds, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed shorebirds at the planning level.

There is no piping plover designated critical habitat that overlaps the action area for BIA-managed lands or mineral estate; therefore, the BIA proposed action would have **no effect** on piping plover designated critical habitat.

Whooping Crane

Effects of the BLM Proposed Action

There are approximately 443,600 acres (less than 1 percent) of whooping crane range that overlaps the action area associated with BLM-administered surface lands. In these areas, whooping cranes may be subject to effects from BLM-administered surface land management, as described in Section 5.2.2.

There are approximately 3,760,100 acres (1 percent) of whooping crane range that overlaps the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, whooping cranes may be subject to effects from mineral exploration and development, as described in Section 5.2.3.

The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A), which would indirectly protect whooping crane migratory stopover habitat in the action area. These include constructing power lines in accordance with avian protection best practices (APLIC 2006, 2012), avoiding constructing communication towers and power lines around wetlands, and avoiding tower designs featuring guy wires in known water bird concentration areas or major avian migration routes. If guy wires are absolutely necessary, then visual markers would be placed on the wires to prevent birds from colliding with them. Appropriate vegetation and riparian buffers around water bodies would be maintained to protect water quality and wildlife habitat suitability.

BLM fluid mineral stipulations (Appendix C) include lease notices that would provide indirect protections for whooping crane migratory habitat in the action area. LN-5, migratory bird flyways and nesting season, would alert lessees that consultation with the USFWS may be required and that the project may be subject to operational constraints to mitigate impacts on the flyway and the migratory birds.

Further, LN-2 would enable the BLM to recommend modifications to exploration and development proposals to protect listed species. Under LN-2, the BLM may not approve any ground-disturbing activity that could affect listed species or critical habitat until it completes its obligations under the ESA.

There are approximately 4,964,300 acres (1 percent) of whooping crane range that overlaps the action area for BLM-administered mineral estate under surface lands managed by other SMAs. This includes wintering habitat at Aransas NWR in Texas. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats, in accordance with 43 CFR 3101.5.

On other SMA lands, the potential for effects on whooping crane would be similar to those described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Of the 371,000 acres of critical habitat designated for whooping crane, approximately 149,800 acres (40 percent) occurs in the action area (**Figure D-4**). All but 400 acres of this occurs in the action area on BLM-administered mineral estate managed by other SMAs. Potential effects on the critical habitat PCEs from mineral development could occur as those described in Section 5.2.3; however, the BLM would not approve any activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

The remaining 400 acres (less than 1 percent) is in the action area on BLM-administered mineral estate. Potential effects on the critical habitat PCEs from mineral development could occur, as described in Section 5.2.3. The potential for effects would be reduced or avoided by BLM BMPs and SOPs (Appendix A) and fluid mineral stipulations (Appendix C); these would indirectly protect whooping crane designated critical habitat. The BLM would not approve any activity that could affect listed species or critical habitat until it completes its obligations under the ESA.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in suitable, occupied, or designated critical habitat for whooping crane, the proposed action may affect, and is likely to adversely affect, whooping crane and its designated critical habitat; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

During additional review for programs or projects in the range of whooping cranes, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for whooping cranes and their designated critical habitat at the planning level.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 6,581,200 acres (2 percent) of whooping crane range that overlaps the action area on BIA-managed surface. These acres could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above.

There are approximately 10,095,500 acres (3 percent) of whooping crane range that overlaps the action area on BIA-managed mineral estates. It could be subject to mineral development effects, as described in Section 5.2.5, above.

There is no whooping crane designated critical habitat that overlaps BIA-managed surface lands or mineral estates, thus: no effects from BIA-managed surface management or mineral estates management are expected.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable whooping crane migration or wintering habitat, authorized projects under the BIA proposed action may affect, and would likely adversely affect, whooping cranes; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

During additional review for programs or projects in whooping crane range, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for whooping cranes at the planning level.

The BIA proposed action would have **no effect** on whooping crane designated critical habitat because there are none in the action area.

Red-Cockaded Woodpecker

Effects of the BLM Proposed Action

The range of the red-cockaded woodpecker does not overlap BLM-administered surface lands; therefore, this species would not be subject to effects of management on BLM surface lands.

Approximately 1,035,100 acres (less than 1 percent) of the total red-cockaded woodpecker range overlaps with BLM-administered mineral estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. Approximately 662,600 acres (less than 1 percent) of range overlaps the action area for BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, red-cockaded woodpecker may be subject to effects from mineral exploration and development, as described in Section 5.2.3. Specifically, BLM authorized actions that remove or degrade mature pine forests in occupied red-cockaded woodpecker clusters would have adverse effects.

Determination of Effects from the BLM Proposed Action

Assuming BLM authorized mineral leasing could occur in suitable or occupied red-cockaded woodpecker habitat, the proposed action may affect, and is likely

to adversely affect, this species. With implementation of lease notices, requirements set forth by other federal SMAs, and further ESA consultation, it is reasonably certain that adverse effects from BLM-administered mineral leasing exploration or development in the action area would be minimal. For these reasons, the potential for these adverse effects would be low enough as to be discountable; therefore, BLM mineral leasing **may affect, but is not likely to adversely affect,** red-cockaded woodpecker at the planning level.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 564,00 acres (less than 1 percent) of red-cockaded woodpecker range that overlaps the action area on BIA-managed surface, that could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above. Specifically, BIA authorized actions that remove or degrade mature pine forests in occupied red-cockaded woodpecker clusters would have adverse effects.

There are approximately 738,000 acres (less than 1 percent) of red-cockaded woodpecker range that overlaps the action area on BIA-managed mineral estates. This could be subject to mineral development effects, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

Assuming any BIA authorized activity could occur in occupied or suitable red-cockaded woodpecker clusters in mature pine forest, the proposed action may, affect and is likely to adversely affect, red-cockaded woodpecker; however, subsequent NEPA and ESA review would occur at the program level (for example, at the mineral lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

During additional review for programs or projects in the range of red-cockaded woodpecker, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for red-cockaded woodpecker at the planning level.

Species Assemblage: Pelagic Broadcast-spawning Fishes

The analysis for the pelagic broadcast-spawning fish species assemblage under the jurisdiction of multiple state ESFOs includes the Arkansas River shiner and pallid sturgeon. The other species in this assemblage is the peppered chub (see Section 5.10). Such species have similar reproductive strategies and potential planning-level effects. BLM and BIA planning decisions that could adversely affect these species are primarily those that reduce water and groundwater quantity and quality and pose barriers to movement.

The ranges or critical habitats for these species that overlap portions of the action area are summarized below. Percentages given are the proportion of the total range or critical habitat in each portion of the action area.

Table 5-3
Pelagic Broadcast-Spawning Fishes Ranges and Critical Habitat in the Action Area—Multiple State ESFOs

Species or Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Arkansas River shiner	148,000 (1%)	1,370,400 (8%)	80,800 (<1%)	516,100 (3%)	752,400 (4%)
Arkansas River shiner designated critical habitat	5,700 (18%)	13,000 (41%)	0	5,300 (17%)	9,100 (29%)
Pallid sturgeon	0	155,400 (<1%)	88,100 (<1 %)	22,500 (<1%)	22,500 (<1%)

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-3** [*pelag fish*], BLM-administered surface lands overlap the Arkansas River shiner's range. Under the BLM proposed action, the shiner and its habitat could be subject to BLM-administered surface land effects, as described in Section 5.2.2, above. BLM-administered surface lands do not overlap the pallid sturgeon's range; therefore, there would be no effects on that species from authorized activities on BLM-administered surface lands.

As summarized in **Table 5-3** above, both species' ranges overlap the action area on BLM-administered mineral estate, not including BLM-administered mineral estate under surface lands managed by other SMAs; therefore, both species could be subject to mineral development effects, as described in Section 5.2.3, above.

As summarized in **Table 5-3** above, both species' ranges overlap the action area on BLM-administered mineral estates on other federal SMA lands. Mineral activities in these areas would be subject to further requirements and stipulations imposed by those agencies.

As summarized in **Table 5-3** above, designated critical habitat for the Arkansas River shiner overlaps the action areas on BLM-administered surface lands and mineral estate. Mineral activities in critical habitat could adversely affect critical habitat PCEs, as described in Section 5.2.3; however, the BLM would not approve any activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

There is no critical habitat that overlaps the action area for BLM-administered mineral estate under surface lands managed by other SMAs, therefore, no effects on critical habitat are expected in these areas.

BLM fluid and solid mineral stipulations (Appendix C) include an NSO stipulation, with exceptions, modifications, or waivers, for riparian-wetland areas and water bodies. No surface occupancy is allowed in these areas or in an area that begins and extends 415 feet landward, from the outside edge of the riparian-wetland area or water body. Implementing NSO stipulations would reduce the potential for adverse effects on pelagic broadcast-spawning fish species and critical habitat PCEs; however, adverse effects would still be possible from activities that affect river connectivity, hydrology, water quality, and water quantity, as described in Sections 5.2.2 and 5.2.3, above.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in suitable or occupied pelagic broadcast-spawning fishes habitat or Arkansas River shiner designated critical habitat, the BLM proposed action may affect, and is likely to adversely affect, these species and designated critical habitat; however, NSO stipulations that would establish a buffer around riparian habitats would reduce the potential for adverse effects.

Further, during additional review for programs or projects in the range of these species or critical habitat, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects. For these reasons, the potential for effects would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** pelagic, broadcast-spawning fish species and designated critical habitat for Arkansas River shiner at the planning level.

Effects of the BIA Proposed Action

As summarized in **Table 5-3** above, both species' ranges overlap BIA-managed surface lands and could, therefore, be subject to BIA-managed surface lands effects under the BIA proposed action as described in Section 5.2.4 above. Additionally, both species' ranges overlap BIA-managed mineral estates and could be subject to mineral development effects as described in Section 5.2.5 above.

As summarized in **Table 5-3** above, designated critical habitat for the Arkansas River shiner overlaps BIA-managed surface lands and mineral estates. Activities in critical habitat could result in adverse effects on Arkansas River shiner critical habitat PCEs, as described in Sections 5.2.4 and 5.2.5.

Determination of Effects from the BIA Proposed Action

Any BIA authorized actions could occur in occupied or suitable pelagic, broadcast-spawning fish habitat or critical habitat; because of this, authorized projects under the BIA proposed action may affect, and are likely to adversely affect, the pelagic, broadcast-spawning fish species and designated critical habitat; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

During additional review, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but is not likely to adversely affect,** determination at the planning level.

Species Assemblage: Benthic-Spawning Fishes

The analysis for benthic-spawning fish species assemblage under the jurisdiction of multiple state ESFOs includes the Neosho madtom. Other species in this assemblage are the leopard darter (Section 5.4.1), Topeka shiner (Section 5.5.1), and fountain darter (Section 5.9.1). Such species share similar reproductive strategies and potential planning-level effects. BLM and BIA planning decisions that could adversely affect these species are primarily those that reduce water and groundwater quantity and quality and pose barriers to movement.

Effects of the BLM Proposed Action

The range of Neosho madtom does not overlap the action area on BLM-administered surface; therefore, BLM-administered surface land effects described in Section 5.2.2, above, are not expected to occur.

The action area on BLM-administered mineral estate, not including mineral estate under surface lands managed by other SMAs, overlaps approximately 70,400 acres (1 percent) of the Neosho madtom's range. These areas could be subject to mineral development effects, as described in Section 5.2.3, above.

The action area on BLM-administered mineral estates on other federal SMA lands overlaps approximately 196,700 acres (4 percent) of the Neosho madtom's range. These areas would be subject to further requirements and stipulations imposed by those agencies.

BLM fluid and solid mineral stipulations (Appendix C) include an NSO stipulation, with exceptions, modifications, or waivers, for riparian-wetland areas and water bodies. No surface occupancy is allowed in these areas and in an area that begins and extends 415 feet landward, from the outside edge of the riparian-wetland area or water body. Implementing NSO stipulations would reduce the potential for adverse effects on benthic-spawning fish species;

however, adverse effects would still be possible from activities that affect river connectivity, hydrology, and water quality and quantity, as described in in Sections 5.2.2 and 5.2.3, above.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in occupied or suitable Neosho madtom habitat, authorized projects under the BLM proposed action may affect, and are likely to adversely affect, the Neosho madtom; however, NSO stipulations would reduce these effects. Further, during additional review for programs or projects in the range of the Neosho madtom, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects. For these reasons, the potential for adverse effects would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** the Neosho madtom at the planning level.

Effects of the BIA Proposed Action

The action area on BIA-managed surface lands overlaps approximately 198,600 acres (4 percent) of the Neosho madtom's range; these areas could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above.

The action area on BIA-managed mineral estates overlaps approximately 211,400 acres (4 percent) of the Neosho madtom's range; these areas could be subject to mineral development effects, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable Neosho madtom habitat, authorized projects under the BIA proposed action may affect, and are likely to adversely affect, this species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but is not likely to adversely affect,** determination at the planning level.

Species Assemblage: Freshwater Mollusks

The analysis for the freshwater mussel species assemblage under the jurisdiction of multiple state ESFOs includes Neosho mucket and rabbitsfoot mussel. Other species in this assemblage are the Ouachita rock pocketbook, scaleshell, and winged mapleleaf (Section 5.4.1) and the golden orb, smooth pimpleback, and Texas fawnsfoot (Section 5.6.1). These freshwater mussels share similar habitat requirements and potential planning-level effects. BLM and BIA planning

decisions that could primarily affect freshwater mussel species are those that would influence water quantity and quality.

The ranges or critical habitats for these species overlap portions of the action area, this is summarized below. Percentages given are the proportion of the total range or critical habitat in each portion of the action area.

Table 5-4
Freshwater Mussel Species Ranges and Critical Habitat in the Action Area—Multiple State ESFOs

Range and Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Neosho mucket	0	844,600 acres (6%)	900,500 acres (7%)	2,205,300 acres (17%)	3,156,400 acres (24)
Neosho mucket designated critical habitat	0	8 miles (2%)	11 miles (2%)	38 miles (7%)	43 miles (8%)
Rabbitsfoot	0	274,000 acres (<1%)	640,500 acres (2%)	1,133,200 acres (3%)	1,391,600 acres (3%)
Rabbitsfoot designated critical habitat	0	11 miles (1%)	5 miles (<1%)	10 miles (1%)	26 miles (2%)

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-4**, above, neither of the freshwater mussel species' ranges or designated critical habitat overlaps the action area on BLM-administered surface lands; thus, there would be no effects from managing BLM-administered surface lands.

As summarized in **Table 5-4**, above, the action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps both species' ranges; these species and their habitat could be subject to mineral development effects as described in Section 5.2.3, above.

As summarized in **Table 5-4**, above, the action area on BLM-administered mineral estates on other federal SMA lands overlaps both species' ranges. These areas would be subject to further requirements and stipulations imposed by those agencies.

As summarized in **Table 5-4**, above, both designated critical habitat for both species occurs in the action area on BLM-administered mineral estate, including BLM mineral estate managed by other SMAs. Activities in critical habitat could adversely affect critical habitat PCEs, as described in Section 5.2.3; however, the

BLM would not approve any activity that could affect listed species or critical habitat until it completes its obligations under the ESA.

There is no critical habitat in the action area on BLM-administered surface, so no effects from management of BLM-administered surface are expected.

BLM fluid and solid mineral stipulations (Appendix C) include an NSO stipulation, with exceptions, modifications, or waivers, for riparian-wetland areas and water bodies. No surface occupancy is allowed in these areas or in an area that begins and extends 415 feet landward, from the outside edge of the riparian-wetland area or water body. Implementing NSO stipulations would reduce the potential for direct adverse effects on freshwater mussels and their critical habitats from surface disturbance; however, adverse effects would still be possible from activities that affect river connectivity, hydrology, water quality, and water quantity, as described in in Sections 5.2.2 and 5.2.3, above.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in occupied or suitable freshwater mussel habitat or designated critical habitat, authorized projects under the BLM proposed action may affect, and are likely to adversely affect, these species or critical habitats; however, NSO stipulations would reduce adverse effects.

Further, during additional review for programs or projects, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects. For these reasons, the potential for adverse effects would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** the Neosho mucket and rabbitsfoot mussels and their designated critical habitats at the planning level.

Effects of the BIA Proposed Action

As summarized in **Table 5-4**, both species' ranges overlap the action area on BIA-managed surface lands; these areas could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above. Additionally, species' ranges overlap the action area on BIA-managed mineral estates and could be subject to mineral development effects, as described in Section 5.2.5, above.

As summarized in **Table 5-4**, designated critical habitat for both species overlaps the action area on BIA-managed surface lands and BIA-managed mineral estates. Activities in critical habitat could result in adverse effects on designated critical habitat PCEs, as described in Sections 5.2.4 and 5.2.5.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable Neosho mucket or rabbitsfoot habitat or designated critical habitat for these

species, authorized projects under the BIA proposed action may affect, and are likely to adversely affect, these species and their designated critical habitats; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but is not likely to adversely affect,** determination at the planning level.

American Burying Beetle

Effects of the BLM Proposed Action

There are approximately 18,500 acres (less than 1 percent) of American burying beetle range and 5,100 acres of American burying beetle CPAs that overlap the action area on BLM-administered surface. In these areas, beetles may be subject to effects from BLM-administered surface land management, as described in Section 5.2.2.

There are approximately 1,556,400 acres (3 percent) of range and 741,900 acres of CPAs that overlap the action area on BLM-administered split-estate. This does not include BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, beetles may be subject to the effects from mineral exploration and development, as described in Section 5.2.3.

The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A), which would indirectly protect American burying beetle habitat in the action area. These include minimizing surface disturbance and vegetation removal during authorized activities, reclaiming temporarily disturbed areas, and establishing special status species baseline conditions through surveys.

Two BLM mineral stipulations (Appendix C) would directly protect American burying beetle habitat. CSU-4 would require lessees to conduct clearance surveys in suitable habitat and would constrain activities to protect the species and its habitat. Waivers, exception, or modifications could be made, as determined during consultation with the USFWS. Coal stipulation CLS-6 would provide similar protection for coal leases in identified habitat; there would be no waivers, exceptions, or modifications for this stipulation.

There are approximately 2,488,300 acres (5 percent) of range and 887,300 acres of CPAs that overlap the action area for BLM-administered mineral estate under surface lands managed by other federal and state SMAs. On other SMAs, the potential for effects would be similar to those described for other BLM-

administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in suitable or occupied habitat for American burying beetle, the proposed action may affect, and is likely to adversely affect, this species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of American burying beetle, the BLM would develop conservation measures, coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for American burying beetle at the planning level.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 5,484,100 acres (11 percent) of American burying beetle range and 1,706,400 acres of American burying beetle CPAs that overlap the action area on BIA-managed surface. These acres could be subject to BIA-managed surface land effects, as described in Section 5.2.4.

There are approximately 8,798,800 acres (17 percent) of range and 2,930,100 acres of CPAs that overlap the action area on BIA-managed mineral estates. These acres could be subject to mineral development effects, as described in Section 5.2.5 above.

The potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B) that would directly and indirectly protect beetle habitat in the action area. These include minimizing surface disturbance and vegetation removal during authorized activities, reclaiming temporarily disturbed areas, establishing special status species baseline conditions through surveys, and prioritizing fuels management projects to enhance and protect habitat.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in suitable or occupied habitat for American burying beetle, the proposed action may affect, and is likely to adversely affect, this species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range

of American burying beetle, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for American burying beetle at the planning level.

Species Assemblage: Bats

The analysis for the bat species assemblage under the jurisdiction of multiple state ESFOs includes the gray bat and the northern long-eared bat. Other species in this assemblage are the Ozark big-eared bat and the Indiana bat; both are under the jurisdiction of the Oklahoma ESFO (see Section 5.4.1).

Listed bat species have similar life histories and habitat requirements. Disturbance to essential hibernacula habitat, such as caves, mines, or other cave-like habitat, and roost sites are the primary human-caused threats. BMPs and lease stipulations apply to special status bat species and are not specific to individual species; therefore, listed bats are analyzed together.

There is no critical habitat for listed bats in the action area; thus, critical habitat is not included in the species assemblage.

Where listed bat ranges overlap portions of the action area, this is summarized below. Percentages given are the proportion of the total range in each portion of the action area.

Table 5-5
Listed Bat Species Ranges in the Action Area—Multiple State ESFOs

Species Range	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Gray bat	0	522,500 (<1%)	175,700 (<1%)	1,405,600 (1%)	1,709,600 (2%)
Northern long-eared bat	7,100 (<1%)	3,500,200 (<1%)	1,881,000 (<1%)	3,443,600 (<1%)	5,099,400 (<1%)
Ozark big-eared bat	0	168,500 (2%)	95,500 (<1%)	1,078,900 (11 %)	1,201,100 (12%)
Indiana bat	0	616,900 (<1%)	548,200 (<1%)	1,204,700 (<1%)	1,052,700 (<1%)

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-5**, the northern long-eared bat is the only listed bat with range overlapping the action area on BLM-administered surface lands; thus, this species could be subject to the effects of surface management activities, as described in Section 5.2.2. Gray bat, Ozark big-eared bat, and Indiana bat known

ranges do not overlap BLM-administered surface lands; therefore, management of BLM-administered surface lands would not affect these species.

As summarized in **Table 5-5**, the action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps all listed bat species' ranges; these species and their habitat could be subject to mineral development effects, as described in Section 5.2.3, above.

BLM SOPs (Appendix A) include direction to minimize the potential spread of white nose syndrome in bats in caves and abandoned mines. This would be in accordance with containment and decontamination procedures and as identified in WO Instruction Memorandum 2010-181.

BLM fluid mineral stipulations (Appendix C) include a CSU stipulation to protect critical bat habitat, including roosts and hibernacula. Site surveys would identify necessary special design, construction, implementation, an mitigation measures to protect these areas.

As summarized in **Table 5-5**, the action area on BLM-administered mineral estate on other federal SMA lands overlaps all listed bat species' ranges. These areas would be subject to further requirements and stipulations imposed by those agencies. For example, the US Forest Service has established a 200-foot buffer zone around all known Ozark big-eared bat roosts, which prohibits activities that may have adverse impacts.

Determination of Effects from the BLM Proposed Action

Only the northern long-eared bat range overlaps BLM-administered surface lands; however, the area of overlap is less than 0.001 percent of the species' total range. In addition, BLM SOPs would minimize the potential spread of white-nose syndrome in abandoned mines and caves from BLM authorized actions. Management on BLM-administered surface lands **may affect, but is not likely to adversely affect,** northern long-eared bat and would have **no effect** on gray bat, Ozark big-eared bat, or Indiana bat.

With implementation of the lease notices, CSU stipulation, and other SMA stipulations, it is reasonably certain that adverse effects on listed bat species would be minimal from BLM-administered mineral leasing exploration or development. This would be the case in the action area on BLM mineral estates. For these reasons, the potential for these adverse effects would be low enough as to be discountable; therefore, BLM mineral management **may affect, but is not likely to adversely affect,** listed bat species at the planning level.

Effects of the BIA Proposed Action

As summarized in **Table 5-5**, the action area on BIA-managed surface overlaps all listed bat species; thus, these species and their habitat could be subject to effects of surface management activities, as described in Section 5.2.4.

As summarized in **Table 5-5**, the action area on BIA mineral estates overlaps all listed bat species' ranges and their habitat; thus, these species and their habitat could be subject to mineral development effects, as described in Section 5.2.5, above.

There are no bat-specific BIA BMPs (Appendix B), but the general direction to survey for special status species (including listed bats) to determine baseline conditions and design projects to avoid, minimize, or mitigate impacts would reduce potential adverse effects on listed bats and their habitats.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable listed bat habitat, authorized projects under the BIA proposed action may affect, and is likely to adversely affect, the gray bat, northern long-eared bat, Ozark big-eared bat, and Indiana bat. Subsequent NEPA and ESA review would occur at the program level or project level, or both. This would be the case for programs and activities carried out under the proposed action. During additional review, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed bat species at the planning level.

5.3.2 Plants

Species Assemblage: Plants (Western Prairie Fringed Orchid)

Numerous listed plant species share similar life histories and habitat requirements, such that the potential types of effects under the proposed action would also be similar. Examples are the direct effects from plant damage or removal during surface disturbance and the indirect effects from nonnative, invasive plant spread or loss of pollinators. BLM and BIA BMPs and BLM lease stipulations would apply to all special status plant species, including listed plant species considered in this species assemblage.

The listed plant species under the jurisdiction of multiple state ESFOs in this species assemblage is the western prairie fringed orchid. Where its range overlaps portions of the action area, it is summarized below.

Effects of the BLM Proposed Action

Western prairie fringed orchid range does not overlap BLM-administered surface lands in the action area; thus, western prairie fringed orchid would not

be subject to effects from BLM-administered surface lands, as described in Section 5.2.2.

Approximately 351,900 acres (3 percent) of the western prairie fringed orchid range overlaps BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs. If there is suitable or occupied habitat in BLM-administered mineral estate, this species or its habitat could be subject to the types of effects from mineral development, as described in Section 5.2.3.

The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral leasing stipulations (Appendix C). Stipulation LN-2 would enable the BLM to recommend modifications to exploration and development proposals to protect listed species. Under LN-2, the BLM may not approve any ground-disturbing activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

LN-1 would result in appropriately timed, special status plant clearance surveys on portions of leases with potential, suitable, or occupied habitat, and in a buffer around these areas. COAs may be applied to avoid or minimize the effects, including avoiding or minimizing development in the area, using dust abatement measures, installing signs or fencing to prevent entry, following specialized reclamation procedures, conducting long-term monitoring, or taking off-site mitigation measures.

There are approximately 259,600 acres (2 percent) of the western prairie fringed orchid range that overlap BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on land use plans or other guidance, as described in Section 5.2.3 (see LN-1 in Appendix C).

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in occupied or suitable listed plant species habitat, authorized projects under the proposed action may affect, and are likely to adversely affect, listed plant species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action.

The BMPs, SOPs, and mineral leasing stipulations would reduce adverse effects on listed plant species. Further, during additional review for programs or projects in the range of listed plant species, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects at the

planning level, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed plant species, including western prairie fringed orchid.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 12,800 acres (less than 1 percent) of the western prairie fringed orchid range that overlaps BIA-managed surface that could be subject to BIA-managed surface lands effects, as described in Section 5.2.4.

There are approximately 12,800 acres (less than 1 percent) of the western prairie fringed orchid range that overlaps BIA-managed mineral estates that could be subject to mineral development effects, as described in Section 5.2.5, above. Incorporating BIA BMPs (Appendix B) for special status species would avoid or minimize adverse effects.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable listed plant species habitat, authorized projects under the BIA proposed action may affect, and are likely to adversely affect, listed plant species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of listed plant species, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed plant species at the planning level, including western prairie fringed orchid.

5.4 EFFECTS: SPECIES UNDER THE JURISDICTION OF THE OKLAHOMA ESFO

5.4.1 Wildlife

Species Assemblage: Cave-Dwelling Fishes

The Ozark cavefish is part of the cave-dwelling fishes species assemblage. Such species share similar habitat types, such as caves, sinkholes, and other similar features. Further, the type of potential effects from the proposed action (see Section 5.2) would be similar. This includes planning decisions that could adversely affect water quantity and quality, including the potential for groundwater depletion or water quality effects, surface water quality effects, and habitat disturbance. Other species in this assemblage are the Mexican blindcat, under the jurisdiction of the Texas Austin ESFO (see Section 5.9).

Effects of the BLM Proposed Action

The range of Ozark cavefish does not overlap the action area on BLM-administered surface; therefore, BLM-administered surface land effects, as described in Section 5.2.2, above, are not expected to occur.

Approximately 35,400 acres (less than 1 percent) of the range of Ozark cavefish overlaps the action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs. These areas could be subject to mineral development effects, as described in Section 5.2.3, above.

BLM fluid and solid mineral stipulations (Appendix C) include an NSO stipulation, with exceptions, modifications, or waivers, for riparian-wetland areas and water bodies. No surface occupancy is allowed in these areas and in an area that begins and extends 415 feet landward, from the outside edge of the riparian-wetland area or water body. Lease notice 9 stipulates that in potential cave occurrence areas, special protective measures, such as operational constraints, may be required as part of approvals for drilling or other operations on the lease. Implementing these stipulations would reduce the potential for adverse effects on cave-dwelling fish species; however, adverse effects would still be possible from activities that affect hydrology, water quality, and water quantity or that disturb cave sites, as described in in Sections 5.2.2 and 5.2.3, above.

Approximately 958,300 acres (2 percent) of the range of Ozark cavefish overlaps the action area on BLM-administered mineral estates under surface lands managed by other SMAs. These areas would be subject to further requirements and stipulations imposed by those agencies.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in occupied or suitable cave-dwelling fish habitat, authorized projects under the BLM proposed action may affect, and are likely to adversely affect, these species; however, stipulations that would establish a buffer around water bodies and protections to potential cave occurrence areas would reduce adverse effects from mineral management in the action area. Further, during additional review for programs or projects in the range of these species, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects. For these reasons, the potential for residual adverse effects would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** cave-dwelling fishes at the planning level, including the Ozark cavefish.

Effects of the BIA Proposed Action

The action area on BIA-managed surface lands overlaps approximately 494,600 acres (10 percent) of the Ozark cavefish's range; these areas could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above.

Additionally, the action area on BIA-managed mineral estates overlaps approximately 497,800 acres (10 percent) of Ozark cavefish's range; these areas could be subject to mineral development effects, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in occupied or suitable cave-dwelling fish habitat, authorized projects under the BLM proposed action may affect, and are likely to adversely affect, these species; however, stipulations that would establish a buffer around water bodies and protections for potential cave occurrence areas would reduce adverse effects from mineral management in the action area. Further, during additional review for programs or projects in the range of these species, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects. For these reasons, the potential for residual adverse effects would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** cave-dwelling fishes at the planning level, including the Ozark cavefish.

Species Assemblage: Benthic-Spawning Fishes

The leopard darter is the only listed benthic-spawning fish species under the jurisdiction of the Oklahoma ESFO. This section incorporates the analysis for the benthic-spawning fish species assemblage under the jurisdiction of multiple state ESFOs (Section 5.3.1).

Effects of the BLM Proposed Action

The action area on BLM-administered surface lands does not overlap any acres of the leopard darter's range; therefore, there would be no BLM-administered surface lands effects, as described in Section 5.2.2, above.

The action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps approximately 6,700 acres (1 percent) of the Leopard darter's range. These areas could be subject to mineral development effects, as described in Section 5.2.3, above. As described in the analysis for the benthic-spawning fishes assemblage for multiple state ESFOs in Section 5.3.1, BLM fluid mineral stipulations for riparian-wetland areas and water bodies (Appendix C) would reduce, but not completely eliminate, the potential for adverse effects from water quantity and quality degradation from mineral activities.

BLM-administered mineral estates on lands managed by other SMAs overlap approximately 95,900 acres (7 percent) of the leopard darter's range. These areas would be subject to further requirements and stipulations imposed by those agencies.

There are approximately 900 acres (32 percent) of leopard darter designated critical habitat in the action area. Of these, approximately 200 acres (7 percent) are in the action area on BLM mineral estate on surface lands managed by other SMAs. The effects from mineral development activities in these areas, as described in Section 5.2.3, could adversely affect leopard darter critical habitat PCEs; however, the BLM would not approve any activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

There is no designated critical habitat for leopard darter in the action areas on BLM-administered surface lands and split-estate; thus, no effects on critical habitat PCEs would occur from management in these areas.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** benthic-spawning fish species at the planning level, including the leopard darter and its designated critical habitat. The rationale is the same as described in the analysis for the benthic-spawning fishes assemblage for multiple state ESFOs in Section 5.3.1.

Effects of the BIA Proposed Action

The action area on BIA-managed surface lands overlaps approximately 198,100 acres (14 percent) of leopard darter range; these areas could be subject to BIA-managed surface land effects under the BIA proposed action, as described in Section 5.2.4, above.

Additionally, the action area on BIA-managed mineral estates overlaps approximately 292,200 acres (20 percent) of leopard darter range; these areas could be subject to mineral development effects, as described in Section 5.2.5, above.

Of the 900 acres (32 percent) of leopard darter designated critical habitat in the action are, approximately 800 acres (29 percent) overlap BIA-managed surface lands and 900 acres (32 percent) overlap BIA-managed mineral estates. The effects from mineral development in these areas, as described in Sections 5.2.4 and 5.2.5, could adversely affect leopard darter critical habitat PCEs.

Determination of Effects from the BIA Proposed Action

The BIA proposed action **may affect, but is not likely to adversely affect,** benthic-spawning fish species at the planning level, including the leopard darter and its designated critical habitat. The rationale is the same as described in the

analysis for the benthic-spawning fishes assemblage for multiple state ESFOs in Section 5.3.1.

Species Assemblage: Freshwater Mussels

Listed freshwater mussels under the jurisdiction of the Oklahoma ESFO are the Ouachita rock pocketbook, scaleshell, and winged mapleleaf. These species fall under the freshwater mussels species assemblage, and the analysis in this section incorporates the analysis for the freshwater mussels species assemblage under the jurisdiction of the multiple state ESFOs in Section 5.3.1.

The ranges for these species overlap portions of the action area, this is summarized below. Percentages given are the proportion of the total range in each portion of the action area.

Table 5-6
Listed Freshwater Mussel Species Ranges in the Action Area—Oklahoma ESFO

Species	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Ouachita rock pocketbook	—	95,000 (2%)	294,800 (5.3%)	597,200 (11%)	832,300 (15%)
Scaleshell	—	575,400 (3%)	368,600 (2%)	795,000 (5%)	1,127,000 (7%)
Winged mapleleaf	—	575,500 (6%)	373,900 (4%)	901,000 (9%)	1,232,800 (12%)

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-6**, no ranges for the Ouachita rock pocketbook, scaleshell, or winged mapleleaf overlap the action area on BLM-administered surface lands; therefore, there would be no potential for BLM-administered surface land effects under the BLM proposed action, as described in Section 5.2.2, above.

As summarized in **Table 5-6**, the action area on BLM-administered mineral estates, not including that under surface lands managed by other SMAs, overlaps the ranges for all three freshwater mussel species. In these areas, the species and their habitat could be subject to mineral development effects, as described in Section 5.2.3, above.

As summarized in **Table 5-6**, the action area on BLM-administered mineral estates on other SMA lands overlaps the ranges for all three freshwater mussel species. These areas would be subject to further requirements and stipulations imposed by those agencies.

As described in the analysis for the freshwater mussels assemblage for multiple state ESFOs in Section 5.3.1, BLM fluid mineral stipulations for riparian-wetland areas and water bodies (Appendix C) would reduce, but not completely eliminate, the potential for adverse effects from water quantity and quality degradation from mineral activities.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** freshwater mussel species at the planning level, including the Ouachita rock pocketbook, scaleshell, and winged mapleleaf. The rationale is the same as described in the analysis for the freshwater mussel species assemblage for multiple state ESFOs in Section 5.3.1.

Effects of the BIA Proposed Action

The action area on BIA-managed surface lands overlaps the ranges for all three freshwater mussel species under the jurisdiction of the Oklahoma ESFO; these species and their habitat could be subject to BIA-managed surface land effects under the BIA proposed action, as described in Section 5.2.4, above.

The action area on BIA-managed mineral estates overlaps the ranges for all three freshwater mussel species under the jurisdiction of the Oklahoma ESFO; these species and their habitat could be subject to mineral development effects, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

The BIA proposed action **may affect, but is not likely to adversely affect,** freshwater mussel species at the planning level, including the Ouachita rock pocketbook, scaleshell, and winged mapleleaf. The rationale is the same as described in the analysis for the freshwater mussel species assemblage for multiple state ESFOs in Section 5.3.1.

Rattlesnake-master Borer Moth

Effects of the BLM Proposed Action

The range for this species does not overlap the action area on BLM-administered surface, so no effects are anticipated from BLM-administered surface land management, as described in Section 5.2.2.

There are approximately 22,200 acres (less than 1 percent) of the species' range that overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, the rattlesnake-master borer moth may be subject to effects from mineral exploration and development, as described in Section 5.2.3.

The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A), which would indirectly protect habitat for this

species and its host plant in the action area. These include minimizing surface disturbance and vegetation removal during authorized activities, conducting weed management, and establishing special status species baseline conditions through surveys. Further, Implementing BMPs and SOPs in the BLM Final Programmatic EISs for Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States (BLM 2007, 2016a) would minimize the potential for adverse indirect effects on this species and its host plant during chemical weed treatments.

BLM mineral stipulations (Appendix C) would directly protect this species and its host plant during mineral exploration and development. Stipulation LN-2 would enable the BLM to recommend modifications to exploration and development proposals to protect listed species. While the rattlesnake-master borer moth is a candidate species under the ESA, this stipulation would still apply. Under LN-2, the BLM may not approve any ground-disturbing activity that may affect listed species or critical habitat until it completes its obligations under the ESA; there would be no waivers, exceptions, or modifications for this stipulation.

There are approximately 88,800 acres (less than 1 percent) of this species' range that overlap the action area for BLM-administered mineral estate under surface lands managed by other federal and state SMAs. On other SMAs, the potential for effects would be similar to those described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in suitable or occupied habitat for rattlesnake-master borer moth, the proposed action may affect, and is likely to adversely affect, this species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of this species, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for rattlesnake-master borer moth at the planning level.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 891,800 acres (7 percent) of this species' range that overlap the action area on BIA-managed

surface. These acres could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above.

There are approximately 1,474,600 acres (12 percent) of this species' range that overlap the action area on BIA-managed mineral estates and that could be subject to mineral development effects, as described in Section 5.2.5, above.

The potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B), which would directly and indirectly protect habitat for this species and its host plant in the action area. These BMPs include minimizing surface disturbance and vegetation removal during authorized activities, reclaiming temporarily disturbed areas, conducting weed management, and establishing special status species baseline conditions through surveys.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in suitable or occupied habitat for rattlesnake-master borer moth, the proposed action may affect, and is likely to adversely affect, this species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of this species, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for rattlesnake-master borer moth at the planning level.

Species Assemblage: Bats

Ozark big-eared bat and Indiana bat are analyzed under the bat species assemblage in Section 5.3.1.

5.4.2 Plants

Species Assemblage: Plants (Harperella)

Harperella is a listed plant species under the jurisdiction of the Oklahoma ESFO. It falls under the listed plant species assemblage, and the analysis in this section incorporates the analysis for listed plant species under the jurisdiction of the multiple state ESFOs (Section 5.3.2). The range of harperella overlaps portions of the action area, this is summarized below.

Effects of the BLM Proposed Action

Harperella range does not overlap BLM-administered surface lands in the action area; thus, harperella would not be subject to the effects from BLM-administered surface land management, as described in Section 5.2.2.

There are approximately 8,800 acres (less than 1 percent) of harperella range that overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas and where there is suitable or occupied habitat, harperella may be subject to effects from mineral exploration and development, as described in Section 5.2.3.

As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral leasing stipulations (Appendix C), including stipulations for special status plant species (LN-1) and ESA consultation (LN-2). Further, NSO-6 for riparian-wetland areas and water bodies and a 415-foot buffer around these areas would protect suitable and occupied harperella habitat.

There are approximately 77,400 acres (less than 1 percent) of harperella range that overlap BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance, as described in Section 5.2.3, further reducing the potential for adverse effects.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including harperella. The rationale is the same as that described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 111,300 acres (1 percent) of harperella range that overlap BIA-managed surface and could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above. As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B).

There are approximately 80,100 acres (less than 1 percent) of harperella range that overlap BIA-managed mineral estates and could be subject to mineral development effects as described in Section 5.2.5 above. As described in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B).

Determination of Effects from the BIA Proposed Action

The BIA proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including harperella. The rationale is the

same as that described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

5.5 EFFECTS: SPECIES UNDER THE JURISDICTION OF THE KANSAS ESFO

5.5.1 Wildlife

Species Assemblage: Benthic-Spawning Fishes (Topeka Shiner)

The Topeka shiner is the only listed benthic-spawning fish species under the jurisdiction of the Kansas ESFO. The analysis in this section incorporates the analysis for the benthic-spawning species assemblage under the jurisdiction of multiple sate ESFOs (Section 5.3.1).

The range of the Topeka shiner overlaps with portions of the action area, this is summarized below. There is no designated critical habitat for Topeka shiner in the action area, so no effects on designated critical habitat are expected.

Effects of the BLM Proposed Action

The action area on BLM-administered surface lands does not overlap any acres of the Topeka shiner's range; therefore, there would be no BLM-administered surface lands effects, as described in Section 5.2.2.

The action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps approximately 138,300 acres (1 percent) of the Topeka shiner's range. These areas could be subject to mineral development effects, as described in Section 5.2.3.

As described in the analysis for the benthic-spawning fishes assemblage for multiple state ESFOs in Section 5.3.1, BLM fluid mineral stipulations for riparian-wetland areas and water bodies (Appendix C) would reduce, but not completely eliminate, the potential for adverse effects from water quantity and quality degradation from mineral activities.

BLM-administered mineral estates on other federal SMA lands overlap approximately 470,000 acres (2 percent) of the Topeka shiner's range. These areas would be subject to further requirements and stipulations imposed by those agencies.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** benthic-spawning fish species at the planning level, including the Topeka shiner. The rationale is the same as that described in the analysis for the benthic-spawning fishes assemblage for multiple state ESFOs in Section 5.3.1. The BLM proposed action would have **no effect** on Topeka shiner designated critical habitat, because there are none in the action area.

Effects of the BIA Proposed Action

There is no Topeka shiner range in the action area on BIA-managed surface lands or mineral estates; therefore, the BIA proposed action has no potential to affect the Topeka shiner.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on the Topeka shiner or its designated critical habitat.

5.5.2 Plants

Species Assemblage: Plants (Mead's Milkweed)

Mead's milkweed is the listed plant species under the jurisdiction of the Kansas ESFO. This species falls under the listed plant species assemblage, and the analysis in this section incorporates the analysis for listed plant species under the jurisdiction of the multiple state ESFOs (Section 5.3.2). The range of Mead's milkweed overlaps portions of the action area, this is summarized below.

Effects of the BLM Proposed Action

Mead's milkweed range does not overlap the action area on BLM-administered surface lands; therefore, it would not be subject to the effects from BLM-administered surface lands, as described in Section 5.2.2, above.

There are approximately 153,700 acres (less than 1 percent) of Mead's milkweed range that overlaps the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, and where suitable or occupied habitat is present, Mead's milkweed may be subject to effects from mineral exploration and development, as described in Section 5.2.3.

As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A), and mineral leasing stipulations (Appendix C), including stipulations for special status plant species (LN-1) and ESA consultation (LN-2).

There are approximately 300,500 acres (1 percent) of Mead's milkweed range that overlap BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance, as described in Section 5.2.3, further reducing the potential for adverse effects.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including Mead's milkweed. The

rationale is the same as that described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 5,600 acres (less than 1 percent) of Mead's milkweed range that overlap the action area on BIA-managed surface that could be subject to BIA-managed surface lands effects, as described in Section 5.2.4 above. As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B).

There are approximately 5,600 acres (less than 1 percent) of Mead's milkweed range that overlap the action area on BIA-managed mineral estates that could be subject to mineral development effects, as described in Section 5.2.5, above. As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B).

Determination of Effects from the BIA Proposed Action

The BIA proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including Mead's milkweed. The rationale is the same as that described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

5.6 EFFECTS: SPECIES UNDER THE JURISDICTION OF MULTIPLE TEXAS ESFOS

5.6.1 Wildlife

Golden-Cheeked Warbler

Effects of the BLM Proposed Action

The range of the golden-cheeked warbler does not overlap the action area on BLM-administered surface lands; therefore, this species would not be subject to effects of management of BLM-administered surface lands described in Section 5.2.2.

Approximately 10,100 acres (less than 1 percent) of the total golden-cheeked warbler range overlap with the action area on BLM-administered mineral estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. Approximately 1,226,900 acres (5 percent) of range overlap the action area for BLM-administered mineral estate under surface lands managed by other SMAs, including Department of Defense lands at Fort Hood. In these areas, golden-cheeked warbler may be subject to effects from mineral exploration and development, as described in Section 5.2.3. Specifically, BLM authorized actions that remove or degrade Ashe juniper-oak woodlands would have adverse effects on golden-cheeked warbler and its habitat.

Determination of Effects from the BLM Proposed Action

Assuming BLM authorized mineral leasing could occur in suitable or occupied golden cheeked-warbler habitat, the proposed action may affect, and is likely to adversely affect, this species. With implementation of lease notices, requirements set forth by other federal SMAs, and further ESA consultation, it is reasonably certain that adverse effects from BLM-administered mineral leasing exploration or development in the action area would be minimal. For these reasons, the potential for these adverse effects would be low enough as to be discountable; therefore, BLM mineral leasing **may affect, but is not likely to adversely affect,** golden cheeked-warbler at the planning level.

Effects of the BIA Proposed Action

The range of the golden-cheeked warbler does not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate, as described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on golden-cheeked warblers.

Northern Aplomado Falcon

Effects of the BLM Proposed Action

The range of the northern aplomado falcon does not overlap the action area on BLM-administered surface lands; therefore, this species would not be subject to the effects of management of BLM-administered surface lands described in Section 5.2.2.

Approximately 96,900 acres (less than 1 percent) of the northern aplomado falcon range overlaps the action area on BLM-administered mineral estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, northern aplomado falcon may be subject to effects from mineral exploration and development, as described in Section 5.2.3.

Approximately 11,036,600 acres (2 percent) of range overlap the action area for BLM-administered mineral estate under surface lands managed by other SMAs. This includes the Laguna Atascosa NWR and Matagorda Island Wildlife Management Area. In NWRs, mineral leasing would be conducted in such a manner as to completely protect listed species and habitats, in accordance with 43 CFR 3101.5. On other SMA lands, the potential for effects on northern aplomado falcon would be similar to those described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

Assuming BLM authorized mineral leasing could occur in suitable or occupied northern aplomado falcon habitat, the proposed action may affect, and is likely to adversely affect, this species. With implementation of lease notices, requirements set forth by other federal SMAs, and further ESA consultation, it is reasonably certain that adverse effects from BLM-administered mineral leasing exploration or development in the action area would be minimal. For these reasons, the potential for these adverse effects would be low enough as to be discountable; therefore, BLM mineral leasing **may affect, but is not likely to adversely affect,** northern aplomado falcon at the planning level.

Effects of the BIA Proposed Action

The range of the northern aplomado falcon does not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate, as described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on the northern aplomado falcon.

Species Assemblage: Freshwater Mollusks

Listed freshwater mussels under the jurisdiction of the multiple Texas ESFOs are the golden orb, smooth pimpleback, and Texas fawnsfoot. These species fall under the freshwater mussels species assemblage, and the analysis in this section incorporates the analysis for the freshwater mussels species assemblage under the jurisdiction of the multiple state ESFOs in Section 5.3.1.

The ranges for these species that overlap portions of the action area are summarized below. Percentages given are the proportion of the total range in each portion of the action area.

Table 5-7
Listed Freshwater Mussel Species Ranges in the Action Area—Multiple Texas ESFOs

Species	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Golden orb	0	93,200 (1%)	300,100 (3%)	0	0
Smooth pimpleback	0	17,200 (<1%)	796,600 (4%)	0	0
Texas fawnsfoot	0	27,000 (<1%)	283,700 (2%)	0	0

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-7**, no ranges for the golden orb, smooth pimpleback, and Texas fawnsfoot overlap the action area on BLM-administered surface lands;

therefore, there would be no potential for BLM-administered surface lands effects under the BLM proposed action, as described in Section 5.2.2, above.

As summarized in **Table 5-7**, the action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps the ranges for all three freshwater mussel species. In these areas, these species and their habitat could be subject to mineral development effects, as described in Section 5.2.3, above.

As summarized in **Table 5-7**, the action area on BLM-administered mineral estates on other SMA lands overlaps the ranges for all three freshwater mussel species. These areas would be subject to further requirements and stipulations imposed by those agencies.

As described in the analysis for the freshwater mussels assemblage for multiple state ESFOs in Section 5.3.1, BLM fluid mineral stipulations for riparian-wetland areas and water bodies (Appendix C) would reduce, but not completely eliminate, the potential for adverse effects from water quantity and quality degradation from mineral activities.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** freshwater mussel species at the planning level, including the golden orb, smooth pimpleback, and Texas fawnsfoot. The rationale is the same as that described in the analysis for the freshwater mussel species assemblage for multiple state ESFOs in Section 5.3.1.

Effects of the BIA Proposed Action

The ranges of the golden orb, smooth pimpleback, and Texas fawnsfoot, do not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to the effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on the golden orb, smooth pimpleback, or Texas fawnsfoot.

5.6.2 Plants

Species Assemblage: Plants

The listed plant species under the jurisdiction of multiple Texas ESFOs are the Navasota ladies'-tresses and Neches River rose-mallow (including its designated critical habitat). These species fall under the listed plant species assemblage, and the analysis in this section incorporates the analysis for listed plant species

under the jurisdiction of the multiple state ESFOs (Section 5.3.2). The range of these species that overlaps portions of the action area is summarized below.

Table 5-8
Listed Plant Species Ranges in the Action Area—Multiple Texas ESFOs

Species Range or Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Neches River rose-mallow	0	214,300 (7%)	125,900 (4%)	0	0
Neches River rose-mallow Designated critical habitat	0	0	0	0	0
Navasota ladies'-tresses	0	188,500 (3%)	168,700 (2%)	0	0

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-8**, neither species' range overlaps with the action area on BLM-administered surface lands; thus, these species would not be subject to the effects from BLM-administered surface lands, as described in Section 5.2.2, above.

As summarized in **Table 5-8**, both species' ranges overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas and where suitable or occupied habitat is present, these species may be subject to the effects from mineral exploration and development, as described in Section 5.2.3.

As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral leasing stipulations (Appendix C), including stipulations for special status plant species (LN-1) and ESA consultation (LN-2).

As summarized in **Table 5-8**, both species' ranges overlap the action area on BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance, as described in Section 5.2.3, further reducing the potential for adverse effects.

As summarized in **Table 5-8**, there is no designated critical habitat for Neches River rose-mallow in the action area on BLM-administered surface or mineral estate; thus, the BLM proposed action would not affect critical habitat for this species.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including Neches River rose-mallow or Navasota ladies'-tresses. The rationale is the same as that described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2. The BLM proposed action would have **no effect** on designated critical habitat for Neches River rose-mallow, because there are none in the action area.

Effects of the BIA Proposed Action

As summarized in **Table 5-8**, neither species' range nor designated critical habitat for Neches River rose-mallow overlap the action area on BIA-managed surface lands or mineral estate; thus, neither species would be subject to the effects from the BIA proposed action.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Neches River rose-mallow or its designated critical habitat or Navasota ladies'-tresses, because neither species' range nor critical habitat is in the action area.

5.7 EFFECTS: SPECIES UNDER THE JURISDICTION OF THE TEXAS COASTAL ESFO

5.7.1 Wildlife

Attwater's Greater Prairie Chicken

Effects of the BLM Proposed Action

The range of Attwater's greater prairie chicken does not overlap the action area on BLM-administered surface lands; therefore, there would be no potential for BLM-administered surface lands effects under the BLM proposed action, as described in Section 5.2.2, above.

There are approximately 1,300 acres (less than 1 percent) of Attwater's greater prairie chicken range that overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, Attwater's greater prairie chicken may be subject to the effects from mineral exploration and development, as described in Section 5.2.3. As described, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A) and BLM fluid mineral stipulations (Appendix C), which would indirectly protect the species and its habitat.

There are approximately 76,600 acres (3 percent) of Attwater's greater prairie chicken range that overlap the action area for BLM-administered mineral estate under surface lands managed by other SMAs, including the Attwater's Prairie Chicken NWR and Texas City Prairie Preserve. In NWRs, mineral leasing would

be conducted so as to completely protect listed species and habitats, in accordance with 43 CFR 3101.5.

On other SMA lands, the potential for effects would be similar to those described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

BLM-authorized mineral management with potential to adversely affect Attwater's greater prairie chicken would not occur on surface lands management by other SMAs with the purpose of protecting the species. With implementation of lease notices, requirements set forth by other SMAs, and further ESA consultation at the project level, it is reasonably certain that the potential for adverse effects on Attwater's greater prairie chicken would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** Attwater's greater prairie chicken at the planning level.

Effects of the BIA Proposed Action

The range of Attwater's greater prairie chicken does not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to the effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate as described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Attwater's greater prairie chicken.

Ocelot

Effects of the BLM Proposed Action

The range of the ocelot does not overlap the action area on BLM-administered surface lands; therefore, there would be no potential for BLM-administered surface land effects under the BLM proposed action, as described in Section 5.2.2 above.

There are approximately 96,900 acres (less than 1 percent) of ocelot range that overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, ocelots may be subject to the effects from mineral exploration and development, as described in Section 5.2.3. The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A) and BLM fluid mineral stipulations (Appendix C), which would indirectly protect the species and its habitat.

There are approximately 1,006,600 acres (4 percent) of ocelot range that overlap the action area for BLM-administered mineral estate under surface lands managed by other SMAs, including the Laguna Atascosa NWR. In NWRs, mineral leasing would be conducted so as to completely protect listed species and habitats, in accordance with 43 CFR 3101.5. On other SMA lands, the potential for effects is similar to those described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

BLM-authorized mineral management with potential to adversely affect ocelot would not occur on NWRs. With implementation of lease notices, requirements set forth by other SMAs, and further ESA consultation at the project level, it is reasonably certain that the potential for adverse effects on ocelot would be low enough as to be discountable; therefore, the BLM proposed action **may affect, but is not likely to adversely affect,** ocelot at the planning level.

Effects of the BIA Proposed Action

Under the BIA proposed action there are approximately 1,900 acres (less than 1 percent) of this species' range that overlap the action area on BIA-managed surface that could be subject to BIA-managed surface land effects, as described in Section 5.2.4 above.

There are approximately 1,900 acres (less than 1 percent) of this species' range that overlap the action area on BIA-managed mineral estates and that could be subject to mineral development effects, as described in Section 5.2.5, above.

The potential for adverse effects would be minimized by incorporating BIA BMPs (Appendix B), which would directly and indirectly protect habitat for this species in the action area. These include establishing special status species baseline conditions through surveys.

Determination of Effects from the BIA Proposed Action

Assuming that any BIA authorized actions could occur in suitable or occupied ocelot habitat, the proposed action may affect, and is likely to adversely affect, this species; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of this species, the BIA would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate

potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for ocelot at the planning level.

Louisiana Pine Snake

Effects of the BLM Proposed Action

The range of the Louisiana pine snake does not overlap the action area on BLM-administered surface lands; therefore, there would be no potential for BLM-administered surface land effects under the BLM proposed action, as described in Section 5.2.2, above.

There are approximately 263,400 acres (3 percent) of Louisiana pine snake range that overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, Louisiana pine snake may be subject to the effects of mineral exploration and development, as described in Section 5.2.3. The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral leasing stipulations (Appendix C). Stipulation LN-2 would enable the BLM to recommend modifications to exploration and development proposals to protect listed species. Under LN-2, the BLM may not approve any ground-disturbing activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

There are approximately 147,100 acres (24 percent) of Louisiana pine snake range that overlap the action area for BLM-administered mineral estate under surface lands managed by other federal and state SMAs, including Ba Steinhagen Lake and Sam Rayburn Reservoir in southeastern Texas. In these areas, the potential for adverse effects on Louisiana pine snake would be similar to those described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized actions could occur in habitat for Louisiana pine snake, the proposed action may affect, and is likely to adversely affect, that species; however, subsequent NEPA and ESA review would be done at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of Louisiana pine snake, the BLM would develop conservation measures, coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects on Louisiana pine snake, thereby reducing effects to a

may affect, but not likely to adversely affect, determination at the planning level.

Effects of the BIA Proposed Action

The range of Louisiana pine snake does not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate, as described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Louisiana pine snake.

5.7.2 Plants

Species Assemblage: Plants

The listed plant species under the jurisdiction of the Texas Coastal ESFO considered in this analysis are South Texas ambrosia, star cactus, Texas ayenia, slender rush-pea, Texas prairie dawn, Texas golden gladecress (and its designated critical habitat), and Walker's manioc. These species fall under the listed plant species assemblage, and the analysis in this section incorporates the analysis for listed plant species under the jurisdiction of multiple state ESFOs (Section 5.3.2). The range of these species that overlaps with portions of the action area is summarized below.

Table 5-9
Listed Plant Species Ranges in the Action Area—Texas Coastal ESFO

Species Range and Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
South Texas ambrosia	—	94,400 (3%)	381,800 (14%)	—	—
Star cactus	—	—	208,300 (12%)	—	—
Texas ayenia	—	—	535,700 (23%)	—	—
Slender rush-pea	—	94,400 (7%)	56,700 (4%)	—	—
Texas prairie dawn	—	53,300 (2%)	78,100 (4%)	—	—
Texas golden gladecress	—	164,600 (22%)	161,600 (22%)	—	—
Texas golden gladecress Designated critical habitat	—	100 (7%)	—	—	—
Walkers manioc	—	—	208,500 (7%)	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-9**, the action area on BLM-administered surface lands does not overlap any of the ranges of listed plant species or designated

critical habitat for Texas golden gladecress under the jurisdiction of the coastal Texas ESFO; thus, none of these species or critical habitat would be subject to effects of BLM-administered surface lands, as described in Section 5.2.2, above.

There is overlap between the ranges of multiple listed plant species under the jurisdiction of the coastal Texas ESFO and designated critical habitat for Texas golden gladecress, and the action area on BLM-administered split-estate. This does not include BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, these species and critical habitat may be subject to effects of mineral exploration and development, as described in Section 5.2.3.

As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A), and mineral leasing stipulations (Appendix C), including stipulations for special status plant species (LN-1) and ESA consultation (LN-2).

As summarized in **Table 5-9**, there is overlap between the ranges of all listed plant species under the jurisdiction of the coastal Texas ESFO and the action area on BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance, as described in Section 5.2.3. This would further reduce the potential for adverse effects.

Designated critical habitat for Texas golden gladecress does not occur in the action area on BLM mineral estate under surface lands managed by other SMAs; therefore, no effects on the critical habitat PCEs are expected from management in these areas.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including South Texas ambrosia, star cactus, Texas ayenia, slender rush-pea, Texas prairie dawn, Texas golden gladecress (and its designated critical habitat), and Walker's manioc. The rationale is the same as described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

Effects of the BIA Proposed Action

As summarized in **Table 5-9**, the action area on BIA-managed surface lands does not overlap any of the ranges of listed plant species under the jurisdiction of the coastal Texas ESFO; therefore, none of these species would be subject to effects of BIA-managed surface lands, as described in Section 5.2.4, above.

As summarized in **Table 5-9**, the action area on BIA-managed mineral estate does not overlap any of the ranges of listed plant species under the jurisdiction

of the coastal Texas ESFO; therefore, none of species would be subject to effects from BIA-managed mineral estate development, as described in Section 5.2.5, above.

As summarized in **Table 5-9**, there is no overlap between designated critical habitat for Texas golden gladecress and the action area on BIA-managed surface lands or BIA-managed mineral estates; therefore, there would be no effects from BIA-managed surface lands or mineral estate development, as described in Sections 5.2.4 and 5.2.5, above.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on South Texas ambrosia, star cactus, Texas ayenia, slender rush-pea, Texas prairie dawn, Texas golden gladecress (and its designated critical habitat), and Walker's manioc. This is because none of these species' ranges or critical habitats are in the action area.

5.8 EFFECTS: SPECIES UNDER THE JURISDICTION OF THE TEXAS ARLINGTON ESFO

5.8.1 Wildlife

There are no wildlife species solely under the jurisdiction of the USFWS Texas Arlington ESFO. See Section 5.6, Effects: Species Under the Jurisdiction of Multiple Texas ESFOs.

5.8.2 Plants

Species Assemblage: Plants

The listed plant species under the jurisdiction of the Texas Arlington ESFO are Sneed pincushion cactus and earth-fruit (geocarpon). These species fall under the listed plant species assemblage, and the analysis in this section incorporates the analysis for listed plant species under the jurisdiction of multiple state ESFOs (Section 5.3.2). The range of these species that overlaps portions of the action area is summarized below.

Table 5-10
Listed Plant Species Ranges in the Action Are—Texas Arlington ESFOs

Species Ranges	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Sneed pincushion cactus	—	—	174,300 (3%)	—	—
Earth-fruit (geocarpon)	—	12,400 (<1%)	31,200 (<1%)	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-10**, neither species' range overlaps the action area on BLM-administered surface lands; therefore, neither species would be subject to effects from BLM-administered surface lands, as described in Section 5.2.2 above.

As summarized in **Table 5-10**, earth-fruit's range overlaps the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas and where suitable or occupied habitat is present, this species may be subject to effects from mineral exploration and development, as described in Section 5.2.3. As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral leasing stipulations (Appendix C). This includes stipulations for special status plant species (LN-1) and ESA consultation (LN-2).

As summarized in **Table 5-10**, there is no overlap between the range of Sneed pincushion cactus and BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. This species would not be subject to effects from mineral exploration and development, as described in Section 5.2.3.

As summarized in **Table 5-10**, both species' ranges overlap the action area on BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance, as described in Section 5.2.3. This would further reduce the potential for adverse effects.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including Sneed pincushion cactus and earth-fruit. The rationale is the same as described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

Effects of the BIA Proposed Action

As summarized in **Table 5-10**, neither species' range overlaps the action area on BIA-managed surface lands; therefore, neither species would be subject to effects from BIA-managed surface lands, as described in Section 5.2.4, above.

As summarized in **Table 5-10**, neither species' range overlaps the action area on BIA-managed mineral estates; therefore, neither species would be subject to effects from BIA-managed mineral estate development, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Sneed pincushion cactus or earth-fruit, because neither species' range is in the action area.

5.9 EFFECTS: SPECIES UNDER THE JURISDICTION OF THE TEXAS AUSTIN ESFO

5.9.1 Wildlife

Houston Toad

Effects of the BLM Proposed Action

The range of Houston toad does not overlap the action area on BLM-administered surface lands; therefore, there would be no potential for BLM-administered surface land effects under the BLM proposed action, as described in Section 5.2.2, above.

There are approximately 8,400 acres (less than 1 percent) of Houston toad range that overlap the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas, Houston toad may be subject to effects from mineral exploration and development, as described in Section 5.2.3. The potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs (Appendix A) and BLM fluid mineral stipulations (Appendix C) that would indirectly protect the species and its habitat.

There are approximately 91,300 acres (2 percent) of Houston toad range that overlap the action area for BLM-administered mineral estate under surface lands managed by other SMAs. On other SMA lands, the potential for effects would be similar to that described for other BLM-administered split-estate, above. Mineral exploration and development in these areas would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Of the 84,500 acres of designated critical habitat for Houston toad, approximately 3,200 acres (4 percent) are in the action area (**Figure D-11**). Approximately 2,870 acres (3 percent) are in the action area on BLM-administered mineral estate managed by other SMAs. Potential effects on the critical habitat PCEs from mineral development could occur, as described in Section 5.2.3; however, the BLM would not approve any activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

The remaining 300 acres (less than 1 percent) are in the action area on BLM-administered mineral estate. Potential effects on the critical habitat PCEs from mineral development could occur, as described in Section 5.2.3. The potential for effects would be reduced or avoided by BLM BMPs and SOPs (Appendix A) and fluid mineral stipulations (Appendix C) that would indirectly protect

designated critical habitat. The BLM would not approve any activity that may affect listed species or critical habitat until it completes its obligations under the ESA.

Determination of Effects from the BLM Proposed Action

Assuming that BLM-authorized mineral actions could occur in suitable, occupied, or designated critical habitat for Houston toad, the proposed action may affect, and is likely to adversely affect, this species and its designated critical habitat; however, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for Houston toad and its designated critical habitat at the planning level.

Effects of the BIA Proposed Action

The range of Houston toad does not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate, as described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Houston toad or its designated critical habitat.

Species Assemblage: Aquatic Salamanders

The analysis for aquatic salamanders includes seven species that depend on water from the Edwards Aquifer and their designated and proposed critical habitat, as applicable. It is unlikely that each of the seven species and critical habitats considered in this assemblage have potential to be affected by the proposed action; however, determining the potential for effects on the species and their habitats is difficult, given the complex karst geology and associated hydrological system of the Edwards Aquifer in which they occur; therefore, no species or critical habitats in this assemblage were dismissed from detailed analysis in this BA.

Effects of the BLM Proposed Action

There is no action area on BLM-administered surface within the range of the aquatic salamanders analyzed or within the Edwards Aquifer, so management of BLM-administered surface lands would not affect these species or their designated or proposed critical habitats.

Portions of the action area on several other SMAs are in the range of the salamanders analyzed in this species assemblage. Mineral exploration and development in these areas, which include the US Army Corps of Engineers (USACE) projects at Canyon Lake, Georgetown Lake, and Stillhouse Reservoir and the Department of Defense Camp Bullis, would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3.

Nonetheless, it is unlikely that measures would completely avoid the potential for adverse indirect effects. This is because these areas are in the Edwards Aquifer contributing or recharge zones (TCEQ 2019). Groundwater movement tracing in the aquifer (see, for example, Figure 8 in USFWS 2016i) has shown that tracers have been detected at springs and wells several miles from the sites where they were injected; therefore, should mineral leasing and development of subsurface mineral estate administered by the BLM affect surface water or groundwater quality, pollutants may enter the Edwards Aquifer. They eventually could be expressed at springs or other subterranean aquifers supporting one or more of the salamander species in this species assemblage. Should this occur, indirect adverse effects, as described in Section 5.2.3, would not be discountable.

The potential for this indirect adverse effect would depend on the type and amount of pollutant discharged, the distance from the point of discharge relative to occupied habitat, and presence of geological features, such as streams, faults, sinkholes, or other voids in the underlying karst geology that may facilitate pollutant movement into and through the aquifer.

Portions of the action area on other SMAs (for example, USACE project Granger Lake, the Austin-Bergstrom International Airport, and Joint Base San Antonio) are also in the range of salamanders analyzed in this species assemblage; however, because these areas are not over the Edwards Aquifer, any potential water quality effects generated during mineral activities in these areas would not enter the Edwards Aquifer; thus, there would be no potential to indirectly affect listed salamander species or their designated or proposed critical habitats.

As summarized in **Table 3-13**, approximately 609 acres (59 percent) of proposed surface and subsurface critical habitat for Georgetown salamander are in the action area. While no other designated or proposed critical habitat for listed salamanders is in the action area, designated critical habitat for the Austin blind and San Marcos salamanders and proposed critical habitat for the Jollyville Plateau and Salado salamanders is within several miles (see **Figure D-12**). Potential indirect adverse effects on the critical habitat PCEs from water quality degradation could occur. As described above, the potential for effects would be reduced, but not completely avoided, by further requirements and stipulations

imposed by the surface management agencies to protect and conserve listed species.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM authorized mineral actions could occur in portions of the action area over the Edwards Aquifer, the proposed action may affect, and is likely to adversely affect, the listed salamanders considered in this analysis, as well as proposed and designated critical habitat for these species. With the implementation of other SMA stipulations, it is reasonably certain that adverse indirect effects on the listed salamanders and their designated and proposed critical habitats from mineral leasing exploration or development in the action area would be minimal.

Further, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of listed salamanders and their designated or proposed critical habitat, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed salamanders and their designated critical habitat at the planning level. It **may affect, but is not likely to destroy or adversely modify,** determination for proposed critical habitat for Salado salamander and Georgetown salamander at the planning level.

Effects of the BIA Proposed Action

The BIA proposed action has no potential to affect listed salamanders or their designated or proposed critical habitats. This is because the range of the salamanders and their designated and proposed critical habitat and the Edwards Aquifer are completely outside of the action area for BIA-managed lands.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on listed salamanders or their designated or proposed critical habitat.

Species Assemblage: Riparian Birds

The riparian bird assemblage analyzed is western yellow-billed cuckoo and its proposed critical habitat and southwestern willow flycatcher and its designated critical habitat. These riparian-dependent species share similar habitat requirements and potential planning-level effects.

The ranges or critical habitats for these species that overlap portions of the action area are summarized below. Percentages given are the proportion of the total range or critical habitat in each portion of the action area.

Table 5-11
Riparian Bird Ranges and Critical Habitat in the Action Area—Texas Austin ESFO

Species or Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Western yellow-billed cuckoo	—	—	174,300 (<1%)	—	—
Western yellow-billed cuckoo proposed critical habitat	—	—	—	—	—
Southwestern willow flycatcher	—	—	174,300 (<1%)	—	—
Southwestern willow flycatcher designated critical habitat	—	—	—	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-11,** there are no riparian bird ranges that overlap the action area on BLM-administered surface lands or BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs; therefore, the effects from BLM-administered surface lands and mineral estate management, as described in Section 5.2.2 and Section 5.2.3, are not expected.

Approximately 174,300 acres (less than 1 percent) of the range of each species overlap the action area on BLM-administered mineral estates on other SMA lands, as summarized in **Table 5-11**. In these areas, effects from mineral estate management described in Section 5.2.3 could occur. Leasing would be subject to further requirements and stipulations to conserve listed species imposed by those agencies.

As summarized in **Table 5-11**, there is no designated or proposed critical habitat for riparian birds in the action area; therefore, effects on critical habitat PCEs are not expected to occur.

Determination of Effects from the BLM Proposed Action

Assuming that any BLM-administered mineral estate management could occur in the ranges of the listed riparian birds, the proposed action may affect, and is likely to adversely affect, these species. With the implementation of other SMA stipulations, it is reasonably certain that adverse effects from mineral actions would be minimal. Further, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed

action. During additional review for programs or projects, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for western yellow-billed cuckoo and southwestern willow flycatcher at the planning level.

The proposed action would have **no effect** on proposed critical habitat for western yellow-billed cuckoo or designated critical habitat for southwestern willow flycatcher because there is no critical habitat in the action area.

Effects of the BIA Proposed Action

As summarized in **Table 5-11,** there are no riparian bird ranges that overlap the action area on BIA-managed surface lands or mineral estates; therefore, effects are not expected to occur.

As summarized in **Table 5-11**, there is no designated or proposed critical habitat for riparian birds in the action area; therefore, effects on critical habitat PCEs are not expected to occur.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on southwestern willow flycatcher and its designated critical habitat or western yellow-billed cuckoo and its proposed critical habitat.

Species Assemblage: Benthic-Spawning Fishes (Fountain Darter)

The fountain darter is the only listed benthic-spawning fish species under the jurisdiction of the Texas Austin ESFO. The analysis in this section incorporates the analysis for the benthic-spawning fishes assemblage under the jurisdiction of multiple state ESFOs (Section 5.3.1).

Further, the fountain darter occurs in headwater spring areas associated with the Edwards Aquifer. This species, and its designated critical habitat, depend on water from the Edwards Aquifer. Potential planning level effects would be similar to those described for the aquatic salamanders species assemblage under the jurisdiction of the Texas Austin ESFO, above; therefore, the analysis in this section incorporates the analysis for the aquatic salamanders species assemblage.

Effects of the BLM Proposed Action

There is no BLM-administered surface within the range of fountain darter or in the Edwards Aquifer, so management of BLM-administered surface lands would not affect fountain darter or its designated critical habitat.

As described in the aquatic salamander species assemblage analysis above, the portions of the action area associated with the USACE project Canyon Lake is

in the range of the fountain darter. Mineral exploration and development in this area could have indirect adverse effects on water quality in fountain darter habitat in the San Marcos and Comal Rivers, which could affect fountain darter or its designated critical habitat. Mineral exploration and development in this area would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3. This would minimize, but not completely avoid, the potential for effects.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** benthic-spawning fish species at the planning level, including the fountain darter and its designated critical habitat. The rationale is the same as that described for the benthic-spawning fishes assemblage in Section 5.3.1 and the aquatic salamander species assemblage in this section.

Effects of the BIA Proposed Action

The BIA proposed action has no potential to affect fountain darter or its designated critical habitat. This is because the range of this species and its designated critical habitat and the Edwards Aquifer are completely outside of the action area for BIA-managed lands.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on fountain darter and its designated critical habitat.

Species Assemblage: Cave-Dwelling Fishes (Mexican Blindcat)

The Mexican blindcat is part of the cave-dwelling fishes species assemblage. The analysis in this section incorporates the analysis for the cave-dwelling fishes assemblage under the jurisdiction of Oklahoma ESFO in Section 5.4.1.

Effects of the BLM Proposed Action

The action area on BLM-administered surface lands and BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, does not overlap the Mexican blindcat's range; therefore, there would be no effects from proposed activities on BLM-administered surface lands, as described in Section 5.2.2, or from BLM-administered mineral estate management, as described in Section 5.2.3.

Approximately 203,400 acres (10 percent) of the range of Mexican blindcat overlaps the action area on BLM-administered mineral estates under surface lands managed by other SMAs. Effects from mineral estate management may occur, but these areas would be subject to further requirements and stipulations imposed by those agencies, as described in Section 5.2.3.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** cave-dwelling fishes at the planning level, including the Mexican blindcat. The rationale is the same as that described in the analysis for the cave-dwelling fish species assemblage for the Oklahoma ESFO in Section 5.4.1.

Effects of the BIA Proposed Action

The BIA proposed action has no potential to affect Mexican blindcat. This is because the range of this species is completely outside of the action area for BIA-managed lands.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Mexican blindcat.

Species Assemblage: Freshwater Mollusks

Freshwater mussels under the jurisdiction of the Texas Austin ESFO considered in this analysis are the Texas fatmucket and Texas pimpleback. These species fall under the freshwater mussels species assemblage, and the analysis in this section incorporates the analysis for the freshwater mussels species assemblage under the jurisdiction of the multiple state ESFOs in Section 5.3.1.

The ranges or critical habitats for these species that overlap portions of the action area are summarized below. Percentages given are the proportion of the total range or critical habitat in each portion of the action area.

Table 5-12
Freshwater Mussel Ranges in the Action Area—Texas Austin ESFO

Species or Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Texas fatmucket	—	5,500 (<1%)	93,100 (1%)	—	—
Texas pimpleback	—	11,000 (<1%)	111,200 (1%)	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-12**, the action area on BLM-administered surface lands does not overlap either of the freshwater mussel species' ranges; therefore, there is no potential for BLM-administered surface lands effects under the BLM proposed action, as described in Section 5.2.2, above.

As summarized in **Table 5-12**, the action area on BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps both species' ranges. In these areas, and where suitable or occupied habitat exists, these species areas could be subject to mineral development effects, as described in Section 5.2.3, above.

As described in the analysis for the freshwater mussels assemblage for multiple state ESFOs in Section 5.3.1, BLM fluid mineral stipulations for riparian-wetland areas and water bodies (Appendix C) would reduce, but not completely eliminate, the potential for adverse effects from water quantity and quality degradation from mineral activities.

As summarized in **Table 5-12**, the action area on BLM-administered mineral estates on other SMA lands overlaps both species' ranges. In these areas, and where suitable or occupied habitat exists, these species areas could be subject to mineral development effects, as described in Section 5.2.3, above. These areas would be subject to further requirements and stipulations imposed by those agencies, which would reduce, but not eliminate, the potential for effects.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** freshwater mussel species at the planning level, including the Texas fatmucket and Texas pimpleback. The rationale is the same as that described in the analysis for the freshwater mussel species assemblage for multiple state ESFOs in Section 5.3.1.

Effects of the BIA Proposed Action

The ranges of the Texas fatmucket and Texas pimpleback do not overlap the action area on BIA-managed surface lands or mineral estate; therefore, this species would not be subject to the effects of management of BIA-managed surface lands described in Section 5.2.4 or mineral estate described in Section 5.2.5.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on the Texas fatmucket or Texas pimpleback.

Species Assemblage: Karst Invertebrates

The analysis for karst invertebrates includes the nine species in the Bexar County Karst Invertebrates Recovery Plan (USFWS 2011f) and the seven species in the Endangered Karst Invertebrates of Travis and Williamson Counties, Texas, Recovery Plan (USFWS 1994). It is unlikely that any of the 16 species considered in this assemblage could be affected by the proposed action; however, the complete distributional ranges of these species are not completely understood, given the inaccessible nature of some of the karst systems in which they likely occur; therefore, no species in this assemblage were dismissed from detailed analysis in this BA.

Effects of the BLM Proposed Action

As summarized in **Table 5-12**, there are no karst zones known to contain listed invertebrates, or with a high probability of containing listed invertebrates, that overlap the action area on BLM-administered surface lands or mineral

estates, not including the mineral estate under surface lands managed by other SMAs; therefore effects from BLM-administered surface lands and mineral estate management, as described in Sections 5.2.2 and 5.2.3, are not expected.

Table 5-13
Karst Zones

Zone and Description	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Areas known to contain listed invertebrate karst species	—	—	16,400 (11%)	—	—
Areas having a high probability of containing suitable habitat for listed invertebrate karst species	—	—	15,000 (8%)	—	—
Areas that probably do not contain listed invertebrate karst species	—	—	26,600 (6%),	—	—
Areas that require further research	—	—	21,000 (3%)	—	—
Areas that do not contain listed invertebrate karst species	—	—	54,300 (18%)	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

As summarized in **Table 5-13** and shown on **Figure D-13**, there are karst zones known to contain listed invertebrates, and with a high probability of containing listed invertebrates, that overlap the action area on BLM-administered mineral estates on other SMA lands. In these areas, and where suitable or occupied habitat exists, these species could be subject to mineral development effects as described in Section 5.2.3, above. These areas would be subject to further requirements and stipulations imposed by other SMAs, which would reduce, but not eliminate, the potential for effects. This would be the case where undetected, yet occupied, karst habitat is affected my mineral management.

Table 5-14
Listed Karst Invertebrate Designated Critical Habitat

Designated Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Rhadine exilis	—	—	89 (4%)	—	—
R. infernalis	—	—	73 (2%)	—	—
Robber Baron Cave meshweaver (*Cicurina baronia*)	—	—	11 (3%),	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

As summarized in **Table 5-14**, designated critical habitat for three listed karst invertebrates overlaps the action area on BLM-administered mineral estates on other SMA lands (see **Figure D-14**). *Rhadine exilis* and *R. infernalis* critical habitat in the action area abuts Department of Defense lands (Camp Bullis). Robber Barron Cave meshweaver critical habitat is partially located in the 1-mile buffer around Department of Defense lands (Ft. Sam Houston). In these areas, the potential effects on the critical habitat PCEs could occur from mineral development effects, as described in Section 5.2.3. As above, these areas would be subject to further requirements and stipulations imposed by other SMAs (see LN-1 in Appendix C). This would reduce, but not eliminate, the potential for effects.

Determination of Effects from the BLM Proposed Action

With the implementation of other SMA stipulations, it is reasonably certain that adverse effects on listed karst invertebrates and their designated critical habitats would be minimal from mineral leasing exploration or development in the action area. Further, subsequent NEPA and ESA review would occur at the program level (for example, at the lease application or sale) or project level (for example, mineral exploration or development activities), or both. This would be the case for programs and activities carried out under the proposed action. During additional review for programs or projects in the range of listed karst invertebrates and their designated critical habitat, the BLM would develop conservation measures, in coordination with the USFWS. Implementing these measures would avoid, minimize, or mitigate potential adverse effects, thereby reducing effects to a **may affect, but not likely to adversely affect,** determination for listed karst invertebrates and their designated critical habitat at the planning level.

Effects of the BIA Proposed Action

The BIA proposed action has no potential to affect listed karst invertebrates or their designated critical habitat. This is because the range of karst invertebrates and designated critical habitat are completely outside of the action area for BIA-managed lands.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on listed karst invertebrates or designated critical habitat for these species.

Species Assemblage: Aquatic Invertebrates

The analysis for the aquatic invertebrates species assemblage includes three aquatic invertebrates that depend on water from the Edwards Aquifer: the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod, and designated critical habitat for these species. These aquatic invertebrates share similar life history and habitat requirements, and, as described in Section 3.8.1, all three share critical habitat.

Planning-level decisions that would primarily affect aquatic invertebrates are those that would influence water quantity and quality. Potential planning level effects would be similar to those described for the aquatic salamanders species assemblage under the jurisdiction of the Texas Austin ESFO, above; therefore, the analysis in this section incorporates the analysis for the aquatic salamanders species assemblage.

The ranges or critical habitats for these species that overlap portions of the action area are summarized below. Percentages given are the proportion of the total range or critical habitat in each portion of the action area.

Table 5-15
Listed Aquatic Invertebrate Species—Texas Austin ESFO

Species Ranges and Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Comal Springs dryopid beetle	—	—	56,400 (7%)	—	—
Comal Springs riffle beetle	—	—	56,400 (7%)	—	—
Peck's cave amphipod	—	—	56,400 (15%)	—	—
Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod designated critical habitat	—	—	—	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-15,** there are no listed invertebrate ranges or critical habitats that overlap the action area on BLM-administered surface lands or BLM-administered mineral estates, not including BLM-administered mineral estate under surface lands managed by other SMAs; therefore any effects from BLM-administered surface lands and mineral estate management described in Sections 5.2.2 and 5.2.3 are not expected.

As described in the aquatic salamander species assemblage analysis, above, the portions of the action area associated with the USACE project Canyon Lake is in the range of the aquatic invertebrates analyzed. Mineral exploration and development in this area could have indirect adverse effects on water quality in habitat, including designated critical habitat, for these species. Mineral exploration and development in this area would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3. This would minimize, but not completely avoid, the potential for effects on these species or designated critical habitat PCEs.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed aquatic invertebrates at the planning level, including the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod, and designated critical habitat for these species. The rationale is the same as that described for the aquatic salamander species assemblage above in this section.

Effects of the BIA Proposed Action

The BIA proposed action has no potential to affect listed aquatic invertebrates or their designated critical habitat. This is because the range of the invertebrates and their designated critical habitat and the Edwards Aquifer are completely outside of the action area for BIA-managed lands.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on listed aquatic invertebrates, including the Comal Springs dryopid beetle, Comal Springs riffle beetle, or Peck's cave amphipod, or designated critical habitat for each of these species.

5.9.2 Plants

Species Assemblage: Plants

The listed plant species under the jurisdiction of the Texas Austin ESFO are Tobusch fishhook cactus, bracted twistflower, Texas snowbells, and Texas wild-rice (including its designated critical habitat). These species fall under the listed plant species assemblage, and the analysis in this section incorporates the analysis for listed plant species under the jurisdiction of multiple state ESFOs (Section 5.3.2). The range of these species or critical habitats that overlaps with portions of the action area is summarized below.

Table 5-16
Listed Plant Species Ranges in the Action Area—Texas Austin ESFO

Species Range and Critical Habitat	BLM Surface	BLM Mineral Estate	BLM Mineral Estate—Other SMA	BIA Surface	BIA Mineral Estate
Tobusch fishhook cactus	—	—	206,200 (2%)	—	—
Bracted twistflower	—	6,500 (<1%)	246,000 (3%)	—	—
Texas snowbells	—	—	203,400 (3%)	—	—
Texas wild-rice	—	—	158,000 (4%)	—	—
Texas wild-rice Designated critical habitat	—	—	—	—	—

Sources: BLM GIS 2015, BIA GIS 2015, USFWS GIS 2019

Effects of the BLM Proposed Action

As summarized in **Table 5-16**, the action area on BLM-administered surface lands does not overlap any of the ranges of listed plant species under the jurisdiction of the Texas Austin ESFO; therefore, none of these species would be subject to effects from BLM-administered surface lands, as described in Section 5.2.2, above.

As summarized in **Table 5-16**, bracted twistflower is the only listed plant with a range that overlaps the action area on BLM-administered split-estate, not including BLM-administered mineral estate under surface lands managed by other SMAs. In these areas and where suitable or occupied habitat is present, this species may be subject to effects from mineral exploration and development, as described in Section 5.2.3. As described in the analysis for the listed plants species assemblage for multiple state ESFOs in Section 5.3.2, the potential for adverse effects would be minimized by incorporating BLM BMPs and SOPs for minerals and energy (Appendix A) and mineral leasing stipulations (Appendix C), including stipulations for special status plant species (LN-1) and ESA consultation (LN-2).

As summarized in **Table 5-16**, there is overlap between the ranges of all listed plant species under the jurisdiction of the Texas Austin ESFO and the action area associated with BLM mineral estate under surface lands managed by other SMAs. In these areas, the other federal SMAs may impose additional restrictions on mineral leasing and development, based on existing land use plans or other guidance, as described in Section 5.2.3, further reducing the potential for adverse effects.

As summarized in **Table 5-16**, there is no overlap between designated critical habitat for Texas wild-rice and the action area on BLM-administered surface estate, BLM-administered split-estate, or mineral estate under surface lands managed by other SMAs; therefore, there would be no direct effects from BLM-administered surface land management, as described in Section 5.2.2 or direct effects from mineral exploration and development, as described in Section 5.2.3, above.

Groundwater extraction for mineral development on portions of the action area associated with other SMAs, primarily the USACE-managed Canyon Lake, could indirectly affect designated critical habitat for Texas wild-rice. As described in Section 3.8.2, Texas wild-rice critical habitat depends on flows in the San Marcos River, which in turn originate from Edwards Aquifer discharges. Critical habitat has been adversely affected in the past by reduced river flows resulting from increased groundwater extraction in the aquifer.

Mineral activities would be subject to further requirements and stipulations imposed by the surface management agencies to protect and conserve listed species, as described in Section 5.2.3. Nonetheless, it is unlikely that measures

would completely avoid the potential for adverse indirect effects. This is because this area is in the Edwards Aquifer contributing zones (TCEQ 2019). Indirect adverse effects would not be discountable.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** listed plant species at the planning level, including Tobusch fishhook cactus, bracted twistflower, Texas snowbells, and Texas wild-rice (and its designated critical habitat). The rationale is the same as that described for the listed plant species assemblage under multiple state ESFOs in Section 5.3.2.

Effects of the BIA Proposed Action

As summarized in **Table 5-16**, the action area on BIA-managed surface lands does not overlap any of the ranges of listed plant species under the jurisdiction of the Texas Austin ESFO; therefore, none of these species would be subject to effects from BIA-managed surface lands, as described in Section 5.2.4, above.

As summarized in **Table 5-16**, the action area on BIA-managed mineral estate does not overlap any of the ranges of listed plant species under the jurisdiction of the Texas Austin ESFO; therefore, none of species would be subject to effects from BIA-managed mineral estate development, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

The BIA proposed action would have **no effect** on Tobusch fishhook cactus, bracted twistflower, Texas snowbells, and Texas wild-rice, because none of these species' ranges are present in the action area. The BIA proposed action would have **no effect** on designated critical habitat for Texas wild-rice, because there is no action area on BIA-managed surface or mineral estates on the Edwards Aquifer.

5.10 EFFECTS: SPECIAL STATUS SPECIES

5.10.1 Peppered Chub

The peppered chub is part of the pelagic, broadcast-spawning species assemblage. The analysis in this section incorporates that for the pelagic, broadcast-spawning species assemblage under the jurisdiction of multiple state ESFOs (Section 5.3.1).

Effects of the BLM Proposed Action

BLM-administered surface lands overlap the 199,200 acres (less than 1 percent) of the peppered chub's range. Under the BLM proposed action, the peppered chub and its habitat could be subject to BLM-administered surface land effects, as described in

5.2.2, above.

The action area on BLM-administered mineral estate, not including BLM-administered mineral estate under surface lands managed by other SMAs, overlaps approximately 2,973,900 acres (4 percent) of the peppered chub's range. These areas could be subject to mineral development effects, as described in Section 5.2.3, above.

BLM fluid mineral stipulations for riparian–wetland areas and water bodies (Appendix C) are described under the analysis for the pelagic, broadcast-spawning species assemblage under the jurisdiction of the multiple state ESFOs (Section 5.3.1). These stipulations would reduce the potential for adverse effects on the peppered chub; however, adverse effects could still occur, as described in Section 5.3.1.

The action area on BLM-administered mineral estates on other federal SMA lands overlaps approximately 1,421,700 acres (2 percent) of the peppered chub's range. These areas would be subject to further requirements and stipulations imposed by those agencies.

Determination of Effects from the BLM Proposed Action

The BLM proposed action **may affect, but is not likely to adversely affect,** the peppered chub at the planning level. The rationale is the same as for the pelagic broadcast-spawning species assemblage described in Section 5.3.1.

Effects of the BIA Proposed Action

The action area on BIA-managed surface lands overlaps approximately 4,948,300 acres (6 percent) of the peppered chub's range; these areas could be subject to BIA-managed surface lands effects, as described in Section 5.2.4, above.

The action area on BIA-managed mineral estates overlaps approximately 3,578,400 acres (5 percent) of the peppered chub's range; these areas could be subject to mineral development effects, as described in Section 5.2.5, above.

Determination of Effects from the BIA Proposed Action

The BIA proposed action **may affect, but is not likely to adversely affect,** the peppered chub at the planning level. The rationale is the same as for the pelagic broadcast-spawning species assemblage described in Section 5.3.1.

5.10.2 Other Special Status Wildlife and Plant Species

Special status wildlife and plant species on the USFWS National Listing Workplan (USFWS 2016a) that occur in the action area may be subject to the nature and type of effects described in Section 5.2, Effects Common to All Listed Species and Critical Habitats. Depending on the distribution and range of the species in the action area, effects could occur from BLM-administered or BIA-managed surface land management, from BLM-administered or BIA-

managed mineral estate management, or from management of BLM-administered mineral estates in areas managed by other SMAs.

Similar to listed and proposed species, the BLM and BIA would minimize or avoid adverse effects on these species by implementing BLM BMPs and SOPs (Appendix A), BIA BMPs (Appendix B), and BLM mineral leasing stipulations (Appendix C). In areas managed by other SMAs with BLM-administered mineral estate, mineral activities would be subject to additional stipulations or restrictions imposed by the other SMAs, including those to protect special status species and suitable or occupied habitat for these species.

5.11 CUMULATIVE EFFECTS

Cumulative effects include those of future state, tribal, local, or private actions that are reasonably certain to occur in the action area. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under Section 7 of the ESA.

Given the programmatic nature of this BA, it is outside the scope of the analysis to identify specific non-federal actions that might result in cumulative impacts on listed and proposed wildlife and plant species, when considered together with the proposed action. This type of site-specific analysis would be done at the local level, using information about individual project or authorized use location, as well as information about non-federal activities reasonably certain to occur in the action area.

When considered in combination with the effects of BLM and BIA actions described above, cumulative effects on listed and proposed wildlife and plant species may result from the following actions:

- Energy and minerals development
- Lands and ROW development
- Renewable energy projects
- Agriculture and vegetation management
- Livestock grazing, recreation
- Wildlife and special status species management

Cumulative effects may also result from natural processes, such as noxious weed and invasive plant spread, wildfire management, and climate change and drought.

The potential for adverse cumulative effects on listed and proposed wildlife and plant species would be minimized or avoided by incorporating BLM BMPs and SOPs (Appendix A), BIA BMPs, (Appendix B), and BLM mineral leasing stipulations (Appendix C).

Chapter 6.
Evaluated Species Determinations

Effect determinations for the listed species and proposed or designated critical habitats analyzed in this BA are summarized in the following tables. The rationale for the determinations is given in Section 5, Evaluated Species and Critical Habitat Effects.

6.1 Species Under the Jurisdiction of Multiple State ESFOs

6.1.1 Wildlife

Table 6-1
Wildlife Species and Critical Habitat Effect Determinations—Multiple State ESFOs

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Birds	Red knot *Calidris canutus rufa*	T	NLAA	NLAA
	Piping plover *Charadrius melodus*	T	NLAA	NLAA
	Piping plover Designated critical habitat	—	NLAA	NE
	Whooping crane *Grus americana*	E	NLAA	NLAA
	Whooping crane Designated critical habitat	—	NLAA	NE
	Red-cockaded woodpecker *Picoides borealis*	E	NLAA	NLAA
	Least tern *Sterna antillarum*	E	NLAA	NLAA
Fishes	Arkansas River shiner *Notropis. girardi*	T	NLAA	NLAA
	Arkansas River shiner designated critical habitat	—	NLAA	NLAA

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
	Neosho madtom *Noturus placidus*	T	NLAA	NLAA
	Pallid sturgeon *Scaphirhynchus albus*	E	NLAA	NLAA
Mollusks	Neosho mucket *Lampsilis rafinesqueana*	E	NLAA	NLAA
	Neosho mucket designated critical habitat	—	NLAA	NLAA
	Rabbits-foot mussel *Quadrula cylindrica*	T	NLAA	NLAA
	Rabbits-foot mussel designated critical habitat	—	NLAA	NLAA
Insects	American burying beetle *Nicrophorus americanus*	E	NLAA	NLAA
Mammals	Gray bat *Myotis grisescens*	E	NE[3]/NLAA	NLAA
	Northern long-eared Bat *M. septentrionalis*	T	NLAA	NLAA

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened
[2]NE—No effect, NLAA—May affect, not likely to adversely affect
[3]This determination applies to actions on BLM-administered surface only.

6.1.2 Plants

Table 6-2
Plant Species Effect Determinations—Multiple State ESFOs

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Western prairie-fringed orchid *Platanthera praeclara*	T	NLAA	NLAA

[1]Status Code: T—Federal-listed threatened
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.2 SPECIES UNDER THE JURISDICTION OF THE OKLAHOMA ESFO

6.2.1 Wildlife

Table 6-3
Wildlife Species and Critical Habitat Effect Determinations—Oklahoma ESFO

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Fishes	Ozark cavefish *Amblyopsis rosae*	T	NLAA	NLAA
	Leopard darter *Percina pantherina*	T	NLAA	NLAA
	Leopard darter designated critical habitat	—	NLAA	NLAA
Mollusks	Ouachita rock pocketbook *Arkansia wheeleri*	E	NLAA	NLAA
	Scaleshell *Leptodea leptodon*	E	NLAA	NLAA
	Winged mapleleaf *Quadrula fragosa*	E	NLAA	NLAA
Insects	Rattlesnake master-borer moth *Papaipema eryngii*	C	NLAA	NLAA
Mammals	Ozark big-eared bat *Corynorhinus townsendii ingens*	E	NE[3]/NLAA	NLAA
	Ozark big-eared bat proposed critical habitat	—	NE	NE
	Indiana bat *Myotis sodalis*	E	NE[3]/NLAA	NLAA
	Indiana bat designated critical habitat	—	NE	NE
Reptiles	American alligator *Alligator mississippiensis*	T	NE	NE

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened, C—Candidate for federal listing
[2]NE—No effect, NLAA—May affect, not likely to adversely affect
[3]This determination applies to actions on BLM-administered surface only.

6.2.2 Plants

Table 6-4
Plant Species Effect Determinations—Oklahoma ESFOs

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Harperella *Ptillium nodosum*	E	NLAA	NLAA

[1]Status Code: E—Federal-listed endangered
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.3 SPECIES UNDER THE JURISDICTION OF THE KANSAS ESFO

6.3.1 Wildlife

Table 6-5
Wildlife Species and Critical Habitat Effect Determinations—Kansas ESFO

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Fishes	Topeka shiner *Notropis topeka*	E	NLAA	NLAA
	Topeka shiner designated critical habitat	—	NE	NE
Mollusks	Spectaclecase mussel *Cumberlandia monodonta*	E	NE	NE

[1]Status Code: E—Federal-listed Endangered
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.3.2 Plants

Table 6-6
Plant Species Effect Determinations—Kansas ESFO

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Mead's milkweed *Asclepias meadii*	T	NLAA	NLAA

[1]Status Code: T—Federal-listed threatened
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.4 SPECIES UNDER THE JURISDICTION OF MULTIPLE TEXAS ESFOS

6.4.1 Wildlife

Table 6-7
Wildlife Species and Critical Habitat Effect Determinations—Multiple Texas ESFOs

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Birds	Golden-cheeked warbler *Dendroica chrysoparia*	E	NLAA	NE
	Northern aplomado falcon *Falco femoralis septentrionalis*	E	NLAA	NE
Fishes	Smalleye shiner *Notropis buccula*	E	NE	NE
	Smalleye shiner designated critical habitat	—	NE	NE
	Sharpnose shiner *N. oxyrhynchus*	E	NE	NE
	Sharpnose shiner designated critical habitat	—	NE	NE
Mollusks	Golden orb *Quadrula aurea*	C	NLAA	NE
	Smooth pimpleback *Q. houstonensis*	C	NLAA	NE
	Texas fawnsfoot *Truncilla macrodon*	C	NLAA	NE

[1]Status Codes: E—Federal-listed endangered, C—Candidate for federal listing
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.4.2 Plants

Table 6-8
Plant Species and Critical Habitat Effect Determinations—Multiple Texas ESFOs

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Neches River rose-mallow *Hibiscus dasycalyx*	T	NLAA	NE
Neches River rose-mallow designated critical habitat	—	NE	NE
Navasota ladies'-tresses *S. parksii*	E	NLAA	NE

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.5 SPECIES UNDER THE JURISDICTION OF THE TEXAS COASTAL ESFO

6.5.1 Wildlife

Table 6-9
Wildlife Species and Critical Habitat Effects Determinations—Texas Coastal ESFO

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Birds	Attwater's greater prairie chicken *Tympanuchus cupido attwateri*	E	NLAA	NE
Mammals	Jaguarundi *Herpailurus yaguarondi*	E	NE	NE
	Ocelot *Leopardus pardalis*	E	NLAA	NLAA
	West Indian manatee *Trichechus manatus*	T	NE	NE
	West Indian manatee designated critical habitat	—	NE	NE
Reptiles	Loggerhead sea turtle *Caretta caretta* (Northwestern Atlantic Ocean DPS)	T	NE	NE
	Loggerhead sea turtle Designated critical habitat	—	NE	NE

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Green sea turtle *Chelonia mydas* (North Atlantic DPS)	T	NE	NE
Leatherback sea turtle *Dermochelys coriacea*	E	NE	NE
Leatherback sea turtle designated critical habitat	—	NE	NE
Hawksbill sea turtle *Eretmochelys imbricata*	E	NE	NE
Hawksbill sea turtle designated critical habitat	—	NE	NE
Kemp's ridley sea turtle *Lepidochelys kempii*	E	NE	NE
Kemp's ridley sea turtle proposed critical habitat	—	NE	NE
Louisiana pine snake *Pituophis ruthveni*	T	NLAA	NE

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.5.2 Plants

Table 6-10
Plant Species and Critical Habitat Effects Determinations—Texas Coastal ESFO

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
South Texas ambrosia *Ambrosia cheiranthifolia*	E	NLAA	NE
Star cactus *Astrophytum asterias*	E	NLAA	NE
Texas ayenia *Ayenia limitaris*	E	NLAA	NE
Black lace cactus *E. reichenbachii* ssp. *fitchii (E. r.* var. *albertii)*	E	NE	NE
Slender rush-pea *Hoffmannseggia tenella*	E	NLAA	NE
Texas prairie dawn *Hymenoxys texana*	E	NLAA	NE
Texas golden gladecress *Leavenworthia texana*	E	NLAA	NE

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Texas golden gladecress designated critical habitat	—	NLAA	NE
Walker's manioc *Manihot walkerae*	E	NLAA	NE
Texas trailing phlox *Phlox nivalis* ssp. *texensis*	E	NE	NE
White bladderpod *Physaria pallida (Lesquerella p.)*	E	NE	NE
Zapata bladderpod *P. thamnophila (Lesquerella t.)*	E	NE	NE
Zapata bladderpod designated critical habitat	—	NE	NE
Ashy dogweed *Thymophylla tephroleuca*	E	NE	NE

[1]Status Code: E—Federal-listed endangered
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.6 SPECIES UNDER THE JURISDICTION OF THE TEXAS ARLINGTON ESFO

6.6.1 Wildlife

There are no wildlife species solely under the jurisdiction of the USFWS Texas Arlington ESFO. See Section 6.4, Species Under the Jurisdiction of Multiple Texas ESFOs, for effect determinations.

6.6.2 Plants

Table 6-11
Plant Species and Critical Habitat Effect Determinations—Arlington ESFO

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Sneed Pincushion Cactus *Coryphantha sneedii* var. *sneedii*	E	NLAA	NE
Earth-fruit *Geocarpon minimum*	T	NLAA	NE

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.7 SPECIES UNDER THE JURISDICTION OF THE TEXAS AUSTIN ESFO

6.7.1 Wildlife

Table 6-12
Wildlife Species and Critical Habitat Effect Determinations—Texas Austin ESFO

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Amphibians	Houston toad *Anaxyrus houstonensis*	E	NLAA	NE
	Houston toad designated critical habitat	—	NLAA	NE
	Salado salamander *Eurycea chisholmensis*	T	NLAA	NE
	Salado salamander proposed critical habitat	—	NLAM	NE
	San Marcos salamander *E. nana*	T	NLAA	NE
	San Marcos salamander designated critical habitat	—	NLAA	NE
	Georgetown salamander *E. naufragia*	T	NLAA	NE
	Georgetown Salamander proposed critical habitat	—	NLAM	NE
	Barton Springs salamander *E. sosorum*	E	NLAA	NE
	Jollyville Plateau salamander *E. tonkawae*	T	NLAA	NE
	Jollyville Plateau salamander designated critical habitat	—	NLAA	NE
	Austin blind salamander *E. waterlooensis*	E	NLAA	NE

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
	Austin blind salamander designated critical habitat	—	NLAA	NE
	Texas blind salamander *Typhlomolge rathbuni*	E	NLAA	NE
Birds	Western yellow-billed cuckoo *Coccyzus americanus occidentails*	T	NLAA	NE
	Western yellow-billed cuckoo proposed critical habitat	—	NLAM	NE
	Southwestern willow flycatcher *Empidonax traillii extimus*	E	NLAA	NE
	Southwestern willow flycatcher designated critical habitat	—	NLAA	NE
	Mexican spotted owl *Strix occidentalis lucida*	T	NE	NE
	Mexican spotted owl designated critical habitat	—	NE	NE
Fishes	Devils River minnow *Dionda diaboli*	T	NE	NE
	Devils River minnow designated critical habitat	—	NE	NE
	Fountain darter *E. fonticola*	E	NLAA	NE
	Fountain darter designated critical habitat	—	NLAA	NE
	Rio Grande silvery minnow *Hybognathus amarus*	E	NE	NE
	Mexican Blindcat (catfish) *Prietella phreatophila*	E	NLAA	NE

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Mollusks	Texas fatmucket *Lampsilis bracteata*	C	NLAA	NE
	Texas hornshell *Popenaias popeii*	C	NE	NE
	Texas pimpleback *Quadrula petrina*	C	NLAA	NE
Insects	Coffin Cave mold beetle *Batrisodes texanus*	E	NLAA	NE
	Helotes mold beetle *B. venyivi*	E	NLAA	NE
	Helotes mold beetle designated critical habitat	—	NE	NE
	Comal Springs riffle beetle *Heterelmis comalensis*	E	NLAA	NE
	Comal Springs riffle beetle designated critical habitat	—	NLAA	NE
	A ground beetle *Rhadine exilis*	E	NLAA	NE
	R. exilis designated critical habitat	—	NE	NE
	A ground beetle *R. infernalis*	E	NLAA	NE
	R. infernalis designated critical habitat	—	NE	NE
	Tooth Cave ground beetle *R. persephone*	E	NLAA	NE
	Comal Springs dryopid beetle *Strygoparhus comalensis*	E	NLAA	NE
	Comal Springs dryopid beetle designated critical habitat	—	NLAA	NE
	Kretschmarr Cave mold beetle *Texamaurops reddelli*	E	NLAA	NE

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Arachnids	Robber baron cave meshweaver *Cicurina baronia*	E	NLAA	NE
	Robber baron cave meshweaver designated critical habitat	—	NE	NE
	Madla Cave meshweaver *C. madla*	E	NLAA	NE
	Madla Cave meshweaver designated critical habitat	—	NE	NE
	Bracken bat cave meshweaver *C. venii*	E	NLAA	NE
	Bracken bat cave meshweaver designated critical habitat	—	NE	NE
	Government Canyon bat cave meshweaver *C. vespera*	E	NLAA	NE
	Government Canyon bat cave meshweaver designated critical habitat	—	NE	NE
	Government Canyon Bat Cave spider *Neoleptoneta microps*	E	NLAA	NE
	Government Canyon Bat Cave spider designated critical habitat	—	NE	NE
	Tooth Cave Spider *Neoleptoneta myopica*	E	NLAA	NE
	Tooth Cave pseudoscorpion *Tartarocreagris texana*	E	NLAA	NE
	Cokendolpher Cave harvestman *Texella cokendolpheri*	E	NLAA	NE
	Cokendolpher Cave harvestman designated critical habitat	—	NE	NE

	Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
	Bone Cave harvestman *T. reyesi*	E	NLAA	NE
	Bee Creek Cave harvestman *T. reddelli*	E	NLAA	NE
Crustaceans	Peck's Cave amphipod *Stygobromus pecki*	E	NLAA	NE
	Peck's Cave amphipod designated critical habitat	—	NLAA	NE

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened, C—Candidate for federal listing
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

6.7.2 Plants

Table 6-13
Plant Species and Critical Habitat Effect Determinations—Austin ESFO

Common and Scientific Name	Status[1]	Determination—BLM Proposed Plan[2]	Determination—BIA Proposed Plan[2]
Tobusch fishhook cactus *Sclerocactus brevihamatus* ssp. *tobuschii (Ancistrocactus t.)*	T	NLAA	NE
Bracted twistflower *Streptanthus bracteatus*	C	NLAA	NE
Texas snowbells *Styrax platanifolius* spp. *texanus (S. t.)*	E	NLAA	NE
Texas wild-rice *Zizania texana*	E	NLAA	NE
Texas wild-rice designated critical habitat	—	NLAA	NE

[1]Status Codes: E—Federal-listed endangered, T—Federal-listed threatened, C—Candidate for federal listing
[2]NE—No effect, NLAA—May affect, not likely to adversely affect

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Appendix A
BLM BMPs and SOPs

TABLE OF CONTENTS

Chapter Page

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APPENDIX A
BLM BMPS AND SOPS

The best management practices and standard operating procedures listed in this appendix are not universally applicable and do not encompass all those that are currently required or available.

INTRODUCTION

Land managers often apply best management practices (BMPs) to a practice that has been specifically developed to mitigate impacts.[1] Land managers use standard operating procedures (SOPs) where broader national or statewide guidance is insufficient to be applied at the district level.[2]

The following guidelines, techniques, and practices (collectively referred to as management guidelines) are a general summary of the BLM BMPs and SOPs. These were compiled from a variety of sources, listed under Sources and General References at the end of this appendix.

These guidelines are by no means a comprehensive list. When used in conjunction with other management plans applicable to public land resources and resource uses, the guidelines help land managers to achieve desired outcomes or conditions, as outlined in the Oklahoma, Kansas, and Texas RMP (OKT RMP), to reduce adverse environmental effects. Any number of these guidelines can be applied or altered as necessary to make progress toward or to achieve the desired outcome or condition.

[1] Best management practices: A suite of techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a land use plan decision unless the land use plan specifies that they are mandatory. They may be updated or modified without a plan amendment if they are not mandatory (BLM Handbook H1601-1; Glossary).
[2] Standard operating procedure: A written procedure, or set of written procedures, providing direction for consistently and correctly performing routine operations. These written procedures set forth methods expected to be followed during the performance of the particular task. The SOPs are approved by the land use manager and are adopted as policy for the Oklahoma Field Office.

The overall vision embraces the use of these guidelines to reduce or minimize impacts on the environment. However, they are not to be considered a land use plan decision unless specifically designated and identified as being a mandatory action in the OKT RMP. Only changes in specific and identified mandatory actions would require an amendment to the RMP.

The management guidelines that follow are identified by resource. Since a number of these management guidelines can be applied to a variety of situations, there may be a duplication or similarity of and between these guidelines. Furthermore, these management guidelines, techniques, and practices may be identified for specific situations or actions (e.g., wind energy rights-of-way, livestock grazing, forestry, or road construction); nevertheless, they are not exclusive to those actions unless otherwise specified.

RESOURCES

Air Quality

Air quality standards are governed by the Clean Air Act of 1990, as amended (42 USC 85). The Environmental Protection Agency is charged with setting National Ambient Air Quality Standards (EPA 2016b).

Standard Operating Procedures

SOPs minimize or reduce adverse impacts on air quality from BLM or BLM-authorized activities by implementing mitigation measures on a case-by-case basis.

Soil Resources

The BLM incorporates appropriate BMPs into Applications for Permit to Drill and associated on- and off-lease rights-of-way approvals. BMPs relevant to soils may reduce the amount of vegetation lost to development or speed the regrowth of vegetation.

BLM may require "Interim Reclamation" to restore vegetation and soil resources while a well continues to produce energy. With interim reclamation, all areas not needed for the production of oil and gas are reclaimed, that is, reshaped, covered with topsoil, and reseeded with native plants. When the well no longer produces oil and gas, final reclamation begins. The well is sealed (plugged) with cement to protect freshwater aquifers. The entire well location and access road are reshaped as closely as possible to the original contour, covered with topsoil, and reseeded (BLM 2013).

Best Management Practices

- Effective erosion control measures will be installed and maintained at the base of all side slopes. Pad erosion will be controlled utilizing Hay bales, silt fencing (screening), earthen berms and hydro-mulching/seeding.

- Restoration plans are developed to identify reclamation, soil stabilization, and erosion reduction measures to ensure impacted areas are restored properly.
- During reclamation, redistribute and seed the topsoil on the disturbed areas, and protect and maintain reclaimed areas until the sites are fully stabilized.
- Use existing routes when possible. Avoid excessive grades on roads, road embankments, ditches, and drainages, especially in areas with erodible soils and use special construction techniques, where applicable. Re-contour and re-vegetate abandoned roads and roads that are no longer needed.
- Identify unstable slopes and local factors that can induce slope instability (such as groundwater conditions, precipitation, earthquake activities, and slope angles). Avoid creating excessive slopes.
- Retain stabilizing vegetation on unstable soils and avoid new roads or heavy equipment use on unstable or highly erodible soils.

Water Resources

Water quality standards are governed by States of Oklahoma, Kansas, and Texas BMPs; however, during times of drought or flooding, certain lands may be temporarily closed to certain uses that may impact water sources or be impacted by flooding waters.

Vegetation–Forestry and Woodland Products

Guidelines for Forestry

Standard Operating Procedures

No fuel wood cutting of live trees will be allowed for cottonwood, willow, alder, limber pine, white bark pine, and curl leaf mahogany, unless resource objectives allow otherwise.

Best Management Practices

- Avoid heavy equipment use in stands of cottonwood, willow, alder, limber pine, white bark pine, and curl leaf mahogany. If heavy equipment use is necessary, allow on a case-by-case basis and mitigate for adverse impacts.
- Do not allow dead and down collection of cottonwood, willow, alder, limber pine, white bark pine, and curl leaf mahogany for personal use, unless resource objectives allow otherwise.
- Where possible, avoid conducting work in an area with Sudden Oak Death disease, or conduct operations during dry season. Equipment

should be routed away from infected plants and trees, and equipment and staging areas should be located away from host plants and trees. Equipment and vehicles should be inspected by operations personnel each time they leave the site, and plant debris should be removed from equipment and vehicles prior to departure. Shoes and boots should also be cleaned of soil and organic debris after working in an infested area and before traveling to an uninfested area.

Guidelines for Firewood Harvesting

- Vehicle use is restricted to existing roads and trails. Do not drive off road.
- Do not damage adjacent trees.
- When cutting down standing trees, cut the stump to 12 inches or less or as close to the ground as possible.
- Scatter lopped branches at least 50 feet from the stump.
- Do not cut trees that have been posted as "SEED TREE DO NOT FALL" or "WILDLIFE TREE DO NOT DISTURB"
- Do not harvest any trees within 330 feet of a spring or creek unless trees are identified for selective removal to meet resource objectives.
- Please pack out your trash as well as trash left by others.

Vegetation–Weeds

Standard Operating Procedures

- Implement BMPs and SOPs in the records of decisions for the BLM Final Programmatic EIS for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States and Programmatic EIS for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States.
- Adopt the following stipulations on BLM and BLM-authorized projects (e.g., rights-of-ways and Applications for Permit to Drill):
  - Identify sites where equipment can be cleaned. Clean equipment before entering BLM-administered lands. Locate and manage vehicle and equipment wash stations to limit weed and invasive species spread into native plant communities.
  - Clean vehicles and equipment (remove soil and plant parts) before entering or leaving a project area. Check body and undercarriage of off-road vehicles and other equipment for

plant material and clean before leaving weed-infested areas. Use standard contract provisions to ensure that contractors adhere to this guideline.

  - Inspect and treat weeds that establish at equipment cleaning sites while keeping main travel corridors free of noxious or invasive weeds to prevent spread and avoid or minimize all types of travel through weed-infested areas. If travel is necessary, restrict such activity to those periods when the spread of seed or propagules is least likely.
  - Schedule and coordinate roadside maintenance in consultation with weed specialists.
  - Inspect and document inspections on travel ways for weeds and treat as necessary.
  - Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way and other areas of disturbed soils.
  - Minimize roadside sources of weed seed that could be transported to other areas.
  - Avoid all types of travel through weed-infested areas.
  - Conduct a survey to locate noxious and invasive weeds before the project begins.
  - Design projects to avoid infestations, to the extent practicable.
  - Monitor and treat weeds during long-term projects to prevent their establishment and spread.
  - After the project, reestablish vegetation (weed-resistant vegetation, where needed), monitor and treat weeds for 3 years, and revegetate as needed to ensure revegetation success and prevent weed reinvasion.

- Ensure that weed prevention is considered in project activities regardless of discipline.
- Locate project staging areas for refueling, maintenance equipment, materials, and operating supplies in weed-free areas.
- Remove mud, dirt, and plant parts from project equipment before moving it into a project area.
- Monitor sites for weeds after soil-disturbing activities and treat as needed.

The BLM will identify on the project area map units that are infested with specific noxious weeds species of concern.

- When determined to be necessary, develop site-specific plans for noxious weed and exotic plant prevention and control. Such plans will be subject to BLM approval. On approval, the noxious weed and exotic plant prevention and control plan will become a part of the authorization of the proposed project, and its provisions will be enforceable under the terms of the authorization.
- Be responsible for preventing and controlling noxious weeds and exotic plants of concern on the project area. Also be responsible for preventing and controlling noxious weed and exotic plant infestations not in the project area but that are determined by the BLM to have originated in the project area.
- Clean off-road equipment before moving them from project areas known to be infested with noxious weeds to other project areas that are free of such weeds.
- Mitigate and reduce weed spread during prescribed fire activities; includes inventorying weeds before burning. Treat high risk areas before burning; pre- and post-treat high risk weed infestations.
- Reestablish vegetation on all disturbed soil from construction, reconstruction, and maintenance activities.
- Use certified weed-free or weed-seed-free hay or straw where certified materials are required or are reasonably available.
- Buy only weed-free seed and conduct required seed testing before use.
- Use weed-free straw or mulch during revegetation.
- Inspect gravel pits and fill sources to identify weed-free sources. Inspect and treat sand, gravel, and fill material to prevent unwanted spread of noxious weeds and nonnative species.
- Inspect material sources onsite, and ensure that they are weed free before use and transport. Treat weed-infested sources for eradication, and strip and stockpile contaminated material before any use of pit material.
- Track weeds that may affect known populations of BLM-sensitive plants. Work with weed coordinator and take potential control measures if necessary.
- Retain bonds until reclamation requirements are completed, including weed treatments, based on inspection and documentation.

Best Management Practices

Executive Order 13112 enhances and orders coordination of federal activities to control and minimize the economic, ecological, and human health impacts caused by invasive species. The executive order also established a National Invasive Species Council to oversee a management plan detailing the goals and objectives of the involved federal agencies.

The Federal Plant Protection Act of 2000 (Title IV of Publ. 106-224) prohibits introducing any animal, plant, or material that is considered harmful to this country's agriculture. The US Department of Agriculture (USDA), Plant Protection and Quarantine Division, is the enforcement authority for this act.

- As required by BLM policy (BLM Manual 9011, Chemical Pest Control), submit to NSO for approval and reporting requirements pesticide use proposals, pesticide application records, biological control agent release proposals, biological control agent release records, pesticide use reports, and integrated weed management reports.
- Keep main travel corridors free of noxious weeds to prevent spread and avoid or minimize all types of travel through weed-infested areas. If travel is necessary, restrict it to periods when the spread of seed or propagules is least likely.
- Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way and other areas of disturbed soils.
- Minimize roadside sources of weed seed that could be transported to other areas.
- Avoid all types of travel through weed-infested areas.
- Determine prevention and maintenance needs and measures to be included at the onset of the project and operation and reclamation plans at all phases, including project layout, design, alternatives evaluation, and project decision.
- Incorporate into planning documents such actions as project inspection, documentation, and weed prevention, including the use of herbicides, if needed.
- Using environmental analysis for projects and maintenance programs, assess weed risks, analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices.

- Consider seasonal impacts of management actions, such as growing vs. dormant season disturbance effects, when developing objectives and strategies.
- Begin project operations in areas without nonnative or noxious weed species.
- Before ground-disturbing activities begin, complete identification and inventories of noxious weeds and other invasive species in and next to project areas, as well as along access routes and potential invasion vicinity. High-risk noxious weed infestations should be avoided when possible.
- Treat or have weeds treated on projects used by contractors before activities begin.
- Coordinate project activities with any nearby herbicide application to maximize cost effectiveness of weed treatments.
- Determine need for and, when appropriate, identify sites where equipment can be cleaned.
- If operation occurs within an infested area, require workers to inspect, remove, clean, and properly dispose of weed seed and plant parts found on clothing and equipment before leaving projected site.
- Inspect and document annually, for at least three years after project completion, the area where material from treated weed-infested sources is used to ensure that any weeds transported to the site are promptly detected and controlled.
- Avoid or minimize all types of travel through weed-infested areas, or restrict travel to those periods when spread of seed or propagules is least likely.
- Minimize soil disturbance to the extent practical, consistent with project objectives.
- Retain native vegetation in and around project activity and keep soil disturbance to a minimum, consistent with project objectives.
- Where project disturbance creates bare ground, consistent with project objectives, reestablish vegetation to prevent conditions where weeds could become established.
- Use caution when transporting vegetation and wood products from project sites to minimize the spread of invasive and nonnative pests.
- Unless the entire project area is already infested with specific noxious weed species of concern, require operators to ensure that, before moving on to the project site, all off-road equipment is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. This would apply to equipment last operated in areas

known by the BLM to be infested with specific noxious weeds of concern,

- Use whatever cleaning methods are necessary to ensure that off-road equipment is free of noxious weeds.
- Ensure revegetation is effective.
- Schedule management activities, such as range management and grazing, when they may be most detrimental to populations of noxious weeds and nonnative species without harming preferred species.
- Use domestic animals to contain the target species in the treatment areas before weed seeds set.
- Avoid creating soil conditions that promote weed germination and establishment.
- Minimize soil disturbance that may encourage establishment of nonnative plants or noxious weed species.
- Use sterile or unpersistent exotic plants at low planting densities as nurse crops for local natives, so as to preclude the migration of noxious weeds into adjacent natural areas.
- Design vegetation treatments that create small-scale openings in order to minimize the footprint of disturbance that can contribute to noxious weed establishment and spread.
- Stockpile uninfested material in a weed-free condition.
- Prevent the introduction and spread of weeds caused by moving infested sand, gravel, borrow, and fill material.
- Dispose of noxious weeds and nonnative vegetation properly to prevent unwanted spread.
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.
- Require the contracting officer's representative to ensure that rental equipment is free of weed seed and propagules before accepting it.
- Avoid acquiring water for dust abatement where access to the water is through weed-infested sites.
- Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for that specific site. Define for each project what constitutes disturbed soil and the objectives for plant cover revegetation.

- Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching.
- Use native material where appropriate and feasible.
- Use local seeding guidelines to determine detailed procedures and appropriate mixes. To avoid weed contamination, have a certified seed laboratory test each lot against the all-state noxious weed list and provide documentation of the seed inspection test.
- Inspect and document all limited term ground-disturbing operations in noxious weed-infested areas for at least three growing seasons following completion of the project.
- Provide information, training, and appropriate weed identification materials to people potentially involved in weed introduction, establishment, and spread on BLM-administered lands, including agency managers, employees, permit holders, and recreational visitors.
- Use such items as wattles, straw bales, dams, seed, and straw mulch for site rehabilitation, and inspect and certify that they are free of weed seeds and propagules.
- To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible, using either natural recovery or artificial techniques as appropriate to the site objectives.
- When revegetating areas, reestablish native vegetation on sites if natural regeneration is unlikely. Use native vegetation that is genetically adapted (from the same seed zone and of similar elevation) to the area treated.
- Mitigate and limit impacts on habitats with existing and healthy native plant populations. Retain native vegetation in and around project areas to the maximum extent, consistent with project objectives.
- Where possible, provide interim revegetation in areas being actively disturbed.

Also, vehicles and equipment exposed to contamination and requiring less than a complete, detailed cleaning are those that are only minimally exposed to the natural environment because of their operational requirements.

Vegetation Treatments

Vegetation treatments are governed by BLM Handbook 9000.

Chemical and Biological Control

Standard Operating Procedures and Best Management Practices—Wildlife Damage Management Activities

- Before using biological controls, ensure that they are tested on a variety of species, including taxonomically close relatives. Disclose impacts from use of biological controls and develop appropriate mitigation measures to reduce adverse effects.
- Follow all EPA use restrictions and requirements for toxicants on public lands. Notify the BLM before using any toxicants and provide a map of the treatment area. Provide and maintain adequate signs to notify the public of the presence of toxicants.

Animal and Plant Health Inspection Service-Wildlife Services (APHIS-WS) will notify the BLM before any damage control is implemented on BLM-administered lands within 1 mile of any community, major mine, developed recreation site, or any residence, within the restricted area(s), and exceptions would be approved on a case-by-case basis. No M-44s or other toxicants that are not species specific are to be used within seven miles of these areas, in accordance with EPA label use restrictions. Toxicants and M-44 cyanide devices are not allowed in wilderness areas.

Vegetation–Rangeland

Guidance may come from various sources. See individual resources.

Vegetation–Riparian Habitat and Wetlands

Best Management Practices

- Minimize crossing streams (intermittent and perennial) and wetlands with vehicles and heavy machinery.
- Locate residue piles, such as sawdust and field chipping residue, away from drainages where runoff may wash residue into water bodies or wetlands.
- Maintain appropriate vegetation and riparian buffers around water bodies to protect water quality and ensure wildlife habitat suitability is maintained. Manage riparian areas to provide adequate shade, sediment control, bank stability, and recruitment of wood into stream channels.
- Locate project staging areas for refueling, maintaining equipment, and storing materials and operating supplies in areas not designated as riparian or stream bank management zones.
- Determine the best locations and design for roads, the slope of roads, and the approach to stream crossings through proper planning.

- Do not locate roads and trails parallel to streams. Design roads that must cross streams to be perpendicular and then to immediately exit the buffer zone.
- Place appropriate improvements, such as culverts, at stream crossings to keep vehicles and equipment out of the stream flow and to prevent direct sedimentation of streams.
- Maintain a minimum of 6-inch stubble height at the end of October on stream bank (lotic) riparian.
- Maintain a minimum of 4-inch stubble height at the end of October on wet meadows (lentic) systems.

Further guidance may be provided by the States of Oklahoma, Kansas, and Texas BMPs.

Fish and Wildlife Management/Special Status Species

Standard Operating Procedures

- Construct fences to comply with applicable wildlife fence standards (Fences - BLM Manual Handbook H-1741-1). Modify existing fences that impede big game movement or that otherwise conflict with wildlife, to comply with applicable wildlife fence standards on a case-by-case basis.
- Minimize the potential spread of white nose syndrome in bats in caves and abandoned mines in accordance with containment and decontamination procedures and as identified in WO Instruction Memorandum 2010-181.
- Survey for special status species and other species of concern within a project area when a project is proposed in order to accurately determine baseline conditions. Design the project to avoid (if possible), minimize, or mitigate impacts on resources if there could be any potential negative impacts.

The BLM will consult agency species management plans and other conservation plan to guide management and will devise mitigation measures when needed. Examples of these plans are the, North American Landbird Conservation Plan, North American Waterbird Conservation Plan, and National Partners in Flight Bird Conservation Plans.

Best Management Practices

- Coordinate with the state wildlife agencies on BLM projects and BLM-authorized projects that are proposed within 0.5 miles of a small capacity water development and 2.0 miles of a large capacity wildlife water development. Projects determined to have a

detrimental effect on wildlife using wildlife water developments will be avoided or rerouted if possible.

- Coordinate with state wildlife agencies on migratory bird inventories when they are proposed by BLM or are required of third parties.
- Ensure that wildlife water developments proposed in Wilderness Study Areas meet the nonimpairment criteria.
- Co-locate new communication towers on existing communication towers or other structures to minimize impacts on wildlife. If co-location is not possible, locate new communication towers next to existing towers.
- Down-shield security lighting for on-ground facilities and equipment to keep light within the boundaries of the site.
- Avoid constructing communication towers and power lines around wetlands.
- Avoid tower designs featuring guy wires if the structure is to be located in known raptor or waterbird concentration areas or in major avian migration routes. If guy wires are absolutely necessary, place visual markers on the wires to prevent birds from colliding with the wires.

Standard Operating Procedures and Best Management Practices—Wildlife Damage Management Activities

- Do not allow aerial control activities within 0.5 mile of active eagle nests between February 1 and August 1. In coordination with State Wildlife Agencies, the APHIS-WS will develop general areas of known active eagle nesting sites.

The BLM will identify, through the APHIS-WS annual work plan process, other areas of public lands considered special resource use areas. In these areas, control activities must be avoided, except as requested by state wildlife agencies, or other protective restrictions may apply.

See also *Vegetation–Riparian and Wetlands*.

Wildland Fire Ecology and Management

Standard Operating Procedures/Best Management Practices—Fuels Management

- Construct fuel breaks or green strips to protect WUI communities and resources and to provide for firefighter and public safety using mechanical, chemical, biological, prescribed grazing, and prescribed fire treatments.

- Construct fuel breaks and green strips in areas containing a good understory of native perennials in order to successfully compete with and deter the establishment of annual species.
- Where possible, construct fuel breaks and green strips to blend with the surrounding topography. Use existing disturbances, such as roads, seeding, burned areas, and natural barriers, as strategic places for fuel breaks.
- Seed green strips in areas that do not have a good understory of desirable native perennials that can successfully compete with annual species.
- Where practicable, use large-scale landscape planning to connect fuel breaks and avoid small piecemeal projects.
- Maintain fuel breaks and green strips to ensure that they effectively change fire behavior.
- Do not allow grazing on seeded species during the first growing season following seeding.
- Where practicable and suitable, reduce new surface disturbance and minimize potential impacts on resource values by constructing fuel breaks and green strips in areas previously disturbed. Areas to be considered include roadways, previously burned areas, and cheatgrass-dominated sites.
- Strategically place and maintain pretreated strips and areas (e.g., mowing, applying herbicide, and strictly managing grazed strips) to aid in controlling wildfire if it should occur near key habitats or important restoration areas, such as where investments in restoration have already been made.

Standard Operating Procedures—Fire Suppression

- Avoid whenever possible burning out unburned islands of native vegetation.
- Avoid surface-disturbing suppression in riparian areas whenever possible.
- Do not construct fire lines using heavy equipment in riparian stream zones, and do not apply fire retardant to water.
- Avoid the application of retardant or foam within 330 feet of the stream channel or waterway, when possible. Aerial application and use of retardants and foams should be consistent with national policy guidelines established by the National Office of Fire and Aviation.

- The unit administrator should determine whether there have been any adverse effects on federally listed species. This would apply in the following circumstances:
  - if the unit administrator determines that retardant or surfactant foam must be used within 330 feet of a waterway or stream channel due to threats to life or property
  - if alternative line construction tactics are not feasible because of terrain constraints, congested areas, or lack of ground personnel
  - if potential damage to natural resources outweighs possible loss of aquatic life
  - if the action agency determines that adverse effects were incurred by federally listed species or their habitats

  In such cases, the action agency must consult with the USFWS, as required by 50 CFR, Part 402.05 (Emergencies), as soon as practicable.
- Close lands temporarily to other uses in areas where fire suppression is being implemented.

In addition to the general suppression constraints, the following constraints are to be implemented within the vicinity of special status aquatic species habitats:

- Impound or divert streamflow by mechanical or other means in order to facilitate extraction of water from the stream for fire suppression.
- Screen the intake end of the draft hose to prevent entry of fish. Screen opening size should be a maximum of 3/16 inch.
- Do not allow water extraction to exceed the ability of the stream inflow to maintain water levels at the time initial attack began. If the water level drops below this predetermined level, cease all water removal immediately until water levels are recharged.
- For streams currently occupied by aquatic special status species, do not allow water to be extracted from ponds or pools if stream inflow is minimal (for example, during droughts) and extracting water would lower the pond or pool level.
- When possible, do not allow fire control lines to cross or terminate at the stream channel.
- Terminate control lines at the edge of the riparian zone at a location determined appropriate to meet fire suppression objectives, based on fire behavior, vegetation and fuel types, and firefighter safety.

Standard Operating Procedures—Emergency Stabilization and Rehabilitation (ES&R)

- Stabilize areas that have low potential to naturally revegetate and that have high wind and soil erosion potential. Treatments include the following:
- Installing water bars and other drainage diversions, culverts along fire roads, dozer lines, and other cleared areas
- Seeding and planting to provide vegetation cover
- Spreading mulch to protect bare soil and discourage runoff
- Repairing damaged roads and drainage facilities
- Clearing stream channels of structures or debris that is deposited by suppression activities
- Installing erosion control and channel stabilization structures
- Closing areas to livestock grazing to promote success of natural revegetation and establishment of seeded species
- Closing lands temporarily to other uses during emergency stabilization and rehabilitation practices if activities inhibit the attainment of treatment goals
- Repairing or replacing range improvements and facilities
- Monitoring ES&R treatments

Fire Prevention and Mitigation

- Post fire prevention signs based on National Fire Danger Rating System (NFDRS).
- Provide fire prevention and mitigation outreach information and education to communities.
- Reduce the potential for human-caused fires by issuing fire restrictions.

Cultural/Paleontological Resources and Tribal Consultation

Best Management Practices

In situations where a proposed undertaking has the potential to affect the physical integrity of a significant cultural resources, numerous measures can be applied to reduce or eliminate the effects. BLM archeologists work through consultation with the tribes, State Historic Preservation Officers (SHPOs), and Tribal Historic Preservation Officers (THPOs) to determine which practice is appropriate. Application of BMPs depends on the nature of the undertaking and the nature of the significant cultural resources.

Avoidance

Avoidance, through modification of the proposed undertaking, is the primary and preferred measure used to protect cultural resources. This can be accomplished at the project planning stage.

Monitoring

In situations where avoidance of adverse effects is not feasible, or there is a determination of no adverse effects, but the potential remains for there to be adverse effects through inadvertent discovery, a BLM-permitted archeologist will monitor construction activities. The presence of a monitor is to ensure that buried cultural materials are immediately identified and that construction activities in that area are halted to avoid further impacts to the site. Before BLM authorization of the project, the project proponent submits a discovery plan outlining the way in which cultural resources will be treated and the responsibilities of the project proponent. BLM archeologists review this plan, and it is submitted to SHPO for concurrence. In the case where monitoring results in a discovery situation, the discovery plan is enacted. Depending on the nature of the discovery, the project may be allowed to proceed or be redesigned. Data recovery may also be required.

Standard Measures to Reduce Visual Contrast

When a proposed project is found to be within the contributing setting of a historic property, an assessment of potential impacts is conducted through viewshed analyses, onsite inspection, and photo inspection. For historic trails such as Chisholm and Santa Fe National Historic Trails, protection measures would be carried out similarly to other historic properties if any project were found to be located within designated buffer of a contributing portion of the historic trail. When a proposed project is outside of the designated buffer of the trail but found to be within the viewshed that contributes to NRHP eligibility, analyses of potential impacts to the integrity of the setting will be carried out in the same way as other properties where setting is an aspect of integrity. Best management practices used to ensure that the contributing viewshed of historic properties is not adversely affected include:

- Consolidating project facilities among oil, gas and geothermal developers, which also facilitates cumulative analysis
- Developing coordinated road and pipeline systems
- Reducing the amount of surface development by consolidating facilities (e.g., develop bottom hole wells using directional drilling from a single surface well location)
- Using low-profile facilities
- Using proper sighting and location to maximize the use of topography and vegetation to screen development

- Designing projects to blend with topographic forms and existing vegetation patterns
- Using environmental coloration or advanced camouflage techniques to break up visual intrusion of facilities that cannot be completely hidden
- Using broken linear patterns for road developments to screen roads as much as possible (including feathering or blending of the edges of linear ROWs to break up the linearity)
- Designing linear facilities and seismic lines to run parallel to key observation points rather than perpendicular
- Crossing the historic trails at right angles with linear developments when it would reduce the physical and visual impact
- Modifying the orientation of facilities to present less of a visual impact (e.g., a facility with several tanks lined up so that one obscures the visibility of the others)

Mitigation

Mitigation measures are determined by the types of proposed actions, the nature of the potential effect, and the qualities of the historic property that render it eligible for NRHP listing. Mitigation measures are applied when best management practices will not reduce or minimize adverse effects. Mitigation may include data recovery or other agreed-upon measures. Consultation with the individual state SHPOs and the ACHP is required when proposed actions are expected to adversely affect properties eligible for the NRHP and mitigation is determined to be the best course of action.

Data Recovery

There are two times during a project when data recovery may be implemented. The first is before project construction when it is determined that there will be an adverse effect on a significant cultural resources. In this case, the BLM Authorized Officer, SHPO, THPO, and relevant tribes will work together to develop a data recovery plan that will mitigate the adverse effects. The second is after a discovery situation when it is determined that the project has already adversely impacted a significant cultural resources. Again, the BLM Authorized Officer, SHPO, THPO, and relevant tribes will work to develop a plan that mitigates all effects of the construction. Data recovery in itself is a destructive process; thus, it must be carried out in a way to successfully retrieve all pertinent information from the site.

Native American Consultation

In addition to consultation with the individual state SHPO offices, BLM conducts Native American Consultation in compliance with Section 106 of the NHPA, NAGPRA, ARPA, the American Indian Religious Freedom Act of 1978, and EO 13007. The BLM has created a process for conducting Native American

consultation for federal undertakings, as described in applicable BLM policy. The BLM has worked extensively with tribes who have traditional ties to the region to establish a protocol for consultation. Consultation with Native American tribes occurs during the NEPA planning process and when individual projects are proposed that may impact properties that have traditional use (i.e., traditional cultural properties [TCPs]) or are sacred to Native American cultures. When one of these site types is identified within proximity to a proposed undertaking, the project proponent and tribal governments are notified. Determinations of eligibility and effects the project may have on the site are made in consultation with tribal representatives.

Standard Operating Procedures

In accordance with 43 CFR, Part 10.4(g), the holder of a BLM authorization to carry out land use activities on federal lands, including all leases and permits, must notify the BLM by telephone and in writing immediately on the discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony.

In accordance with 43 CFR, Parts 10.4(c) and (d), activities must stop in the immediate vicinity of the discovery. The discovery must be protected from the authorized activity for 30 days or unless otherwise notified by the BLM.

All BLM activities and BLM authorized activities shall comply with the following:

- BLM Manual 8100
- BLM Manual 8120 (Tribal Consultation under Cultural Resources Authorities)
- BLM Manual Handbook H-8120-1 (General Procedural Guidance for Native American Consultation)

Paleontological Resources

Best Management Practices

In situations where a proposed undertaking has the potential to affect the physical integrity of paleontological resources, numerous measures can be applied to reduce or eliminate the effects. Application of BMPs depends on the nature of the undertaking and the nature of the significant paleontological resources.

Avoidance

Avoidance, through modification of the proposed undertaking, is the primary and preferred measure used to protect paleontological resources. This can be accomplished at the project planning stage.

Monitoring

In situations where avoidance of adverse effects is not feasible, or there is a determination of no adverse effects, but the potential remains for there to be adverse effects through inadvertent discovery, a BLM-permitted archeologist will monitor construction activities. The presence of a monitor is to ensure that plant and animal fossil are immediately identified and that construction activities in that area are halted to avoid further impacts to the site. In the case where monitoring results in a discovery situation, the discovery plan is enacted. Depending on the nature of the discovery, the project may be allowed to proceed or be redesigned. Data recovery may also be required.

Mitigation

Mitigation measures are applied when best management practices will not reduce or minimize adverse effects. Mitigation may include data recovery or other agreed-upon measures.

Data Recovery

There are two times during a project when data recovery may be implemented. The first is before project construction when it is determined that there will be an adverse effect on a significant paleontological resource. In this case, the BLM Authorized Officer will develop a data recovery plan that will mitigate the adverse effects. The second is after a discovery situation when it is determined that the project has already adversely impacted a significant paleontological resource. Again, the BLM Authorized Officer will work to develop a plan that mitigates all effects of the construction. Data recovery in itself is a destructive process; thus, it must be carried out in a way to successfully retrieve all pertinent information from the site.

Visual Resources

Best Management Practices or Standard Operating Procedures

- Refer to Visual Resource Contrast Rating Handbook H-8431-1
- Refer to Visual Contrast Rating Worksheet Form 8400-4
- Refer to Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as The Gold Book; BLM and Forest Service 2007)
- Refer to Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands, 1st Edition - 2013 or later
- The following considerations can be helpful in choosing a project location:
  - visual contrasts or impacts decrease as the distance between the viewer and the proposed development

increases, so projects should be located as far away from prominent viewing locations as possible

  - the human eye is naturally drawn to prominent topographic features, so projects should not be located on or near such features
  - the shape and placement of projects should be designed to blend with topographic forms and existing vegetation patterns
  - both topographic features and vegetation should be used to screen proposed development.

- Techniques that help reduce surface disturbance are as follows:
  - collocating several projects within the same right-of-way
  - placing underground utilities either along the edge or under the surface of an existing road
  - placing several underground utilities within the same trench
  - establishing limits of disturbance that reflect the minimum area required for construction
  - consolidating development of a similar nature within a common structure
  - planning projects so that they use existing infrastructure, whenever possible
  - maximizing slope when it is aesthetically and technically appropriate
  - locating construction staging and administrative areas in less visually sensitive areas
  - requiring restoration of disturbed areas no longer required after construction has been completed
- Every landscape has the basic elements of form, line, color, and texture. Repeating these elements reduces contrasts between the landscape and the proposed activity or development and results in less of a visual impact.
- The following considerations can be helpful in making color selections:
  - natural surfaces are usually well textured and have shade and shadow effects that darken them; surfaces of structures are usually smooth and reflect light even if dull-finish paint is used; as a general rule, colors on smooth man-made structures need to be two or three shades darker than the

background colors to compensate for the shadow patterns created by naturally textured surfaces that make colors appear darker

  - the color for all structures should be selected to achieve the best blending with the surrounding landscape in both summer and winter
  - galvanized steel on utility structures should be darkened to prevent glare; low-luster paints should be used wherever possible to help reduce glare (although it is almost impossible to remove all sun glare)
  - color (hue) is most effective within 1,000 feet; beyond that point, color becomes more difficult to distinguish, and tone or value determines visibility and resulting visual contrast
  - Surface disturbance of western mineralized soils can result in strong color contrasts; in many situations, this suggests that the area should be avoided as a location for the proposed development or that color selections for the man-made facilities or disturbance might need to reflect the lighter color soil revealed by the disturbance
  - colors should be selected from a distance that permits viewing of the entire landscape surrounding the proposed development
  - colors that blend with or are in harmony with the existing colors of the earth, rocks, and vegetation are usually more visually pleasing and attract less attention than colors that are chosen to match the color of the sky

- Another effective method of reducing the visual impact from a proposed activity or development is to retain as much of the vegetation as possible and where practical to use it to screen the development from public viewing areas. Some other techniques are as follows:
  - design vegetation openings to repeat natural openings in the landscape; edges that are scalloped and irregular are more natural looking; straight line edges should be avoided
  - minimize the impact on existing vegetation by the following:
    - partially clearing the limits of construction rather than clearing the entire area (leaving islands of vegetation results in a more natural look)
    - using irregular clearing shapes

    - feathering and thinning the edges of the cleared areas to reduce strong lines of contrast; to create a more natural look along an edge, retain a good mix of tree/shrub species and sizes
    - disposing of all slash
- The visual impact from new structures placed on the existing landscape can be reduced by using the following:
    - repeating form, line, color, and texture
    - minimizing the number of structures and combining different activities in one structure wherever possible
    - using earth-tone paints and stains and self-weathering metals
    - chemically treating wood so that it can be allowed to self weather
    - using natural stone in wall surfaces
    - burying all or part of the structure
    - selecting paint finishes with low levels of reflectivity
    - using rustic designs and native building materials
    - using natural-appearing forms to complement landscape character
    - screening the structure from view with natural landforms and vegetation

The scars from excessive cut and fill during construction in the southern great plains often leave long-lasting negative visual impacts. This is especially true of activities that disturb the highly mineralized soils of the southern great plains. Once the dark surface soil layer is disturbed, exposing the much lighter subsurface soil, a strong contrast is created that may take years to recover.

There are a number of ways to reduce the contrasts created by earthwork construction, the most important of which are proper location and alignment. Fitting the proposed development to the existing landforms so as to minimize the size of cuts and fills will greatly reduce visual impacts from earthwork. To reduce strong visual impacts, other earthwork design techniques should be considered, where appropriate, such as balancing cut and fill and constructing with all fill or all cut. Other strategies are as follows:

- Hauling in or hauling out excessive earth cut or fill in sensitive viewing areas
- Rounding or warping slopes (shaping cuts and fills to appear as natural forms)

- Bending slopes to match existing landforms
- Retaining rock formations, vegetation, and drainage, whenever possible
- Blasting split-face rock (cutting rock areas so that the resulting rock forms are irregular in shape, as opposed to making uniform "highway" rock cuts
- Toning down freshly broken rock faces using asphalt emulsions and rock stains
- Using retaining walls to reduce the amount and extent of earthwork
- Retaining vegetation by using retaining walls, reducing surface disturbance, and protecting roots from damage during excavation
- Avoiding soil types that will generate strong contrasts with the surrounding landscape when they are disturbed
- Prohibiting dumping of excess earth/rock on downhill slopes

Strategies for restoration and reclamation are akin to the design strategies for earthwork, as well as the design fundamentals of repeating form, line, color, and texture and reducing unnecessary disturbance. The objectives of restoration and reclamation include reducing long-term visual impacts by decreasing the amount of disturbed area and blending the disturbed area into the natural environment, while still providing for project operations.

Though restoration and reclamation are a separate part of project design, they should not be forgotten or ignored. It is always a good idea to require a restoration/reclamation plan as part of the original design package. All areas of disturbance that are not needed for operation and maintenance should be restored as closely as possible to previous condition.

Several strategies that can enhance any restoration or reclamation are as follows:

- Striping, saving, and replacing topsoil (6-inch surface layer) on disturbed earth surfaces
- Enhancing vegetation by
  - mulching cleared areas
  - furrowing slopes
  - using planting holes on cut/fill slopes to retain water
  - choosing native plant species
  - fertilizing, mulching, and watering vegetation

  - replacing soil, brush, rocks, forest debris over disturbed earth surfaces when appropriate, thus allowing for natural regeneration rather than introducing an unnatural looking grass cover

- Minimizing the number of structures and combining different activities in one structure wherever possible.

Projects and activities associated with linear alignments include rights-of-way, roads, trails, pipeline developments, and underground and overhead utility lines. The visual impact of a linear project depends largely on where it is located and how it is molded to the natural terrain. Proper location can often contribute significantly to reducing line and color impacts, making other measures either unnecessary or less costly and easier to accomplish.

Finding the best route for linear alignments involves the following:

- Identifying and analyzing all possible corridor alignments and selecting the one most feasible for the proposed project.
- Locating the proposed project within the selected corridor after a thorough analysis of all environmental, socioeconomic, and engineering factors.

There are several major considerations for determining an alignment, as follows:

- Topography is a crucial element in alignment selection. Visually, it can be used to subordinate or hide man-made changes in the landscape. Projects located at breaks in topography or behind tree groupings are usually of much less visual impact than projects on steep side slopes. By taking advantage of natural topographic features, cut and fill slopes can be greatly minimized.
- Topographic breaks frequently exhibit a natural line element that the proposed alignments can repeat or blend with to strengthen the design. This line element is partly established by a visual shadow zone, which will further reduce the contrast of the project.
- Soils are especially important when selecting an alignment and should be analyzed for stability and fertility, and a revegetation program should be planned.
- Hydrological conditions can strongly affect the visual impact of buried and surface construction. The risks of surface and subsurface erosion within the corridor should be analyzed and evaluated.
- Crossings with other linear features or structures should be designed to minimize their visual impact, as follows:
  - when possible, crossings should be made at right angles

  - structures should be set as far back from the crossing as possible
  - in areas with tree and shrub cover, the rights-of-way and structures should be screened from the crossing area

It is important to remember that when a system is planned and designed, the following parameters apply:

- Other services that will be needed to support the system must be analyzed and included in the design considerations. For example, a construction access road, electrical power with a backup system, and sanitation facilities are usually needed for most projects. At times, the visual impact of the support facilities is the deciding factor for the specific location of the main project.
- How the system is to be maintained must also be considered.
- A rehabilitation plan should be developed. All areas of disturbance that are not needed for operation and maintenance should be restored as closely as possible to previous conditions.

The engineering design, landscape design, and visual considerations for a linear alignment must be determined together to ensure that all three are addressed and included in the final design solution.

Night Lighting

- Lighting Plan and Design Features
  - Consider a lighting plan using design/installation features intended to minimize night-sky and wildlife impacts.
  - Consider lighting designs that meet safety and information needs taking place in the lit space.
  - Consider using shields and covers on lights to focus lighting on work areas.
  - When practicable, consider using warm-white or amber lighting in place of industry-standard blue lighting.
  - When practicable, consider using warm-white or amber lighting in place of industry-standard blue lighting.
- Lighting Placement and Location
  - Consider illuminating required work and thoroughfare areas only.
  - Consider overall efficiency and effectiveness of the placement, number, and type of lights used.

  - Human safety and site security should be the focus of any lighting selected. Be cognizant that "over-lighting" can adversely affect dark-adapted night vision.
  - Consider using lower lumen "transition zones" between lighted and lighted areas.
  - Encourage use of headlamps and flashlights outside of work areas.
- Lighting Efficiency and Effectiveness
  - Consider using the following lighting controls in your lighting plan and design:
    - Motion Sensors
    - Photo Sensors
    - Timers
    - Dimmers
    - CCT changeable lights
  - Use FAA-approved aircraft detection lighting systems for structures taller than 200 feet.
  - Consider using vehicle-mounted lights or portable light towers for temporary lighting.
- Focused Lighting
  - Facility lighting should be the appropriate intensity required for tasks, safety, and basic security.
  - Use of efficient, shielded light fixtures require smaller wattage bulb to be effective.

Livestock Grazing

Standard Operating Procedures

- Springs and seeps or other projects affecting water and associated resources should be designed to maintain the associated riparian area and assure attainment of standards.
- Periodic compliance inspections on grazing allotments should be conducted to ensure adherence to mandatory terms and conditions of grazing permits.

Best Management Practices

- Use livestock grazing as an intensively managed prescriptive grazing practice to control noxious weeds or invasive plants.

- In spring, graze for a short duration earlier in the season so that sufficient soil moisture remains for plant recovery.
- Implement short duration grazing (up to three weeks, with more animals in smaller pastures) where infrastructure permits it during the growing season. Avoid regrazing the same plants in one growing season.
- Rotate livestock use areas year to year and not in the same place at the same time each year.
- Allow for rest and recovery periods before or after grazing during critical growth period.
- Maintain range developments to maintain or improve distribution.
- Avoid the following grazing management practices:
  - long seasonal use with no recovery time
  - heavy use (which stresses plants)
  - little or no regrowth before winter, when there is little stubble for root crown protection
  - use at the same time every year, repeating the stress
  - no rest or growing season recovery (little recovery with long seasons of use)
  - little or ineffective herding
  - salt placed in the same locations year after year
  - grazing during the critical growth period year after year
- Do no graze seedings until the plants are well established.
- Use rotation or deferment to vary the timing of grazing to allow for periodic rest of upland vegetation during critical growth periods.
- Provide occasional rest to allow whole growing season for recovery.
- Use the target weed's biology when developing a grazing strategy.
- Manage heavy grazing on target weed species to account for any intermixed desirable species.
- Manage animals' post-treatment grazing to contain weed seeds.

Best Management Practices—Vegetation/Riparian Zone Management Guidelines

- Achieve proper functioning condition by managing livestock grazing with appropriate riparian management practices.
- Graze earlier in the season when cattle use uplands.

- Graze plants only once or twice per year.
- Avoid hot season grazing of riparian areas.
- Allow regrowth before winter by grazing early enough for substantial plant regrowth during the growing season to slow spring flows and retain soil.
- For maintenance or improvement of willows, allow two growing seasons rest before late season use.
- Provide and maintain alternate water sources for better distribution.
- In addition to the grazing management practices to avoid listed above, avoid the following:
  - hot season grazing in big pastures with little riparian (poor distribution)
  - few waters and only riparian waters (poor distribution)
  - heavy use (stresses plants, tramples banks, and consumes last year's wood)
  - little or no regrowth before winter (little stubble for sediment)

Minerals and Energy

Actions involving minerals and energy are governed by the following:

- Surface Operating Standards and Guidelines to Oil and Gas Exploration and Development (also known as "The Gold Book"; BLM and Forest Service 2007).
- Mineral Materials Disposal Handbook H-3600-1 (2002)
- Solid Minerals Reclamation Handbook H-3042-1 (1992)
- 43 CFR, Part 8900 et seq.
- Onshore Orders 1-8
- Washington Office BMPs; BMP Technical Information can be found online at: https://www.blm.gov/bmp/General_Information.htm

Best Management Practices—Fluid Mineral Leasing

<u>Exploration</u>

- Install temporary gates for use during the course of operations, unless the fence was immediately repaired. On completion of operations, restore fences to at least their original condition.

- Mitigate or suspend all activities off maintained roads that create excessive surface rutting during adverse conditions affecting soil moisture caused by such climatic factors as thawing, heavy rains, snow, flooding, or drought.
- Limit off-road vehicle travel to that necessary to complete the geophysical operations.
- Require specialized low surface impact equipment (such as wide- or balloon-tired vehicles and ATVs) or helicopters for any activities in off-road areas to protect the fragile soils or other resources.
- Locate powder magazines at least a mile from traveled roads, unless otherwise authorized after analysis or review. Require loaded shot holes and charges to be attended at all times (30 CR 56.6100 and 56.6306; 43 CFR 3150).
- Require all trash, flagging, and lath to be removed and hauled to an authorized disposal site. Do not allow oil or lubricants to be drained onto the ground surface.
- Require the undersides of all heavy equipment to be washed before being driven onto public lands and discourage driving through or parking on noxious weed infestations.
- Stockpile all available topsoil from all disturbances for use in reclamation projects.
- Stockpile, shred, and use removed vegetation as mulch during site rehabilitation.
- Return geophysical drill hole cuttings to the hole if possible, or at a minimum, rake and spread it out so as not to impede vegetation regrowth or to create erosion problems.

Preconstruction

- Use existing routes to the extent possible. Keep additional roads, if needed, to an absolute minimum and have the BLM Administrative Officer approve the location of routes before construction.
- Construct and maintain all access roads to BLM road standards, according to the Gold Book (BLM and Forest Service 2007) and BLM Manual 9113 (BLM 2011b).
- Restrict off-road travel to terrain with less than 30 percent slopes; 20 percent if highly erodible.
- Limit proposed surface disturbance and vehicular travel to the approved well location and access route.

Well Pad and Facility Construction

- Ensure that every pad, access road, or facility site have an approved surface drainage plan.
- Confine or direct drainage from disturbed areas so that erosion of undisturbed areas would not be increased.
- Do not allow runoff water (including that from roads) to flow into intermittent or perennial waterways without first passing through a sediment-trapping mechanism. Erosion control structures may include water bars, berms, drainage ditches, sediment ponds, or devices.
- Plan access road construction for exploratory wells such that a permanent road could later be constructed in the event of field development.
- Avoid constructing access roads on steep hillsides and near watercourses where alternate routes provide adequate access.
- Design access roads requiring construction with cut and fill to minimize surface disturbance; take into account the character of the landform, natural contours, cut material, depth of cut, resource concerns, visual contrast, and where the fill material will be deposited.
- Do not cast fill material over hilltops or into drainages. Cut slope ratios should normally be no steeper than 3:1 and fill slopes no steeper than 2:1.
- Use low water crossings whenever possible.
- Ensure that well site layout takes into account the character of the topography and landform. Avoid deep vertical cuts and steep, long fill slopes. Construct all cut and fill slopes to the least percent slope practical.
- Require trash to be retained in portable trash cages and hauled to an authorized disposal site for disposal. Prohibit burning on the well site.
- Install and maintain cattle guards whenever access roads cut are through pasture gates or fences. Maintenance includes cleaning out under cattle guard bases, when needed.
- Adequately fence, post, or cover mud, separation pits, and other containments used during the exploration or operation of the lease for storing any hazardous materials.

Utilization

- Conduct operations to prevent damage to, interference with, or disruption of water flows and improvements associated with all springs, wells, and impoundments.
- Prevent surface subsidence when mining through proper mine designs.
- Require companies controlling roads that provide access to crucial wildlife areas to close the roads with a lockable gate to prevent general use during critical periods of the year, when resource problems are experienced (for example, during hunting seasons and winter).
- Allow the use of closed road segments to legitimate authorized agents of the lessee or their subcontractors, the land managing agency, and other agencies with a legitimate need (for example, State Wildlife Agencies and other law enforcement agencies).
- Require closing and reclaiming unnecessary roads to reduce fragmentation and restore habitat integrity, while reducing the potential for wildlife disturbances.
- Close roads during crucial periods, such as wildlife winter periods, spring runoff, calving and fawning seasons, and saturated soil conditions.
- Require storage of in approved containers for petroleum products, such as gasoline, diesel fuel, helicopter fuel, crankcase oil, lubricants, and cleaning solvents used to fuel, lubricate, and clean vehicles and equipment.
- Require hazardous materials to be properly stored in separate containers to prevent mixing, drainage, or accidents. Prohibit hazardous materials from being drained onto the ground or into streams or drainage areas.
- Require totally enclosed containment for all solid construction waste. Trash, garbage, petroleum products, and related litter would be removed to an authorized sanitary landfill approved for the disposal of these waste classes.

Transportation and Access

Standard Operating Procedures

- Continue coordinating with counties and other agency road entities to promote use of BMPs for road maintenance they perform within BLM boundaries.
- Maintain an inventory of existing road and trail systems.

- Use BLM Manual 9113.16 and BLM Handbook 9113-2 to guide all maintenance and road construction designs and requirements. Include definitions for functional road classification and maintenance levels for BLM roads.
- Require all highway ROWs and other road authorizations to include noxious weed and invasive plant stipulations for prevention, inventory, treatment, and revegetation or rehabilitation. Road abandonment would generally include at least 3 years of post-abandonment monitoring and treatment.

Best Management Practices

- In order to ensure public access and safety, the BLM will continue an active road maintenance program, using redesign, blading, brush removal for sight distance as appropriate, scarification, graveling, water barring, low water crossings, spur ditching, seeding and culvert installation and cleaning.
- No new NEPA analysis would be required for road maintenance within the defined maintenance disturbance/easement footprint, which is defined as previously disturbed or maintained. Disturbance outside of the defined maintenance disturbance/easement footprint or road realignment would be subject to additional NEPA compliance.

Lands and Realty

Standard Operating Procedures

Power lines will be constructed in accordance to standards outlined in Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 1996 by Avian Power Line Interaction Committee (APLIC 2006) or based on best science available. Right-of-way applicants will assume the burden and expense of proving that proposed pole designs not shown in this publication are safe for raptors. A raptor expert approved by the BLM Authorized Officer will provide such proof.

ROWs and other lands and realty authorizations would contain noxious weed and invasive plant management terms or stipulations for all ground-disturbing actions. Examples of these authorizations are power lines, pipelines, transmission corridors, energy development sites and related development, and gravel pits. This would require the following:

- Conducting a predisturbance noxious weed inventory
- Designing to avoid or minimize vegetation removal and weed introduction or spread

- Managing weeds during the life of the ROW or authorization to prevent or minimize weed introduction or spread
- Abandoning the ROW or authorization to establish competitive vegetation on bare ground areas
- Monitoring revegetation success and weed prevention and control for a reasonable number of years

Best Management Practices
Coordinate with the State Wildlife Agencies early in the sale process on proposals to dispose of public land encumbered by a small or large capacity wildlife water development Ensure if the ROW is permitted, that the water development is sufficiently mitigated.

Recreation

Guidance for recreation use can be found in the Land Use Planning Handbook H-1601-1, Appendix C, Section II-C; the Recreation Permit Administration Handbook H-2930-1; Recreation Permit Fee Manual 2930; and 43 CFR, Part 2930.

Special recreation permits would contain noxious weed management stipulations; examples are pre-event inventories to avoid infested areas, event management to avoid or isolate activities that could introduce or spread weeds, monitoring and treatment of infestations exacerbated by the activity, and other appropriate noxious weed management stipulations.

Lands may be temporarily closed to other uses during recreation performed under a special recreation permit, such as equestrian endurance rides or motorcycle events.

Recreational use permits shall be issued in an equitable manner for specific recreational uses of BLM-administered lands and related waters as a means to manage visitor use; provide for visitor health, safety, and enjoyment; minimize adverse resource impacts; and provide for private and commercial recreational use according to limits or allocations established through the BLM's planning process.

The BLM shall provide for more intensive visitor management, resource protection, and facility investment where the public has demonstrated its desire to use lands for outdoor recreation; where Congress has determined that the resources present in the area are of national importance; and where it has been determined that outdoor recreation is a high priority.

Recreation resources will be evaluated on an individual basis as part of activity and project level planning. Such evaluations will consider sensitivity, and impacts on recreation resources in the affected area. Stipulations will be attached as

appropriate to ensure the compatibility of projects with recreation management objectives.

Wilderness Study Areas

Standard Operating Procedure
All Wilderness Study Areas (WSAs) will be managed in accordance with the Interim Management Policy and Guidelines for Lands under Wilderness Review H-8500-1.

Manage all WSAs in accordance with BLM Manual 6330 Management of Wilderness Study Areas (BLM 2012f).

Manage and protect WSAs Consistent with relevant law so as not to impair the suitability of such areas for preservation as wilderness.

Ensure that all decisions and activities within WSAs conform to FLPMA, NEPA, designating legislation, and other applicable laws, and BLM policies and guidelines.

Develop and maintain relationships with other federal agencies, tribal governments, state and local governments, and general public regarding stewardship of WSAs.

New discretionary uses that would impair the suitability of areas for designation as wilderness should not be established or authorized within WSAs.

Exceptions to the nonimpairment criteria are only allowable for seven classes:

- Emergencies
- Public Safety
- Restoration of impacts from violations and emergencies
- Valid existing rights
- Grandfathered uses
- Protection or enhancement of wilderness characteristics or values
- Other legal requirements.

All proposals within WSAs are subject to the policies established in the BLM Manual 6330 and must be evaluated consistent with implementing regulations, policy, and guidance using the NEPA process provided in H-1790-1. Compliance with NEPA may include the use of the following: EA, EIS, DNA, or under rare circumstances, a CX.

Issuance of fluid mineral leases will be limited to within 0.25 miles of a WSA boundary. Any quarter-quarter sections intersected by or including a portion of a WSA boundary will be excluded from nomination unless an official Cadastral Survey has been completed (IM NV-2011-003).

Public Health and Safety

Standard Operating Procedures and Best Management Practices—Wildlife Damage Management Activities

- No control is allowed on public lands within a mile of any community, major mine, developed recreation site, or any residence, except for the purpose of human health and safety or as requested specifically by a cooperator. APHIS-WS will notify the BLM before any damage control is implemented within the restricted areas, and the BLM would approve exceptions on a case-by-case basis. No M-44s or other toxicants that are not species specific are to be used within these areas, in accordance with EPA label use restrictions (that is, seven miles).
- Controls, such as distance and signs, next to state or federal highways and county-maintained roads must be consistent with the State Wildlife Agencies trapping regulations.
- All EPA use restrictions and requirements for toxicants are to be followed where control devices are used on public lands. The BLM must be notified before any toxicants are deployed, and a map of the treatment area must be provided. Adequate signs must be provided and maintained.
- All equipment (including traps, snares, and M-44s) and warning signs will be removed from bird-hunting areas, identified in coordination with State Wildlife Agencies, no later than one week before the opening day of the hunting season.
- The BLM will identify through the APHIS-WS annual work plan process other areas of public lands considered special resource use areas on which control activities must be avoided, except as requested by State Wildlife Agencies, or other protective restrictions may apply. An example is special status species habitats.

Summary

The BMPs/SOPs listed in this handbook are not universally applicable and do not encompass all the effective BMPs/SOPs currently required or available. These BMPs/SOPs expand and supplement the basic guidelines and minimum requirements of the BLM manuals, practices, and regulations. However, several common themes related to the mitigation of environmental impacts were expressed throughout the previous sections, as follows:

- The need for proper planning related to timing, spatial extent, and duration critical to minimize environmental impacts
- The value of consulting with specialists, such as cultural resource offices and weed managers, to make educated and accurate management decisions
- The importance of considering more than one factor, such as wildlife or water quality, when developing or implementing management activities
- The necessity of contingency revegetation plans in cases where natural reestablishment of native vegetation may not be feasible due to lack of seed source or impacts from competing noxious weeds or invasive vegetation
- The need to give special emphasis to the protection of sensitive resources., such as listed species habitats and cultural resources
- The importance of developing inventory and monitoring strategies

Regardless of the project proposed or outcomes desired, managers involved in integrated vegetation management should consider these six thematic BMPs as well as the protection of human health and safety throughout all stages of planning and implementation.

SOURCES AND GENERAL REFERENCES

Listed below are additional resources that the BLM may consult, on a case-by-case basis, for additional BMP guidance applicable in the OKT planning area.

Instruction Memorandums and Technical Documents

BLM

Instruction Memorandum No. 2007-021. Integration of Best Management Practices into Application for Permit to Drill Approvals and Associated Rights-of-Way

Best Management Practices (BMPs) Information Sheets (2004). http://www.blm.gov/style/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/bmps.Par.73748.File.dat/WO1_WO_BMPs_Technical_Information_Sheets.pdf.

Best Management Practices (BMPs) Technical Information (2013). http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html.

Final Programmatic Environmental Impact Statement for Vegetation Treatments using Herbicides on Bureau of Land Management Lands in 17 Western States. BLM Washington Office, Washington DC.

Record of Decision for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States. August 2016. Internet website: https://eplanning.blm.gov/epl-front-office/projects/nepa/70301/92842/111843/Record_of_Decision.pdf.

Land Use Planning

BLM

Record of Decision for Vegetation Treatment on BLM Lands in Seventeen Western States (2007)

Manuals and Handbooks

BLM

Manual 9113.16, Roads

Handbook 9113-2, Road Design

USEPA

Inactive Mine Site Characterization and Cleanup Handbook, EPA 910-8-00-001 (2000)

Reports

BLM

Programmatic Environmental Report for Vegetation Treatments on BLM land (2005)

EPA

Drinking Water Academy Bulletin, Managing Septic Systems to Prevent Contamination of Drinking Water, EPA-816-F-01-030 (2001)

Forest Service

Drinking Water from Forests and Grasslands: A Synthesis of Scientific Literature, General Technical Report SRS-39 (2000)

Standards and Guidelines

BLM

Visual Resource Management for Fluid Minerals. Best Management Practices/Participants Notebook Field Reference Guide (2007)

BLM and Forest Service

Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (commonly referred to as The Gold Book), 4th edition, (2007)

Forest Service
Low-Volume Roads Engineering, Best Management Practices Field Guide, (2003)

US Department of Transportation
Best Management Practices for Erosion and Sediment Control (current edition)

Useful websites:
National Ambient Air Quality Standards http://www.epa.gov/air/criteria.html

Interagency Operating Procedure References

BLM (United States Department of the Interior, Bureau of Land Management). 2006. BLM Manual 9011-Chemical Pest Control. Internet website: http://www.blm.gov/ca/st/en/prog/weeds/9011.print.html. Accessed October 30, 2008.

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Appendix B
BIA BMPs

TABLE OF CONTENTS

Chapter Page

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APPENDIX B
BIA BMPS

The best management practices listed in this appendix are not universally applicable and do not encompass all those that are currently required or available. Best management practices are not required, only recommended.

INTRODUCTION

Land managers often apply best management practices (BMPs) to a practice that has been specifically developed to mitigate impacts.[1]

The following guidelines, techniques, and practices (collectively referred to as management guidelines) are a general summary of the BIA's BMPs. These were compiled from a variety of sources, listed under Sources and General References at the end of this appendix.

These guidelines are by no means a comprehensive list. When used in conjunction with other tribal plans applicable to land resources and resource uses, the guidelines help land managers to achieve desired outcomes or conditions, as outlined in the BIA Integrated RMP, to reduce adverse environmental effects. Any number of these guidelines can be applied or altered as necessary to make progress toward or to achieve the desired outcome or condition.

The overall vision embraces the use of these guidelines to reduce or minimize impacts on the environment. However, they are not to be considered a land use plan decision unless specifically designated and identified as being a mandatory action in the BIA Integrated RMP.

[1] Best management practices ~ A suite of techniques that guide, or may be applied to, management actions to aid in achieving desired outcomes. BMPs are often developed in conjunction with land use plans, but they are not considered a land use plan decision unless the land use plan specifies that they are mandatory. They may be updated or modified without a plan amendment if they are not mandatory (BLM Handbook H-1601-1; Glossary).

The management guidelines that follow are identified by resource. Since a number of these management guidelines can be applied to a variety of situations, there may be a duplication or similarity of and between these guidelines. Furthermore, these management guidelines, techniques, and practices may be identified for specific situations or actions (e.g., wind energy rights-of-way, livestock grazing, forestry, or road construction); nevertheless, they are not exclusive to those actions unless otherwise specified.

Air Quality

Air quality standards are governed by the Clean Air Act of 1990, as amended (42 USC, Section 85). The Environmental Protection Agency is charged with setting National Ambient Air Quality Standards (EPA 2016b).

Air Quality BMPs

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions:
  - use water or dust suppressants to control fugitive dust on roads
  - control road speeds
  - use van or carpooling
- BMPs to reduce engine emissions:
  - use cleaner diesel (Tier 2, 3, and 4) engines
  - use natural gas-powered engines

Dust Control

- Keep a watering truck on-site and water the access roads as necessary, especially during periods of high winds and/or low precipitation.
- Practice dust abatement on roads.

Soils/ Erosion Control

- Minimize topsoil removal and disturbance.
- Stockpile stripped topsoil and protect it from erosion by seeding with native grasses, until reclamation activities commence. At that time, the soil would be redistributed and seeded on the disturbed areas.
- Avoid removal of, and damage to, trees, shrubs, and groundcover where possible.
- During reclamation, redistribute and seed the topsoil on the disturbed areas, and protect and maintain reclaimed areas until the sites are fully stabilized.

- Follow permit conditions and/or develop a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.
- Recontour disturbed areas to approximate the original contours of the landscape.
- Maintain buffer strips or use other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Implement an erosion control plan.
- Conduct snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Construct berms and install straw wattles on the downslope sides of the proposed disturbed soils. Lay matting and/or conduct hydro seeding on the fill side of the disturbed soils.
- Conduct interim reclamation of at least half the disturbed area.

Vegetation–Forestry and Woodland Products

Follow the forestry management BMPs as described by the Oklahoma Forestry Services here: http://www.forestry.ok.gov/Websites/forestry/images/documents/WaterQuality/Forestry%20BMP-3-16.pdf.

Vegetation–Weeds

Executive Order 13112 enhances and orders coordination of federal activities to control and minimize the economic, ecological, and human health impacts caused by invasive species. The executive order also established a National Invasive Species Council to oversee a management plan detailing the goals and objectives of the involved federal agencies.

The Federal Plant Protection Act of 2000 (Title IV of Publ. 106-224) prohibits introducing any animal, plant, or material that is considered harmful to this country's agriculture. The US Department of Agriculture (USDA), Plant Protection and Quarantine Division, is the enforcement authority for this act.

- A noxious weed survey would be conducted prior to construction covering the ground-disturbing activities, access roads, and utility corridor ROWs. The applicant would control any noxious weeds within the ROW and other applicable facilities by approved chemical or mechanical methods, according to the weed management plan developed by the BIA to treat known or likely to occur noxious weed species.
- Clean vehicles and equipment (remove soil and plant parts) before entering or leaving a project area. Check body and undercarriage of

off-road vehicles and other equipment for plant material and clean before leaving weed-infested areas. Use standard contract provisions to ensure that contractors adhere to this guideline.

- Design projects to avoid infestations, to the extent practicable.
- Monitor and treat weeds during long-term projects to prevent their establishment and spread.
- Ensure that weed prevention is considered in project activities regardless of discipline.
- Locate project staging areas for refueling, maintenance equipment, materials, and operating supplies in weed-free areas.
- Clean off-road equipment before moving them from project areas known to be infested with noxious weeds to other project areas that are free of such weeds.
- Mitigate and reduce weed spread during prescribed fire activities; this includes inventorying weeds before burning. Treat high-risk areas before burning; pre- and post-treat high-risk weed infestations.
- Reestablish vegetation on all disturbed soil from construction, reconstruction, and maintenance activities.
- Buy only weed-free seed and conduct required seed testing before use.
- Keep main travel corridors free of noxious weeds to prevent spread and avoid or minimize all types of travel through weed-infested areas. If travel is necessary, restrict to periods when the spread of seed or propagules is least likely.
- When developing objectives and strategies, consider seasonal impacts of management actions, such as growing vs. dormant season disturbance effects.
- Avoid or minimize all types of travel through weed-infested areas, or restrict travel to those periods when spread of seed or propagules is least likely.
- Retain native vegetation in and around project activity and keep soil disturbance to a minimum, consistent with project objectives.
- Where project disturbance creates bare ground, consistent with project objectives, reestablish vegetation to prevent conditions where weeds could become established.
- Use caution when transporting vegetation and wood products from project sites to minimize the spread of invasive and nonnative pests.

- Use domestic animals to contain the target species in the treatment areas before weed seeds set.
- Use sterile or nonpersistent exotic plants at low planting densities as nurse crops for local natives, so as to preclude the migration of noxious weeds into adjacent natural areas.
- Design vegetation treatments that create small-scale openings in order to minimize the footprint of disturbance that can contribute to noxious weed establishment and spread.
- Stockpile uninfested material in a weed-free condition.
- Prevent the introduction and spread of weeds caused by moving infested sand, gravel, borrow, and fill material.
- Dispose of noxious weeds and nonnative vegetation properly to prevent unwanted spread.
- Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for that specific site.
- Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching.
- Use local seeding guidelines to determine detailed procedures and appropriate mixes.
- Use items such as wattles, straw bales, dams, seed, and straw mulch for site rehabilitation, and inspect and certify that they are free of weed seeds and propagules.
- To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible, using either natural recovery or artificial techniques as appropriate to the site objectives.
- When revegetating areas, reestablish native vegetation on sites if natural regeneration is unlikely. Use native vegetation that is genetically adapted (from the same seed zone and of similar elevation) to the area treated.
- Mitigate and limit impacts on habitats with existing and healthy native plant populations. Retain native vegetation in and around project areas to the maximum extent, consistent with project objectives.
- Where possible, provide interim revegetation in areas being actively disturbed.

Chemical and Biological Control

Follow all EPA use restrictions and requirements for toxicants. Notify the BIA before using any toxicants and provide a map of the treatment area. Provide and maintain adequate signs to notify the public of the presence of toxicants.

Vegetation–Riparian Habitat and Wetlands

- Minimize crossing streams (intermittent and perennial) and wetlands with vehicles and heavy machinery.
- Locate residue piles, such as sawdust and field chipping residue, away from drainages where runoff may wash residue into water bodies or wetlands.
- Maintain appropriate vegetation and riparian buffers around water bodies to protect water quality and ensure wildlife habitat suitability is maintained. Manage riparian areas to provide adequate shade, sediment control, bank stability, and recruitment of wood into stream channels.
- Locate project staging areas for refueling, maintaining equipment, and storing materials and operating supplies in areas not designated as riparian or stream bank management zones.
- Determine the best locations and design for roads, the slope of roads, and the approach to stream crossings through proper planning.
- Do not locate roads and trails parallel to streams. Design roads that must cross streams to be perpendicular and then to immediately exit the buffer zone.
- Place appropriate improvements, such as culverts, at stream crossings to keep vehicles and equipment out of the stream flow and to prevent direct sedimentation of streams.
- Maintain a minimum of 6-inch stubble height at the end of October on stream bank (lotic) riparian.
- Maintain a minimum of 4-inch stubble height at the end of October on wet meadows (lentic) systems.

Fish and Wildlife Management/Special Status Species

Survey for special status species and other species of concern within a project area when a project is proposed in order to accurately determine baseline conditions. Design the project to avoid (if possible), minimize, or mitigate impacts on resources if there could be any potential negative impacts.

Best Management Practices

- Collocate new communication towers on existing communication towers or other structures to minimize impacts on wildlife. If

collocation is not possible, locate new communication towers next to existing towers.

- Down-shield security lighting for on-ground facilities and equipment to keep light within the boundaries of the site.
- Avoid constructing communication towers and power lines around wetlands.
- Avoid tower designs featuring guy wires if the structure is to be located in known raptor or waterbird concentration areas or in major avian migration routes. If guy wires are absolutely necessary, place visual markers on the wires to prevent birds from colliding with the wires.

Wildland Fire Ecology and Management

Fire Control

The applicant or lessee would implement fire prevention and control measures including, but not limited to:

- Requiring construction crews to carry fire extinguishers in their vehicles and/or equipment
- Requiring construction crews to be trained in the proper use of fire extinguishers
- Contracting with the local fire district to provide fire protection
- Maintaining buffers around work areas where there is a risk of fire as a result of construction activities

Fuels Management

- Construct fuel breaks or green strips to protect WUI communities and resources and to provide for firefighter and public safety using mechanical, chemical, biological, prescribed grazing, and prescribed fire treatments.
- Construct fuel breaks and green strips in areas containing a good understory of native perennials in order to successfully compete with and deter the establishment of annual species.
- Where possible, construct fuel breaks and green strips to blend with the surrounding topography. Use existing disturbances, such as roads, seeding, burned areas, and natural barriers, as strategic places for fuel breaks.
- Seed green strips in areas that do not have a good understory of desirable native perennials that can successfully compete with annual species.

- Maintain fuel breaks and green strips to ensure that they effectively change fire behavior.
- Where practicable and suitable, reduce new surface disturbance and minimize potential impacts on resource values by constructing fuel breaks and green strips in areas previously disturbed. Areas to be considered include roadways, previously burned areas, and cheatgrass-dominated sites.
- Give priority for implementing specific species (e.g., lesser prairie chicken and American burying beetle) habitat restoration projects in annual grasslands first to sites that are next to or surrounded by key habitats.
- Strategically place and maintain pretreated strips and areas (e.g., mowing, applying herbicide, and strictly managing grazed strips) to aid in controlling wildfire if it should occur near key habitats or important restoration areas, such as where investments in restoration have already been made.

Fire Suppression

- Avoid, whenever possible, burning out unburned islands of native vegetation.
- Avoid surface-disturbing suppression in riparian areas whenever possible.
- Do not construct fire lines using heavy equipment in riparian stream zones, and do not apply fire retardant to water.
- Avoid the application of retardant or foam within 330 feet of the stream channel or waterway, when possible. Aerial application and use of retardants and foams should be consistent with national policy guidelines established by the National Office of Fire and Aviation.
- The unit administrator should determine whether there have been any adverse effects on federally listed species. This would apply in the following circumstances:
  - if the unit administrator determines that retardant or surfactant foam must be used within 330 feet of a waterway or stream channel due to threats to life or property
  - if alternative line construction tactics are not feasible because of terrain constraints, congested areas, or lack of ground personnel
  - if potential damage to natural resources outweighs possible loss of aquatic life

  - if the action agency determines that adverse effects were incurred by federally listed species or their habitats

- In such cases, the action agency must consult with the USFWS, as required by 50 CFR, Part 402.05 (Emergencies), as soon as practicable.
- Close lands temporarily to other uses in areas where fire suppression is being implemented.

In addition to the general suppression constraints, the following constraints are to be implemented within the vicinity of special status aquatic species habitats. Special status terrestrial species (e.g., lesser prairie chicken and American burying beetle) fire suppression BMPs apply plus the following:

- Impound or divert streamflow by mechanical or other means in order to facilitate extraction of water from the stream for fire suppression.
- Screen the intake end of the draft hose to prevent entry of fish. Screen opening size should be a maximum of 3/16 inch.
- Do not allow water extraction to exceed the ability of the stream inflow to maintain water levels at the time initial attack began. If the water level drops below this predetermined level, cease all water removal immediately until water levels are recharged.
- For streams currently occupied by Arkansas River shiner or other listed aquatic species or within designated critical habitat (e.g., rabbits-foot mussel and Neosho mucket), do not allow water to be extracted from ponds or pools if stream inflow is minimal (for example, during droughts) and extracting water would lower the pond or pool level.
- When possible, do not allow fire control lines to cross or terminate at the stream channel.
- Terminate control lines at the edge of the riparian zone at a location determined appropriate to meet fire suppression objectives, based on fire behavior, vegetation and fuel types, and firefighter safety.
- Use available maps and spatial data depicting lesser prairie chicken habitats or habitat for other listed species vulnerable to fire management in suppression response and staging decisions.
- Continue improving firefighter awareness of the importance of sagebrush habitat.
- Continue the use of resource advisors who are familiar with local lesser prairie chicken habitat needs, or the needs for other listed species vulnerable to fire management; who are trained in

suppression procedures; and who can advise about most appropriate tactics, during initial and extended attack.

Emergency Stabilization and Rehabilitation (ES&R)
Stabilize areas that have low potential to naturally revegetate and that have high wind and soil erosion potential. Treatments include the following:

- Installing water bars and other drainage diversions, culverts along fire roads, dozer lines, and other cleared areas
- Seeding and planting to provide vegetation cover
- Spreading mulch to protect bare soil and discourage runoff
- Repairing damaged roads and drainage facilities
- Clearing stream channels of structures or debris that are deposited by suppression activities
- Installing erosion control and channel stabilization structures
- Closing areas to livestock grazing to promote success of natural revegetation and establishment of seeded species
- Closing lands temporarily to other uses during emergency stabilization and rehabilitation practices if activities inhibit the attainment of treatment goals

Cultural/Paleontological Resources and Tribal Consultation

The Applicant will recognize the need to protect cultural resources on the project locations and commit to the following:

- Prohibiting all project workers from collecting artifacts or disturbing cultural resources in any area under any circumstances.
- Avoiding impacts on significant or unevaluated cultural resources. If cultural resources are discovered during construction, work shall immediately be stopped, the affected site secured, and the BIA and THPO notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.
- If avoidance isn't feasible, developing mitigation through consultation.

Best Management Practices

In situations where a proposed undertaking has the potential to affect the physical integrity of significant cultural resources, numerous measures can be applied to reduce or eliminate the effects. BIA archeologists work through consultation with the tribes, SHPOs, and THPOs to determine which practice is appropriate. Application of BMPs depends on the nature of the undertaking and the nature of the significant cultural resources.

Avoidance

Avoidance, through modification of the proposed undertaking, is the primary and preferred measure used to protect cultural resources. This can be accomplished at the project planning stage.

Monitoring

In situations where avoidance of adverse effects is not feasible, or there is a determination of no adverse effects, but the potential remains for there to be adverse effects through inadvertent discovery, a BIA-permitted archeologist may monitor construction activities. The presence of a monitor, which may be a tribal appointee, is to ensure that buried cultural materials are immediately identified and that construction activities in that area are halted to avoid further impacts on the site. Before BIA authorization of the project, the project proponent submits a discovery plan outlining the way in which cultural resources will be treated and the responsibilities of the project proponent. BIA archeologists review this plan, and it is submitted to the SHPO and THPO for concurrence. In the case where monitoring results in a discovery situation, the discovery plan is enacted. Depending on the nature of the discovery, the project may be allowed to proceed or be redesigned. Data recovery may also be required.

Standard Measures to Reduce Visual Contrast

When a proposed project is found to be within the contributing setting of a historic property, an assessment of potential impacts is conducted through viewshed analyses, on-site inspection, and photo inspection. For historic trails, such as Chisholm and Santa Fe NHTs, protection measures would be carried out similarly to other historic properties if any project were found to be located within the designated buffer of a contributing portion of the historic trail. When a proposed project is outside of the designated buffer of the trail but found to be within the viewshed that contributes to NRHP eligibility, analyses of potential impacts on the integrity of the setting will be carried out in the same way as other properties where setting is an aspect of integrity. Best management practices used to ensure that the contributing viewshed of historic properties is not adversely affected include:

- Consolidating project facilities among oil, gas, and geothermal developers, which also facilitates cumulative analysis
- Developing coordinated road and pipeline systems
- Reducing the amount of surface development by consolidating facilities (e.g., develop bottom hole wells using directional drilling from a single surface well location)
- Using low-profile facilities
- Using proper sighting and location to maximize the use of topography and vegetation to screen development

- Designing projects to blend with topographic forms and existing vegetation patterns
- Using environmental coloration or advanced camouflage techniques to break up visual intrusion of facilities that cannot be completely hidden
- Using broken linear patterns for road developments to screen roads as much as possible (including feathering or blending of the edges of linear ROWs to break up the linearity)
- Designing linear facilities and seismic lines to run parallel to key observation points rather than perpendicular
- Crossing the historic trails at right angles with linear developments when it would reduce the physical and visual impact
- Modifying the orientation of facilities to present less of a visual impact (e.g., a facility with several tanks lined up so that one obscures the visibility of the others)

Native American Consultation

In addition to consultation with the State Historic Preservation Office and Tribal Historic Preservation Office, the BIA conducts Native American Consultation in compliance with Section 106 of the National Historic Preservation Act, Native American Graves Protection and Repatriation Act, Archaeological Resources Protection Act, American Indian Religious Freedom Act of 1978, and other applicable laws, regulations, and policies.

Paleontological Resources

The Applicant will recognize the need to protect paleontological resources on the project locations and commit to the following:

- Prohibiting all project workers from collecting fossil remains of animals or plants in any area under any circumstances.
- Avoiding impacts on significant or unevaluated paleontological resources. If paleontological resources are discovered during construction, work shall immediately be stopped, the affected site secured, and the BIA notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.
- If avoidance isn't feasible, developing mitigation.

Best Management Practices

In situations where a proposed undertaking has the potential to affect the physical integrity of paleontological resources, numerous measures can be applied to reduce or eliminate the effects. Application of BMPs depends on the nature of the undertaking and the nature of the paleontological resources.

Avoidance
Avoidance, through modification of the proposed undertaking, is the primary and preferred measure used to protect paleontological resources. This can be accomplished at the project planning stage.

Monitoring
In situations where avoidance of adverse effects is not feasible, or there is a determination of no adverse effects, but the potential remains for there to be adverse effects through inadvertent discovery, a BIA-permitted archeologist may monitor construction activities. In the case where monitoring results in a discovery situation of fossil remains of plants or animals, the discovery plan is enacted. Depending on the nature of the discovery, the project may be allowed to proceed or be redesigned. Data recovery may also be required.

Visual Resources

Best Management Practices
The following considerations can be helpful in choosing a project location:

- Use natural (topography and vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.
- Paint facilities a color that would blend with the environment.
- Contour disturbed areas to approximate the original contours of the landscape.
- Design roads and facility sites to minimize visual impacts.
- Visual contrasts or impacts decrease as the distance between the viewer and the proposed development increases, so projects should be located as far away from prominent viewing locations as possible.
- The human eye is naturally drawn to prominent topographic features, so projects should not be located on or near such features.
- The shape and placement of projects should be designed to blend with topographic forms and existing vegetation patterns.
- Both topographic features and vegetation should be used to screen proposed development.

Techniques that help reduce surface disturbance are as follows:

- Collocating several projects within the same right-of-way
- Placing underground utilities either along the edge or under the surface of an existing road
- Placing several underground utilities within the same trench

- Establishing limits of disturbance that reflect the minimum area required for construction
- Consolidating development of a similar nature within a common structure
- Planning projects so that they use existing infrastructure, whenever possible
- Maximizing slope when it is aesthetically and technically appropriate
- Locating construction staging and administrative areas in less visually sensitive areas
- Requiring restoration of disturbed areas no longer required after construction has been completed

Every landscape has the basic elements of form, line, color, and texture. Repeating these elements reduces contrasts between the landscape and the proposed activity or development and results in less of a visual impact.

The following considerations can be helpful in making color selections:

- Natural surfaces are usually well textured and have shade and shadow effects that darken them; surfaces of structures are usually smooth and reflect light even if dull-finish paint is used; as a general rule, colors on smooth man-made structures need to be two or three shades darker than the background colors to compensate for the shadow patterns created by naturally textured surfaces that make colors appear darker.
- The color for all structures should be selected to achieve the best blending with the surrounding landscape in both summer and winter.
- Galvanized steel on utility structures should be darkened to prevent glare; low-luster paints should be used wherever possible to help reduce glare (although it is almost impossible to remove all sun glare).
- Color (hue) is most effective within 1,320 feet; beyond that point, color becomes more difficult to distinguish, and tone or value determines visibility and resulting visual contrast.
- Surface disturbance of western mineralized soils can result in strong color contrasts; in many situations, this suggests that the area should be avoided as a location for the proposed development or that color selections for the man-made facilities or disturbance might need to reflect the lighter color soil revealed by the disturbance.

- Colors should be selected from a distance that permits viewing of the entire landscape surrounding the proposed development.
- Colors that blend with or are in harmony with the existing colors of the earth, rocks, and vegetation are usually more visually pleasing and attract less attention than colors that are chosen to match the color of the sky.

Another effective method of reducing the visual impact from a proposed activity or development is to retain as much of the vegetation as possible and where practical to use it to screen the development from public viewing areas. Some other techniques are as follows:

- Design vegetation openings to repeat natural openings in the landscape; edges that are scalloped and irregular are more natural looking; straight line edges should be avoided.
- Minimize the impact on existing vegetation by the following:
  - partially clearing the limits of construction rather than clearing the entire area (leaving islands of vegetation results in a more natural look)
  - using irregular clearing shapes
  - feathering and thinning the edges of the cleared areas to reduce strong lines of contrast; to create a more natural look along an edge, retain a good mix of tree/shrub species and sizes
  - disposing of all slash

The visual impact from new structures placed on the existing landscape can be reduced by using the following:

- Repeating form, line, color, and texture
- Minimizing the number of structures and combining different activities in one structure wherever possible
- Using earth-tone paints and stains and self-weathering metals
- Chemically treating wood so that it can be allowed to self weather
- Using natural stone in wall surfaces
- Burying all or part of the structure
- Selecting paint finishes with low levels of reflectivity
- Using rustic designs and native building materials
- Using natural-appearing forms to complement landscape character

- Screening the structure from view with natural landforms and vegetation

The scars from excessive cut and fill during construction in the southern great plains often leave long-lasting negative visual impacts. This is especially true of activities that disturb the highly mineralized soils of the southern great plains. Once the dark surface soil layer is disturbed, exposing the much lighter subsurface soil, a strong contrast is created that may take years to recover.

There are a number of ways to reduce the contrasts created by earthwork construction, the most important of which are proper location and alignment. Fitting the proposed development to the existing landforms so as to minimize the size of cuts and fills will greatly reduce visual impacts from earthwork. To reduce strong visual impacts, other earthwork design techniques should be considered, where appropriate, such as balancing cut and fill and constructing with all fill or all cut. Other strategies are as follows:

- Hauling in or hauling out excessive earth cut or fill in sensitive viewing areas
- Rounding or warping slopes (shaping cuts and fills to appear as natural forms)
- Bending slopes to match existing landforms
- Retaining rock formations, vegetation, and drainage, whenever possible
- Blasting split-face rock (cutting rock areas so that the resulting rock forms are irregular in shape), as opposed to making uniform "highway" rock cuts
- Toning down freshly broken rock faces using asphalt emulsions and rock stains
- Using retaining walls to reduce the amount and extent of earthwork
- Retaining vegetation by using retaining walls, reducing surface disturbance, and protecting roots from damage during excavation
- Avoiding soil types that will generate strong contrasts with the surrounding landscape when they are disturbed
- Prohibiting dumping of excess earth/rock on downhill slopes

Strategies for restoration and reclamation are akin to the design strategies for earthwork, as well as the design fundamentals of repeating form, line, color, and texture and reducing unnecessary disturbance. The objectives of restoration and reclamation include reducing long-term visual impacts by decreasing the amount of disturbed area and blending the disturbed area into the natural environment, while still providing for project operations.

Though restoration and reclamation are a separate part of project design, they should not be forgotten or ignored. It is always a good idea to require a restoration/reclamation plan as part of the original design package. All areas of disturbance that are not needed for operation and maintenance should be restored as closely as possible to the previous condition.

Several strategies that can enhance any restoration or reclamation are as follows:

- Striping, saving, and replacing topsoil (6-inch surface layer) on disturbed earth surfaces
- Enhancing vegetation by
  - mulching cleared areas
  - furrowing slopes
  - using planting holes on cut/fill slopes to retain water
  - choosing native plant species
  - fertilizing, mulching, and watering vegetation
  - replacing soil, brush, rocks, and forest debris over disturbed earth surfaces when appropriate, thus allowing for natural regeneration rather than introducing an unnatural looking grass cover
- Minimizing the number of structures and combining different activities in one structure wherever possible

Projects and activities associated with linear alignments include rights-of-way, roads, trails, pipeline developments, and underground and overhead utility lines. The visual impact of a linear project depends largely on where it is located and how it is molded to the natural terrain. Proper location can often contribute significantly to reducing line and color impacts, making other measures either unnecessary or less costly and easier to accomplish.

Finding the best route for linear alignments involves the following:

- Identifying and analyzing all possible corridor alignments and selecting the one most feasible for the proposed project
- Locating the proposed project within the selected corridor after a thorough analysis of all environmental, socioeconomic, and engineering factors

There are several major considerations for determining an alignment, as follows:

- Topography is a crucial element in alignment selection. Visually, it can be used to subordinate or hide man-made changes in the

landscape. Projects located at breaks in topography or behind tree groupings are usually of much less visual impact than projects on steep side slopes. By taking advantage of natural topographic features, cut and fill slopes can be greatly minimized.

- Topographic breaks frequently exhibit a natural line element that the proposed alignments can repeat or blend with to strengthen the design. This line element is partly established by a visual shadow zone, which will further reduce the contrast of the project.
- Soils are especially important when selecting an alignment and should be analyzed for stability and fertility, and a revegetation program should be planned.
- Hydrological conditions can strongly affect the visual impact of buried and surface construction. The risks of surface and subsurface erosion within the corridor should be analyzed and evaluated.

Crossings with other linear features or structures should be designed to minimize their visual impact, as follows:

- When possible, crossings should be made at right angles.
- Structures should be set as far back from the crossing as possible.
- In areas with tree and shrub cover, the rights-of-way and structures should be screened from the crossing area.

It is important to remember that when a system is planned and designed, the following parameters apply:

- Other services that will be needed to support the system must be analyzed and included in the design considerations. For example, a construction access road, electrical power with a backup system, and sanitation facilities are usually needed for most projects. At times, the visual impact of the support facilities is the deciding factor for the specific location of the main project.
- How the system is to be maintained must also be considered.
- A rehabilitation plan should be developed. All areas of disturbance that are not needed for operation and maintenance should be restored as closely as possible to previous conditions.

The engineering design, landscape design, and visual considerations for a linear alignment must be determined together to ensure that all three are addressed and included in the final design solution.

Water Resources

- Implement a Storm Water Pollution Prevention Plan and BMPs for the construction of the access roadway and proposed well pad to prevent erosion and sedimentation.
- Avoid or minimize topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Protect domestic or stock watering wells by prohibiting surface occupancy and disturbance within 660 feet of domestic watering wells.

Livestock Grazing

Best Management Practices

- Use livestock grazing as an intensively managed prescriptive grazing practice to control cheatgrass and noxious or invasive weeds.
- In spring, graze for a short duration earlier in the season so that sufficient soil moisture remains for plant recovery.
- Implement short-duration grazing (up to 3 weeks, with more animals in smaller pastures) where infrastructure permits it during the growing season. Avoid regrazing the same plants in one growing season.
- Rotate livestock use areas year to year and not in the same place at the same time each year.
- Graze during the dormant season to allow plants to recover every year.
- Allow for rest and recovery periods before or after grazing during critical growth period.
- Maintain range developments to maintain or improve distribution.
- Avoid use most years in areas of valuable woody plants during times when they are selected.
- Avoid selective use on key species by rest following heavy dormant season use.
- Graze established seedings to avoid decadent plants and poor nutrient cycles, particularly in crested wheatgrass seedings.
- Avoid the following grazing management practices:
  - long seasonal use with no recovery time
  - heavy use (which stresses plants)
  - little or no regrowth before winter, when there is little stubble for root crown protection

  - use at the same time every year, repeating the stress
  - no rest or growing season recovery (little recovery with long seasons of use)
  - little or ineffective herding
  - salt placed in the same locations year after year
  - livestock left behind after pasture moves
  - grazing during the critical growth period year after year
- Do no graze seedings until the plants are well established.
- Use rotation or deferment to vary the timing of grazing to allow for periodic rest of upland vegetation during critical growth periods.
- Provide occasional rest to allow whole growing season for recovery.
- When using livestock to control cheatgrass or noxious or invasive weeds, match animal dietary preference or tolerance to the target species.
- Use the target weed's biology when developing a grazing strategy.
- Manage heavy grazing on target weed species to account for any intermixed desirable species.
- Manage animals' post-treatment grazing to contain weed seeds.

Best Management Practices—Vegetation/Riparian Zone Management Guidelines
Achieve proper functioning condition by managing livestock grazing with appropriate riparian management practices.

- Graze earlier in the season when cattle use uplands.
- Graze plants only once or twice per year.
- Avoid hot season grazing of riparian areas.
- Allow regrowth before winter by grazing early enough for substantial plant regrowth during the growing season to slow spring flows and retain soil.
- For maintenance or improvement of willows, allow two growing seasons rest before late season use.
- Provide and maintain alternate water sources for better distribution.
- In addition to the grazing management practices to avoid listed above, avoid the following:
  - hot season grazing in big pastures with little riparian area (poor distribution)

- few waters and only riparian waters (poor distribution)
- heavy use (stresses plants, tramples banks, and consumes last year's wood)
- little or no regrowth before winter (little stubble for sediment)

Minerals and Energy

Water Pollution and Prevention

General BMPs
To reduce the impact of accidental releases to surface waters, do not site construction or production equipment adjacent to surface water pathways to lakes, streams (including dry washes and ephemeral streams), wetlands, drainage and irrigation ditches, canals, flood plains, and shallow water wells unless proper permitting is secured.

- All applicable personnel (both company and contractor) should receive training to provide for proper operation and maintenance of the equipment. This training should include start-up and shutdown procedures, normal operating procedures, and emergency response procedures, in the event of a leak or spill of a hazardous substance.
- Operating procedures should provide for early identification of developing corrosion problems, failure-prone equipment, and malfunctions so that corrective action can be taken before environmental or safety consequences occur. Frequency of failure analysis should be considered to aid in scheduling equipment replacements.
- Advance planning and arrangements should include availability and ready access to vacuum trucks and to similar pickup equipment to recover any spilled material.

Air Pollution Prevention

General Facility BMPs
In general terms, all facilities that have the potential to emit air contaminants should be maintained in good working order and operated properly during facility operations. Each operator is encouraged to establish and maintain a program to replace, repair, and/or maintain facilities to keep them in good working order. The minimum expectations of such a program include:

- Compliance with the manufacturer's specifications and recommendations for installation and operation, and performance and effect on emissions

- An owner- or operator-developed inspection and maintenance plan for such equipment that is consistent with good air pollution control practices. This may include the cleaning and routine inspection of equipment from which emissions may result; conducting regularly scheduled audio, visual, and olfactory inspections of potential sources of pollutants; and recording them in a log book.

BMPs for construction equipment

The reduction of fugitive emissions of gases or vapor from equipment due to leaks and other unintended or irregular releases of gases is significant, as fugitive emissions contribute to air pollution and climate change, as well as the economic cost of lost commodities. Because of the large number of potential leak sources at construction areas, fugitive emissions can be a significant proportion of total emissions. Though the quantities of leaked gases may be small, gases that have serious health or environmental impacts can cause a significant problem.

- Use dust control measures (spraying of water) to control dust, if necessary. Water used for dust abatement should not contain oil or solvents. Do not use dust abatement as a means of water disposal.
- As appropriate, convert gas pneumatic controls to instrument air to eliminate methane emissions.

Hydrogen Sulfide Emissions BMPs

If construction activities occur where hydrogen sulfide (H_2S) is present, BMPs include:

- During construction activities occurring where H_2S is reasonably expected to be present, maintain and implement a vigorous safety plan to include H_2S monitors on-site with alarms and sirens, appropriate signs, and the mandatory wearing of individual H_2S monitors for personal safety and protection. Various guidance, such as BIA's On-Shore Order #6, provide details as to appropriate criteria for detection and monitoring equipment and signage.

Migratory Birds

The Oklahoma Ecological Services Field Office of the US Fish and Wildlife Service has developed a document, Oklahoma Ecological Services Field Office Migratory Bird and Eagle Impact Avoidance Measures for Actions Associated with Oil and Gas Projects (April 2014), that is intended not only to assist the oil and gas industry but other industries and projects occurring in the state with project evaluation and compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) for activities within Oklahoma.

All utility lines, including gathering pipelines and electric and fiber optic lines, essential to the proposed project would be installed underground.

- Locate the proposed ground disturbance and utility corridors in areas with existing disturbances to the extent possible.
- Install covers under drip buckets and spigots.

Best Management Practices—Fluid Mineral Leasing

Exploration

- Install temporary gates for use during the course of operations, unless the fence was immediately repaired. On completion of operations, restore fences to at least their original condition.
- Mitigate all activities off maintained roads that create excessive surface rutting during adverse conditions affecting soil moisture caused by such climatic factors as thawing, heavy rains, snow, flooding, or drought.
- Limit off-road vehicle travel to that necessary to complete the geophysical operations.
- Encourage specialized low-surface impact equipment (such as wide- or balloon-tired vehicles and ATVs) or helicopters for any activities in off-road areas to protect the fragile soils or other resources.
- Locate powder magazines at least a mile from traveled roads, unless otherwise authorized after analysis or review. Require loaded shot holes and charges to be attended at all times (30 CR 56.6100 and 56.6306; 43 CFR 3150).
- Require all trash, flagging, and lath to be removed and hauled to an authorized disposal site. Do not allow oil or lubricants to be drained onto the ground surface.
- Require the undersides of all heavy equipment to be washed before being driven onto BIA-administered lands and discourage driving through or parking on noxious weed infestations.
- Stockpile all available topsoil from all disturbances for use in reclamation projects.
- Stockpile, shred, and use removed vegetation as mulch during site rehabilitation.
- Return geophysical drill hole cuttings to the hole if possible, or at a minimum, rake and spread it out so as not to impede vegetation regrowth or to create erosion problems.

Preconstruction

- Use existing routes to the extent possible. Keep additional roads, if needed, to an absolute minimum and have the BIA Administrative Officer approve the location of routes before construction.
- Restrict off-road travel to terrain with less than 30 percent slopes; 20 percent if highly erodible.
- Limit proposed surface disturbance and vehicular travel to the approved lease location and access route.

Transportation and Access

- Construction personnel would stay within the approved ROW or would follow designated access roads.
- Plan transportation to reduce vehicle density.
- Post speed limits on roads.
- Use existing routes to the extent possible, upgrading as needed.
- Minimize the size of facility sites and types of roads to reduce surface disturbance.
- Plan roads and facility sites to minimize visual impacts.
- No new NEPA analysis would be required for road maintenance within the defined maintenance disturbance/easement footprint, which is defined as previously disturbed or maintained. Disturbance outside of the defined maintenance disturbance/easement footprint or road realignment would be subject to additional NEPA compliance.

Lands and Realty

Power lines should be constructed in accordance to standards outlined in Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 1996 by Avian Power Line Interaction Committee (APLIC 2006) or based on best science available. Right-of-way applicants will assume the burden and expense of proving that proposed pole designs not shown in this publication are safe for raptors. A raptor expert approved by the Authorized Officer will provide such proof.

ROWs and other lands and realty authorizations would contain noxious weed and invasive plant management terms or stipulations for all ground-disturbing actions. Examples of these authorizations are power lines, pipelines, transmission corridors, energy development sites and related development, and gravel pits. This would require the following:

- Avoiding locating ROWs on steep slopes
- Sharing any common ROWs whenever possible

- Managing weeds during the life of the ROW or authorization to prevent or minimize weed introduction or spread
- Abandoning the ROW or authorization to establish competitive vegetation on bare ground areas

Public Health and Safety

- Store chemicals properly (including secondary containment).
- Keep sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Minimize the use of hazardous materials whenever possible.
- Minimize the quantity of hazardous materials stored on the project site at any given time.
- Ensure that all hazardous materials and chemicals stored on-site are stored properly (secured, covered, secondary containment, incompatible materials separated, etc.).
- Collect and dispose of any spent or residual hazardous materials/wastes in accordance with federal regulations.

Best Management Practices—Wildlife Damage Management Activities

- All EPA use restrictions and requirements for toxicants are to be followed where control devices are used on BIA-administered lands. The BIA must be notified before any toxicants are deployed, and a map of the treatment area must be provided. Adequate signs must be provided and maintained.
- All equipment (including traps, snares, and M-44s) and warning signs will be removed from bird-hunting areas, identified in coordination with state wildlife agencies, no later than 1 week before the opening day of the hunting season.

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Appendix C
BLM Mineral Stipulations

APPENDIX C
BLM MINERAL STIPULATIONS

All SMA related stipulations are defined by individual SMAs at the time of the lease. Though BLM has identified current stipulations in the following stipulation table, the SMA may change the specifics of the stipulation at the time of the lease sale.

BLM-ADMINISTERED SURFACE AND FEDERAL MINERAL ESTATE

Fluid Minerals- NSO Stipulations

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
NSO-2	Proposed	Floodplains	NSO	**Stipulation:** All or portions of the lands under this lease lie in or are adjacent to a major watercourse and are therefore subject to periodic flooding. Surface occupancy of areas within a Federal Emergency Management Agency (FEMA) or similarly identified floodplain map will not be allowed. Directional drilling from outside the floodplain into federal minerals beneath the floodplain is allowed, as long as it does not adversely affect the natural hydrology and geomorphology. **Purpose:** To manage surface and ground water quality to maintain, improve, or restore the chemical, physical, and biological function of water resources.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Exception: An exemption allowing surface occupancy beyond floodway encroachment lines, the lines marking the limits of floodways on Federal, State, and local flood plain maps, or the Regulatory Flood Fringe, the area on either side of the floodway, may be allowed below the base flood elevation (BFE) if the lessee can demonstrate that the proposed action has sufficient mitigation, floodproofing, and engineering design features to prevent adverse impacts on the chemical, physical, and biological functions of the relevant floodplain, floodway, and adjacent body of water contributing to flooding, as defined by the official FEMA Flood Boundary Floodway Map (FBFM) and the FEMA Flood Hazard Boundary Map (FHBM), and a variance is permitted by the State's Coordinating Agency. **Waiver and/or Modification:** None
NSO-3	Proposed	Sole Source Surface Drinking Water Supply	NSO	**Stipulation:** NSO within 1,000 feet of waterbodies identified by the State of Texas in 30 TAC Section 307.10(2). **Purpose:** To protect public drinking water supplies. **Waiver, Exception, and/or Modification:** None
NSO-4	Proposed	Public Municipal Water Wells	NSO	**Stipulation:** NSO within 1-mile of public municipal water wells by the State of Oklahoma in OAC 785:45. **Objective:** To protect public drinking water supplies. **Waiver, Exception, and/or Modification:** None
NSO-6	Proposed	Riparian-Wetland Areas and Waterbodies	NSO	**Stipulation:** All or portions of the lands under this lease contain wetland-riparian areas and/or waterbodies. Riparian-wetland areas and waterbodies include but are not limited to perennial, ephemeral, or intermittent streams; springs, seeps, lakes, ponds, reservoirs, and playas. No surface occupancy is allowed within these areas and within an area that begins and extends 415 feet landward from the outside edge of the riparian-wetland area or waterbody, as determined by the BLM biologist prior to any surface-disturbing activities.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Purpose: Manage surface water and groundwater quality to maintain, improve, or restore the chemical, physical, and biological function of water resources. **Exception:** An exception may be granted if the lessee can demonstrate and the NEPA analysis has determined that there would be no adverse impacts to the natural hydrology and geomorphology associated with the wetland-riparian area and/or waterbody. **Modification:** A modification may be granted if it is determined that a portion of the area does not qualify as a riparian-wetland area or waterbody, or if scientific research indicates that a lesser or more restrictive buffer is appropriate for managing these riparian-wetland/waterbody areas. **Waiver:** A waiver may be granted if it is determined that the entire riparian-wetland area or waterbody does not qualify as a riparian-wetland area or waterbody, or if scientific research indicates that a buffer is not necessary for managing these riparian-wetland/waterbody areas.
NSO-8	Proposed	National and State Historic Trails	NSO	**Stipulation:** NSO within the National Scenic and Historic Trails Right-of-Way and Management Corridor, or similar protected area or measures identified in the applicable land use plan. **Purpose:** To safeguard the nature and purposes of the National Scenic and Historic Trails. **Waiver:** This stipulation may be waived if, in coordination with the National Scenic and Historic Trails Administering Agency, it is determined that the stipulation is not needed to safeguard the nature and purposes of the National Scenic and Historic Trails. **Exception:** An exception may be granted, if, as a result of the required National Scenic and Historic Trails inventory, no resources, qualities, values, or associated settings, or primary use or uses are present, resulting in no adverse impacts to the

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				nature and purposes of the National Scenic and Historic Trails; or if the operator agrees to implement avoidance or mitigation measures developed in coordination with the National Scenic and Historic Trails administering agency that render the project compatible and does not substantially interfere with the nature and purposes of the National Scenic and Historic Trails. **Modification:** This stipulation may be modified to reduce the NSO area if, in coordination with the National Scenic and Historic Trails administering agency, it is determined that the reduced NSO area is adequate to safeguard the nature and purposes of the National Scenic and Historic Trails.
NSO-9	(OSU-1, OK RMP)	Oklahoma State University	NSO	**Stipulation:** This lease or portions of this lease fall within Oklahoma State University (OSU) – Lake Carl Blackwell lands. No occupancy or other activity is allowed on OSU lands within 660 feet of Lake Carl Blackwell or other designated OSU facilities. The lessee will coordinate all permitting and operational activities with an authorized OSU official. **Purpose:** To protect Lake Carl Blackwell and associated university structures from impacts associated with oil and gas development. **Waiver, Exception, and/or Modification:** None
NSO-10	Proposed	Cross Bar RMA	NSO	**Stipulation:** This lease or a portion of the lease is located within the Cross Bar RMA. No surface occupancy within the Cross Bar RMA boundaries. **Purpose:** To protect the Cross Bar RMA surface resources and visitor recreation experience and provide for a diversity of recreational opportunities. **Waiver, Exception, and/or Modification:** None

Fluid Mineral- CSU Stipulations

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
CSU-1	Proposed	Lands with Sensitive Soils	CSU	**Stipulation:** The lease or portions of the lease contain Sensitive Soils. Soils susceptible to erosion at excessive rates (per NRCS Highly Erodible Land (HEL) definition and Skidmore Wind Erodibility Groups 1 or 2) and/or Biological Soil Crusts (BSC) (per U.S. Department of Interior Technical reference 1730-2 2001; *Biological Soil Crusts: Ecology and Management)*, which are found to be sensitive to surface disturbance, shall be avoided. Parcels exhibiting Sensitive Soil characteristics shall undergo a site-specific survey by a BLM-approved specialist to identify necessary special design, construction, implementation, mitigations, and/or reclamation measures. Surface-disturbing activities shall require re-location beyond standard lease terms and conditions (i.e., 656 feet). The mandated relocation, beyond standard lease terms and conditions, shall be communicated to the lessee/operator through a Conditions of Approval (COA) at the Application for Permit to Drill (APD) stage to avoid adverse impacts to Sensitive Soils on or near the lease parcel. If avoidance of Sensitive Soils is unattainable under standard lease terms and conditions, the operator/lessee shall be required to submit an operation plan to the BLM authorized officer. The operation plan shall require, but is not limited to, special design, construction, and implementation measures describing how impacts to Sensitive Soils (Biological Soil Crusts and NRCS identified Highly Erodible Soils) would be prevented or minimized, and how disturbed sited would be successfully reclaimed. The operator/lessee shall be subject to all or a combination of requirements, including, but not limited to: • Areas of existing surface disturbance • Co-location of development activities and operations • Development and implementation of effective erosion control and soil protection plan • Use of closed-loop fluids systems **Purpose:** To prevent degradation of Sensitive Soils and maintain or improve soil composition. **Waiver:** None

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Exception: The BLM authorized officer shall provide for site-specific exception(s) if the operator/lessee's operation plan provides for appropriate levels of special design, construction, implementation, and reclamation measures. **Modification:** None

CSU-4	Proposed	American Burying Beetle (Proposed for delisting)	CSU	**Stipulation:** This lease may contain suitable habitat for American Burying Beetle (ABB), a federally listed endangered species. The lessee is required to adhere to the current protocol for ABB as determined by USFWS, and may be subject to constraints including but not limited to:
				• A clearance survey conducted by a qualified biologist may be required in all ABB suitable habitat.
				  ○ If the survey is positive and reveals that beetles are present, no construction or ground-disturbing activities will be allowed during the active season while the ABB remains above ground unless the lessee is issued a take permit by the USFWS.
				  ○ If the clearance survey is negative, surface disturbance and construction will be allowed during the active season. A new survey may be required for any new projects proposed in the next active season when the beetles emerge above ground.
				
				Purpose: Protect, preserve, and enhance federally listed, proposed, or candidate species and their habitats and promote the recovery of these species for BLM-related actions, in accordance with Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 USC, Section 1531 et seq.).
				
				Waiver, Exception, and/or Modification: Determined during consultation with the USFWS.

CSU-6	Proposed	Federal coal	CSU	**Stipulation:** Federal coal resources exist on this lease or a portion of the lease. Federal oil and gas operators must coordinate development with the Federal coal lessee, and vice versa. Operations authorized by this lease may be altered or modified by the authorized officer in order to conserve and protect the coal mineral resources and provide for simultaneous operations.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Purpose: To provide for both the leasing and development of federal coal deposits and fluid minerals in accordance with existing laws, regulations, orders, and policy. **Waiver, Exception, and/or Modification:** None
CSU-7	Proposed	Visual Resource Management (VRM) Class III	CSU	**Stipulation:** The objective of this VRM class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. Therefore, surface activities in this parcel are subject to case-by-case basis operational constraints to minimize visual impacts, including, but not limited to: • Utilize existing disturbance. • Facilities or structures such as power lines, oil wells, and storage tanks are required to be screened, painted, and designed to blend with the surrounding landscape except where safety indicates otherwise. • The proposed pad size must be reduced to the minimum necessary for safe drilling operations. Final well pad dimensions will be determined during the permit approval process. • All aboveground facilities, structures, appurtenances, and pipelines must be low profile (less than 8 feet in height) unless concealed behind landscape features and determined not to impact the viewshed. • All aboveground facilities, structures, appurtenances, and pipelines will be painted with a site-specific non-reflective (flat) paint color. • Upon completion of the well and installation of the production facilities (if the well is a producer) the pad will be reclaimed back to a size necessary for production operations only. The edges will be recontoured and the extra caliche and pad material (excluding top soil) will be hauled off-site. • Reclaimed areas will be grid rolled and reseeded. Mitigation needed to meet VRM Class III management objectives will be determined on a case-by-case basis for each proposed lease activity.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Purpose: Maintain the scenic quality and natural aesthetics of cultural landscapes and other areas with high-quality visual resources that are considered important because of their social, economic, and environmental benefits and managed for overall multiple use in accordance with VRM classification objectives currently described in the BLM Visual Resource Inventory Handbook (H-8410-1, BLM 1986a). **Waiver, Exception, and/or Modification:** None
CSU-8	Proposed	Special Status Bat Species (SSBS)	CSU	**Stipulation:** The lease or portions of the lease is known to contain Special Status Bat Species (SSBS) habitat. Parcels potentially containing SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat shall undergo a site-specific survey by a BLM-approved specialist/biologist to identify necessary special design, construction, implementation, and/or mitigation measures. Based on survey results, planned surface disturbing activities the BLM specialist/biologist has assessed to be sufficiently threatening to SSBS roosts or hibernacula within USFWS confirmed habitat during the site-specific survey shall require relocation of surface disturbing activities to a geographic position that meets current regulatory and BLM/USFWS policy requirements. The mandated relocation, beyond standard lease terms and conditions (i.e., 200 meters/656 feet), shall be communicated to the lessee/operator through a Condition of Approval (COA) at the Application for Permit to Drill (APD) stage. If the BLM's site-specific survey results reveal the existence of SSBS maternity roosts or hibernacula within USFWS confirmed habitat and appropriate surface disturbing activity relocation is unattainable, additional protective/mitigation measures shall be required of the lessee and/or operator, to include, but not limited to, the following: • Development and implementation of a BLM-approved mitigation/protection plan for activities known to cause adverse impacts to SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat. This plan shall require, but is not limited to, special design, construction, and implementation measures describing how adverse impacts to known SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat would be prevented or mitigated.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				• Disturbance area minimization, utilization of previously existing disturbed areas, roads, well-pads, and corridors, and implementation of mitigation measures such as operational twinning. **Purpose:** To prevent disturbance or destruction of known SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat. **Waiver:** None **Exception:** The BLM authorized officer shall provide for site-specific exception(s) if the operator/lessee's operation plan provides for the mandated levels of protective special design, construction, and implementation measures outlined in the BLM site-specific survey to prevent additional species loss. **Modification:** None

Fluid Mineral- TL Stipulations

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
TL-1	Proposed	Bald and Golden Eagle Nests	TL	**Stipulation:** The lease or portions of the lease contain known Bald or Golden Eagle nests. Parcels containing know Bald or Golden Eagle nests, occupied or unoccupied, shall undergo a site-specific survey by a BLM-approved specialist/biologist to identify any required buffers, special design, construction, implementation, and/or mitigations measures necessary to protect Bald or Golden Eagle nests. Unless a lesser restrictive protective zone is authorized by the BLM specialist/biologist, with USFWS concurrence, surface-disturbing activities shall not be allowed within 0.5 mile of an occupied Bald or Golden Eagle nest during the ordinary nesting period (December 15th – July 15th). This stipulation does not apply to the operations and maintenance of production facilities. **Purpose:** To protect and prevent disturbance of Bald and Golden Eagle nesting habitat in accordance with the Migratory Bird Treaty Act, 16 U.S.C. 703 (MBTA) and the Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668c (Eagle Act). **Waiver:** None **Exception:** An exception to this stipulation shall be granted by the BLM Authorized Officer if a site survey conducted by a BLM specialist/biologist or USFWS specialist/biologist confirms the known Bald or Golden Eagle nest associated with the lease parcel in question has been inactive for at least two consecutive years. An exception may also be considered and authorized by the BLM Authorized Officer on a case-by-case basis if the nest fledges early and a BLM site-specific survey finds that there is no outstanding danger to the either the nest or its inhabitants. **Modification:** None
TL-2	Proposed	Least Tern (Proposed for delisting)	TL	**Stipulation:** No construction, drilling, completion, or workover activities are allowed from April 1 to August 15 within least tern nesting and fledging habitat and within an area that extends 300 feet (100 yards) from the outside edge of suitable sandy riverbank nesting habitat.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Purpose: Protect, preserve, and enhance federally listed, proposed, or candidate species and their habitats and promote the recovery of these species for BLM-related actions, in accordance with Section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 USC, Section 1531 et seq.). **Exception:** An exception may be granted within sandy riverbank areas when the project area is no longer considered suitable habitat and the project would not adversely impact the remaining habitat or if the nest fledges early, as determined by the Authorized Officer. **Modification:** A modification may be granted for the portion of the lease in which suitable habitat no longer exists or is considered unsuitable, as determined by the Authorized Officer. **Waiver:** A waiver may be granted when the habitat is no longer present or considered unsuitable as determined by the Authorized Officer.
TL-6	Proposed	Red-Cockaded Woodpecker	TL	**Lease Notice:** This lease may contain foraging habitat[1] for the Red-cockaded woodpecker (RCW), a federally listed endangered species. A foraging analysis survey performed by a qualified biologist may be required within 2,640 feet of RCW cavity tree clusters to identify RCW foraging habitat and to ensure the proposed action does not reduce suitable foraging habitat below USFWS required management stability standards. If foraging habitat is present, compliance with the current USFWS protocol as described in the RCW recovery plan would be required. This may also include no surface disturbance or occupancy within a 200-foot wide area surrounding an aggregation of cavity trees, previously and currently used and defended by a group of RCWs and extending 200 feet from the outermost cavity trees.

[1] Foraging habitat is defined in the red-cockaded woodpecker recovery plan (USFWS 1985).

Fluid Mineral- Lease Notices

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
LN-1	Proposed	Potential, Suitable, and Occupied Habitat for Special Status Plant Species	LN	**Lease Notice:** The lease contains potential, suitable, and/or occupied habitat for special status plant species; therefore, special status plant species clearance surveys may be required prior to approving any surface-disturbing activities within or adjacent to BLM Special Status Plant Species' potential, suitable and occupied habitats. Survey requirements would include the following: • Clearance surveys must be conducted by a qualified botanist. • The area to be surveyed will include at a minimum the project area plus an additional 328 feet outside the project area. • Clearance surveys will be conducted during the blooming season or the period in which the plant species is most easily detected. Based on the results of the survey, conditions of approval may be applied to land use authorizations and permits that fall within the area of direct/indirect impacts or affected habitat, as appropriate. Possible mitigation strategies may include, but are not limited to: • Avoidance/restriction of development such as locating the surface disturbance area away from the edge of occupied or suitable habitat and ideally outside of the area where indirect/direct impacts would occur; • Minimizing the area of disturbance utilizing strategies such as but not limited to twinning, and utilizing existing disturbance and corridors; • Dust abatement measures; • Signs, fencing, and other deterrents to reduce human disturbance; • Construction of well sites, roads, and associated facilities outside of the blooming season; • Specialized reclamation procedures such as, but not limited to, o separating soil and subsoil layers with barriers to reclaim in the correct order, o using a higher percentage of forbs in the reclamation seed mix to

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				promote pollinator habitat, o collection of seeds for sensitive plant species' genetic preservation, grow-out, and reclamation; • Long-term monitoring of indirect/direct impacts on the species and/or habitat; • Qualified, independent third-party contractors to provide general oversight and assure compliance with project terms and conditions during construction; • Nonnative or invasive species monitoring and control in occupied and suitable habitat; • Off-site mitigation such as conservation easements, funding for research, or habitat protection/improvement projects to offset impacts to occupied plant populations (40 CFR 1508.20).
LN-2	Proposed, in compliance with WO-ESA-7	Endangered Species Act Section 7 Consultation	LN	**Lease Notice:** The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further their conservation and management objectives to avoid any BLM-approved activity that would contribute to a need to list such a species or its habitat. The BLM may require modifications to or may disapprove any proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or to result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the ESA (16 USC, Section 1531 et seq.). This lease stipulation applies to the following in Kansas: • Allen County Split-Estate Tract • Barber County Split-Estate Tract 2 • Clark County Split-Estate Tracts 14 • Comanche County Split-Estate Tract 3

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				• Cowley County Split-Estate • Douglas County Split-Estate Tracts 1 and 3 • Finney County Split-Estate Tracts 1 and 3 • Franklin County Split-Estate Tracts 1 • Hamilton County Split-Estate Tracts 1, 2, 4, 5, 7 • Jefferson County Split-Estate Tract 2 • Johnson County Split-Estate Tract • Leavenworth County Split-Estate Tracts 4 and 5 • Linn County Split-Estate Tracts • Logan County Split-Estate Tract 3 • Meade County Split-Estate Tracts • Scott County Split-Estate Tract 2 • Seward County Split-Estate Tracts 1, 3, and 4 • Wabaunsee County Split-Estate Tract • Wallace County Split-Estate Tract 1 This lease stipulation applies to the following in Oklahoma: • Alfalfa County Split-Estate Tracts 35 • Beaver County Split-Estate Tracts 19, 20- 22, 30, 27, 28, 29, 34, and 38 • Blaine County Split-Estate Tracts 2-9, 12-20, and 27 • Bryan County Split-Estate Tracts • Caddo County Split-Estate tracts • Canadian County Split-Estate 16, 9, and 11-13 • Cherokee County Split-Estate Tracts • Cleveland County Split-Estate Tracts • Cotton County Split-Estate Tracts 15 • Custer County Split-Estate Tracts 10 and 15-19 • Dewey County Split-Estate Tracts 1 through 28 • Ellis County Split-Estate Tracts 17, 22 through 31, and 50 through 61 • Grant County Split-Estate Tracts 14 • Harper County Split-Estate Tracts 1, 10, 13, and 15-22

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				• Haskell County Split-Estate Tracts • Jackson County Split-Estate Tracts 14, 15, and 21-39 • Kingfisher County Split-Estate Tracts 2, 3, 4, 5, and 10-17 • Latimer County Split-Estate Tracts • Le Flore County Split-Estate Tracts • Major County Split-Estate Tracts 1-8, 10-12, 14-20, 26-29, and 97-99 • Muskogee County Split-Estate Tracts • Payne County Split-Estate Tracts 4, 7, and 8 • Pittsburg County Split-Estate Tracts • Pottawatomie County Split-Estate Tracts 4, 7, and 8 • Pushmataha County Split-Estate Tracts 60, 64, 69, and 84 • Rogers County Split-Estate Tracts • Sequoyah County Split-Estate Tracts • Tillman County Split-Estate Tracts 4 and 7-12 • Tulsa County Split-Estate Tracts • Woods County Split-Estate Tracts 1 through 6, 63-67, 70-72, 74-105, and 122-127 • Woodward County Split-Estate Tracts 1, 19, 38, and 42-50 **Purpose:** To protect plants, animals, or their habitats determined to be threatened, endangered, or other special status species. **Waiver, Exception, and/or Modification:** None
LN-4	Proposed	Black-footed Ferrets	LN	**Lease Notice:** If black-footed ferrets occur anywhere in Kansas, they are presumed to be associated with prairie dogs. All or portions of this lease area lie within a Kansas county where prairie dog towns have occurred in the past. Therefore, if a prairie dog town of 80 acres or more is found to occur on or near this lease, a black-footed ferret survey may be required before permitting surface-disturbing activity, which may impact the prairie dog town.
LN-5	Proposed	Migratory Bird Flyways and Nesting Season	LN	**Lease Notice:** The lease or portions of the lease falls within the Central Flyway for Migratory Birds. Consultation with the USFWS may be

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				required at the time of the Application for Permit to Drill. In addition, the proposed project(s) may be subject to operational constraints required to mitigate impacts to the flyway and the migratory bird species within the flyway. If surface-disturbing activities occur during the migratory birds' nesting season (which varies per species and could be any time between December 15th to July 30th), surveys for ground- and tree-nesting birds may be required to be conducted by an entity approved by the BLM Authorized Officer. If active nests are encountered, surface-disturbing activities may be delayed until the nesting activities are complete. The project proponent must consult with the BLM to determine whether a survey is required, the extent of the survey and the timing of the nesting season. The Migratory Bird Treaty Act (MBTA) of 1918, as amended, authorizes the Secretary of Interior to adopt such measures necessary to protect and preserve migratory raptor and other avian species. In accordance with MBTA and Executive Order 13186 (Federal Register Volume 66, Issue 11, January 17, 2001), the BLM may require modifications to or may disapprove any proposed activity that is likely to jeopardize migratory raptor and other avian species.
LN-7	Proposed	Federal Minerals		**Lease Notice:** Other federal minerals, including but not limited to, asphalt, salt and coal, may exist on this lease or portions of the lease. If other federal minerals are present, then the oil and gas lessee and operators are required to coordinate development with the other federal minerals lessee, and vice versa. Operations authorized by this lease may be altered or modified by the authorized officer in order to conserve and protect the other mineral resources and provide for simultaneous operations. Some areas may not be drillable due to multiple mineral resources present.
LN-8	Proposed (NM-14-LN)	Paleontological Resources		**Lease Notice:** All development in this lease will be subject to compliance with the Paleontological Resources Preservation Act (PRPA),

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				the National Environmental Policy Act (NEPA), and the Federal Land Policy and Management Act (FLPMA). The lessee shall immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations under this authorization. The lessee shall suspend all activities in the vicinity of such discovery until notified to proceed by the Authorized Officer and shall protect the discovery from damage or looting. The Authorized Officer will evaluate, or will have evaluated, such discoveries after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the Authorized Officer after consulting with the operator and the Regional Paleontologist. Upon approval of the Authorized Officer, the operator will be allowed to continue construction through the site, or will be given the choice of either (1) following the Authorized Officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the Authorized Officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area. The lessee is responsible for any cost associated for mitigating paleontology resources discovered as a result of their activities. In addition, surface occupancy or use may be subject to, but not limited to, the following special operating constraints: • Access may be restricted to existing roads. • A pedestrian survey for paleontological resources is required in areas that have been classified as Potential Fossil Yield Classification (PFYC) U- Unknown, 4 or 5. A survey is also required in areas that are known to contain fossil localities. This survey would be completed using a qualified paleontologist as identified in BLM Handbook 8270, prior to any surface disturbing activity. A report on the results of the paleontological survey would be required to be submitted and approved by BLM as part of the permit application for the proposed lease activity. The survey and report would be used to determine the presence of paleontological material exposed on the surface, and if

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				necessary, the appropriate treatments such as avoidance and/or project re-design during all phases of the proposed lease activity. Based on the recommendations of the paleontology survey report, monitoring of ground disturbing activities may be required.
LN-9	Proposed	Potential Cave or Karst Occurrence Area		**Lease Notice:** All or a portion of the lease is located in a potential cave or karst occurrence area. Within this area, caves or karst features such as sinkholes, passages, and large rooms may be encountered, within surface areas ranging from a few acres to hundreds of acres. Due to the sensitive nature of the cave or karst systems of this area, special protective measures (i.e., operational constraints) may be developed during environmental analyses and be required as part of approvals for drilling or other operations on this lease. These measures could include, but are not limited to the following: changes in drilling operations; special casing and cementing programs; modifications in surface activities; or other reasonable measures to mitigate impacts to cave or karst values. These measures may be imposed in accordance with 43 CFR 3101.1-2; 43 CFR 3162.5-1; Onshore Oil and Gas Order No. 1; and Section 6 of the lease terms. In addition, third-party clearances surveys may be required, and as various geophysical techniques are proven useful for detection they may be required on a case-by-case basis.

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
LN-10	WO-NHPA/ TX, OK, and KS RMPs	Cultural Resources and Tribal Consultation	LN	**Stipulation:** This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, Executive Order 13007, or other statutes and executive orders. The BLM would not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations, for example, to consult with the State Historic Preservation Officer (SHPO) and tribes, under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties or may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated. **Purpose:** To protect cultural resources. **Waiver, Exception, and/or Modification:** None
LN-15	Proposed	This lease notice applies to the following: • Oklahoma Department of Wildlife Conservation (ODWC)-Owned and -Managed Lands • Sabine River Authority Lands • Oklahoma State University lands-Lake Carl Blackwell • Texas A&M Biological Research Site • Texas National Guard lands	LN	**Lease Notice:** Lease parcels under regulatory authority of an Other Surface Management Agency (SMA), where the Bureau of Land Management (BLM) administers mineral estate, require consent, concurrence, and stipulations, if any should apply, from the authorized Other SMA official prior to the BLM leasing any Other SMA lands. An Other SMA consent or concurrence letter and current stipulation(s), if any should apply, for the proposed lease parcel shall be made available for public review prior to the lease sale, where the proposed land parcel will be offered for sale. Examples of potential Other SMA stipulations which may be applied include, but are not limited to, any one or combination of the following: · No Surface Occupancy (NSO) · No Drilling (ND) · Directional Drilling (DD) · Controlled Surface Use (CSU) · Timing Limitations (TL)

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
				Buffer Zones are intended to protect resource values: (i.e., dams, spillways, major structures, restricted areas, recreation areas & facilities, bridges, tunnels, USFWS listed threatened and endangered species or BLM special status species, etc.)

Coal Stipulations

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
CLS-2	Proposed	Wetlands/ Riparian Areas	NSO	**Stipulation:** All or portions of the lands under this lease contain wetlands or riparian areas or both. Surface occupancy of these areas and within a 415-foot buffer will not be allowed without the specific approval, in writing, of the BLM. The buffer may be accomplished by such measures as avoidance and fencing. **Purpose:** To protect the integrity of wetland and/ or riparian areas. **Waiver:** None **Exception:** Exception/modification for boring or drilling as long as to not affect wetland or riparian function. **Modification:** Impacts on or disturbance to wetlands and riparian habitats that occur on this lease must be avoided or mitigated. The mitigation would be developed during the application for permit to drill.
CLS-4	Proposed	Nesting Migratory Birds	TL	**Stipulation:** If surface-disturbing activities occur during the nesting period (generally from March 1 to July 30), surveys for ground- and tree-nesting birds will be conducted by an entity approved by the BLM Field Office. If active nests are encountered, surface-disturbing activities will be delayed until the nesting activities are complete. Follow the BLM-FWS MOU (EO 13186). **Purpose:** To protect migratory bird nesting sites. **Waiver, Exception, and/or Modification:** None
CLS-6	Proposed	American Burying Beetle (Proposed for delisting)	CSU	**Stipulation:** The lessee will not conduct surface-disturbing lease activities that would result in unacceptable impacts on the ABB, a federally listed endangered species. The lessee may be required to arrange for a qualified biologist to conduct field surveys. Survey requirements and ESA coordination and consultation will be accomplished with the cooperation of the USFWS. This stipulation applies to federal coal leases that occur in USFWS identified ABB habitat. **Purpose:** To protect ABB habitat.

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				Waiver, Exception, and/or Modification: None
CLS-8	Proposed	Cultural Resources (Historic Properties)		**Stipulation:** Before undertaking any activities that may disturb the surface of the leased lands, the lessee would conduct a cultural resource intensive field inventory in a manner specified by the BLM Authorized Officer or of the surface-managing agency, if different, on portions of the mine plan area and adjacent areas, or exploration area, that may be adversely affected by lease-related activities and that were not previously inventoried at such a level of intensity. The inventory would be conducted by BLM-permitted archaeologist and a report of the inventory and recommendations for protecting any cultural resources identified would be submitted to the Assistant Director of the Midcontinent Region of the OSM, the BLM Authorized Officer, if activities are associated with coal exploration outside an approved mining permit area, and the Authorized Officer of the surface-managing agency, if different. The lessee would undertake measures, in accordance with instructions from the Assistant Director or BLM Authorized Officer, to protect cultural resources on the leased lands. The lessee would not commence the surface-disturbing activities until permission to proceed is given by the Assistant Director or BLM Authorized Officer. The lessee would protect all cultural resource properties within the lease area from lease-related activities until the cultural resource mitigation measures could be implemented as part of the approved mining and reclamation or exploration plan. The cost of conducting the inventory, preparing reports, and carrying out mitigation measures would be borne by the lessee. If cultural resources are discovered during operations under this lease, the lessee would immediately bring them to the attention of the Assistant Director or BLM Authorized Officer, or the authorized officer of the surface-managing agency, if the Assistant Director is not available. The lessee would not disturb such resources, except as may be subsequently authorized by the Assistant Director or BLM Authorized Officer. Within two working days of notification, the Assistant Director or BLM Authorized Officer would evaluate or have evaluated any cultural resources discovered and would determine if any action may be required to protect or preserve such discoveries. The cost of data recovery for cultural resources discovered during lease operations would be borne by the lessor, unless otherwise specified by the BLM Authorized Officer or of the surface-managing agency, if different. All cultural resources would remain

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				under the jurisdiction of the United States until ownership is determined under applicable law. **Purpose:** To protect cultural resources in compliance with section 106 of the NHPA. **Waiver, Exception, and/or Modification:** None
CLS-9	Proposed	Visual Resources	CSU	**Stipulation:** In VRM Class II, coal development activities would be located, designed, operated, and reclaimed so that activities should not attract attention to the casual observer. **Purpose:** To retain the existing character of the landscape (VRM Class II Objective). **Waiver, Exception, and/or Modification:** None
CLS-10	1994 OK RMP (CLS-1)	Rights-of-Way	CSU	**Stipulation:** If it is impractical to relocate the right-of-way (ROW), surface mining would be prohibited in the ROW and to within a 100-foot buffer zone from the outside of the ROW. Relocation approval of both the holder and issuing parties involved in the ROW would be required. **Purpose:** To protect sensitive resources from ROW development (habitat, etc.) **Waiver, Exception, and/or Modification:** None
CLS-11	1994 OK RMP (CLS-2)	Occupied Dwellings	CSU	**Stipulation:** The coal lessee would consult with the owners of occupied dwellings and would maintain or, with the owner's written consent, adjust the designated 300-foot buffer zone. **Purpose:** To protect occupied dwellings from disturbance. **Waiver, Exception, and/or Modification:** None

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
CLS-12	Proposed*	Reservoirs (USACE)*	CSU	**Stipulation:** No mining around or under reservoir facilities, such as dams, spillways, or critical structures, within a 2,000-foot buffer in Oklahoma and a 3,000-foot buffer in Kansas and Texas. **Purpose:** To protect USACE facilities. **Waiver, Exception, and/or Modification:** None
CLS-13	Proposed	National Scenic and Historic Trails	CLS	**Stipulation:** No surface-disturbing activities within the National Scenic and Historic Trails Right-of-Way and Management Corridor, or similar protected area or measures identified in the applicable land use plan. **Purpose:** To safeguard the nature and purposes of the National Scenic and Historic Trails. **Waiver, Exception, and/or Modification:** None
CLS-14	Proposed	Special Status Bat Species (SSBS)	CSU	**Stipulation:** The lease or portions of the lease is known to contain Special Status Bat Species (SSBS) habitat. Parcels potentially containing SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat shall undergo a site-specific survey by a BLM-approved specialist/biologist to identify necessary special design, construction, implementation, and/or mitigation measures. Based on survey results, planned surface disturbing activities the BLM specialist/biologist has assessed to be sufficiently threatening to SSBS roosts or hibernacula within USFWS confirmed habitat during the site-specific survey shall require relocation of surface disturbing activities to a geographic position that meets current regulatory and BLM/USFWS policy requirements. The mandated relocation, beyond standard lease terms and conditions (200 meters/656 feet), shall be communicated to the lessee/operator through a Condition of Approval (COA) at the leasing stage. If the BLM's site-specific survey results reveal the existence of SSBS maternity roosts or hibernacula within USFWS confirmed habitat and appropriate surface disturbing activity relocation is unattainable, additional protective/mitigation measures shall be required of the lessee and/or operator, to include, but not limited to, the following: • Development and implementation of a BLM-approved mitigation/protection plan for activities known to cause adverse impacts to

Stipulation #	Stip Reference	Protected Resource	Type	Stipulation Description
				SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat. This plan shall require, but is not limited to, special design, construction, and implementation measures describing how adverse impacts to known SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat would be prevented or mitigated. • Disturbance area minimization, utilization of previously existing disturbed areas, roads, mine staging areas, and/or corridors, and implementation of mitigation measures such as operational twinning. **Purpose:** To prevent disturbance or destruction of known SSBS maternity roosts or hibernacula within USFWS confirmed SSBS habitat. **Waiver:** None **Exception:** The BLM authorized officer shall provide for site-specific exception(s) if the operator/lessee's operation plan provides for the mandated levels of protective special design, construction, and implementation measures outlined in the BLM site-specific survey to prevent additional species loss. **Modification:** None

Mineral Material Stipulations

Special Consideration #	Special Consideration Reference	Protected Resource	Type	Stipulation Description
MM-1	Proposed	Wetland/ Riparian Areas	NSO	**Stipulation:** All or portions of the lands under this lease contain wetlands or riparian areas or both. Mineral material development of these areas and within a 415-foot buffer will not be allowed without the specific approval, in writing, of the BLM. The buffer may be accomplished by such measures as avoidance or fencing. **Purpose:** To protect the integrity of wetland and/ or riparian areas. **Waiver:** None **Exception:** Exception/modification for boring or drilling that would not affect wetland or riparian function. **Modification:** Impacts on or disturbance to wetlands and riparian habitats that occur on this lease must be avoided or mitigated. The mitigation would be developed during permitting.
MM-2	Proposed	Nesting Raptors	TL	**Stipulation:** The lease or portions of the lease contain known Bald or Golden Eagle nests. Parcels containing know Bald or Golden Eagle nests, occupied or unoccupied, shall undergo a site-specific survey by a BLM-approved specialist/biologist to identify any required buffers, special design, construction, implementation, and/or mitigations measures. Surface-disturbing activities shall not be allowed within 0.5 mile of an occupied Bald or Golden Eagle nest during the nesting period (December 15th – July 15th). This stipulation does not apply to the operations and maintenance of production facilities. **Purpose:** To protect and prevent disturbance of Bald and Golden Eagle nesting habitat in accordance with the Migratory Bird Treaty Act, 16 U.S.C. 703 (MBTA) and the Bald and Golden Eagle Protection Act, 16 U.S.C. 668-668c (Eagle Act).

Special Consideration #	Special Consideration Reference	Protected Resource	Type	Stipulation Description
				Waiver: None **Exception:** An exception to this stipulation may be granted by the BLM Authorized Officer if a site survey conducted by a BLM specialist/biologist or USFWS specialist/biologist confirms the known Bald or Golden Eagle nest associated with the lease parcel in question has been inactive for no less than two consecutive years. An exception may also be considered and authorized by the BLM Authorized Officer on a case-by-case basis if the nest fledges early. **Modification:** None
MM-3	Proposed	Least Tern (Proposed for delisting)	TL	**Stipulation:** Close least tern nesting and fledging habitat and surrounding 300-foot area to mineral materials disposal from April 1 to June 1. **Purpose:** To protect least tern nesting and fledgling habitat. **Waiver, Exception, and/or Modification:** None

- *Other Federal Surface Management Agency-managed lands

OTHER SURFACE MANAGEMENT AGENCIES

Other SMA- Lease Notices

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
LN-1	Proposed	This lease notice applies to the following SMAs: • Falcon Reservoir SMA (US Section of the International Boundary and Water Commission Stip. No. 1)	LN	**Lease Notice:** Lease parcels under regulatory authority of an Other Surface Management Agency (SMA), where the Bureau of Land Management (BLM) administers mineral estate, require consent, concurrence, and stipulations, if any should apply, from

Lease Notice #	Lease Notice Reference	Protected Resource	Type	Lease Notice Description
		• Amistad Reservoir SMA (US Section of the International Boundary and Water Commission Stip. No. I) • Facilities (Bureau of Reclamation) • Facilities (Department of Defense) • Facilities USDA Research Stations • USDOE- Facilities • Structure and Surface Resources (USACE Projects) • Department of Justice-El Reno Prison • International Boundary and Water Commission lands		the authorized Other SMA official prior to the BLM leasing any Other SMA lands. An Other SMA consent or concurrence letter and current stipulation(s), if any should apply, for the proposed lease parcel shall be made available for public review prior to the lease sale, where the proposed land parcel will be offered for sale. Examples of potential Other SMA stipulations which may be applied include, but are not limited to, any one or combination of the following: • No Surface Occupancy (NSO) • No Drilling (ND) • Directional Drilling (DD) • Controlled Surface Use (CSU) • Timing Limitations (TL) Buffer Zones intended to protect resource values (i.e., dams, spillways, major structures, restricted areas, recreation areas & facilities, bridges, tunnels, USFWS listed threatened and endangered species or BLM special status species, etc.)

Appendix D
Figures

Appendix D. Figures

FIGURES

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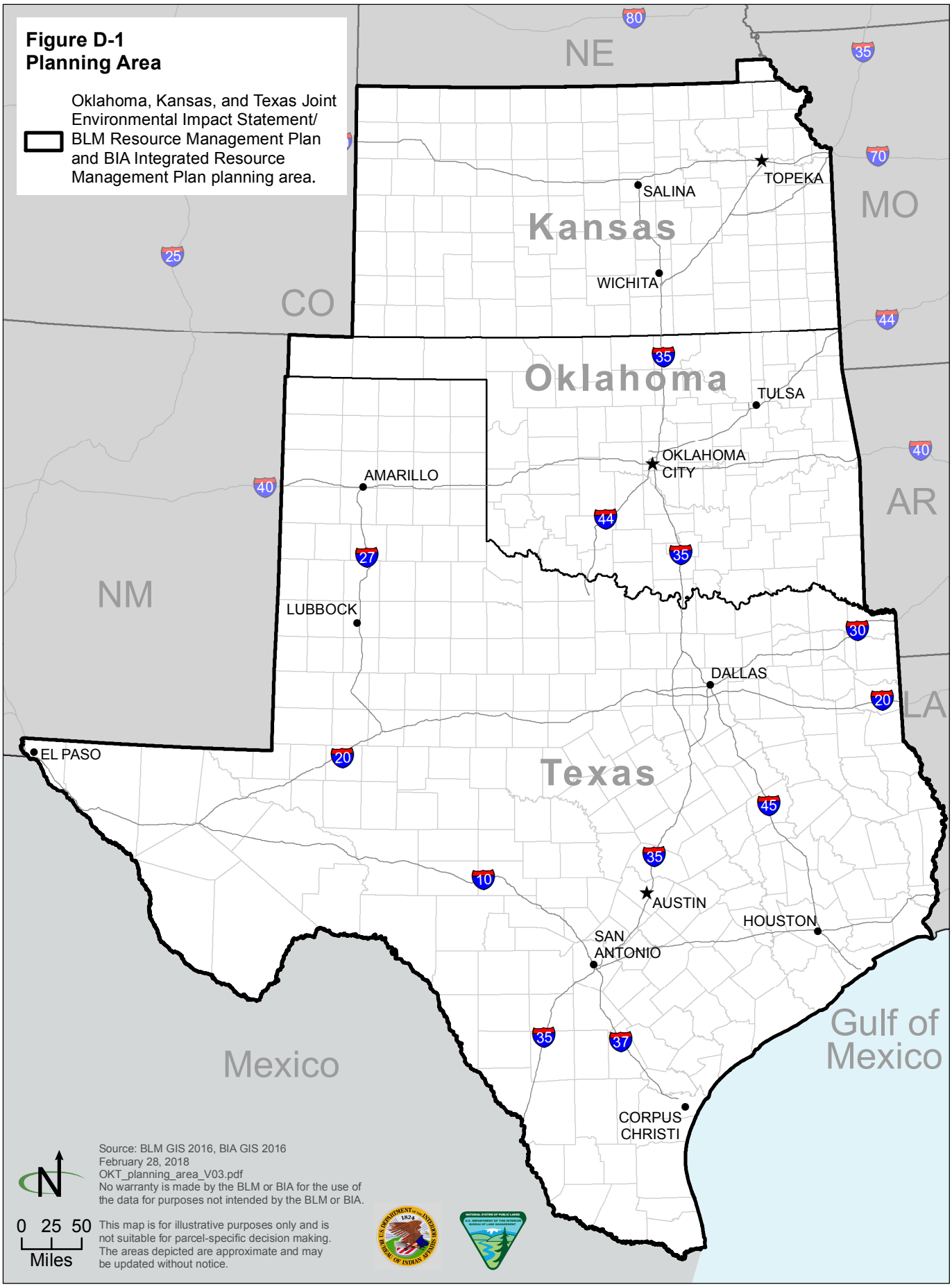
Figure D-1
Planning Area
Oklahoma, Kansas, and Texas Joint Environmental Impact Statement/ BLM Resource Management Plan and BIA Integrated Resource Management Plan planning area.
NE
MO
CO
NM
AR
LA
Kansas
Oklahoma
Texas
Mexico
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
45
10
37
N
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016
February 28, 2018
OKT_planning_area_V03.pdf
No warranty is made by the BLM or BIA for the use of the data for purposes not intended by the BLM or BIA.
This map is for illustrative purposes only and is not suitable for parcel-specific decision making. The areas depicted are approximate and may be updated without notice.

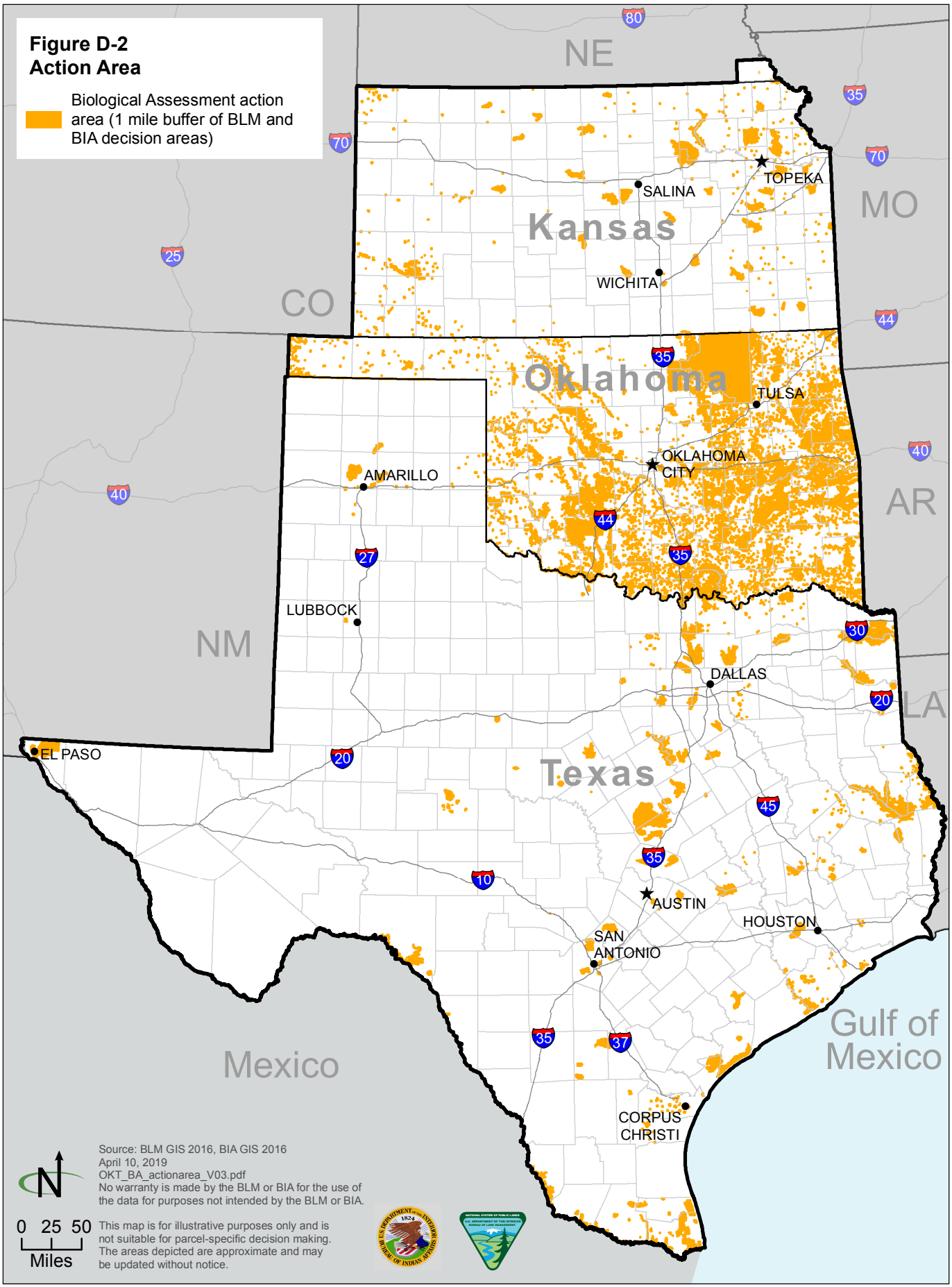
Figure D-2
Action Area
Biological Assessment action area (1 mile buffer of BLM and BIA decision areas)
NE
MO
CO
NM
AR
LA
Kansas
Oklahoma
Texas
Mexico
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
45
10
37
N
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016
April 10, 2019
OKT_BA_actionarea_V03.pdf
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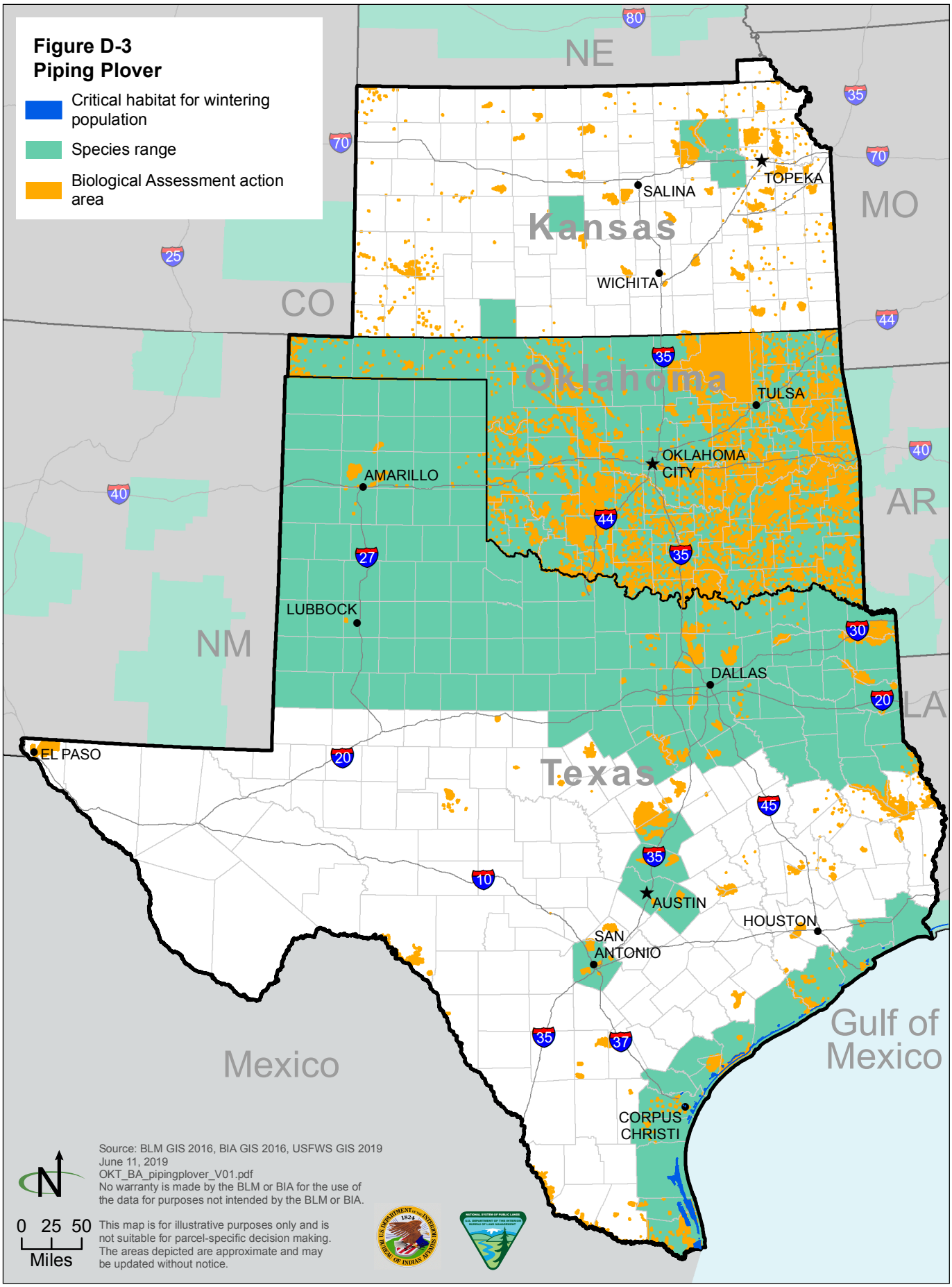
Figure D-3
Piping Plover
Critical habitat for wintering population
Species range
Biological Assessment action area
NE
CO
NM
Kansas
Oklahoma
Texas
Mexico
MO
AR
LA
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
10
45
37
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_pipingplover_V01.pdf
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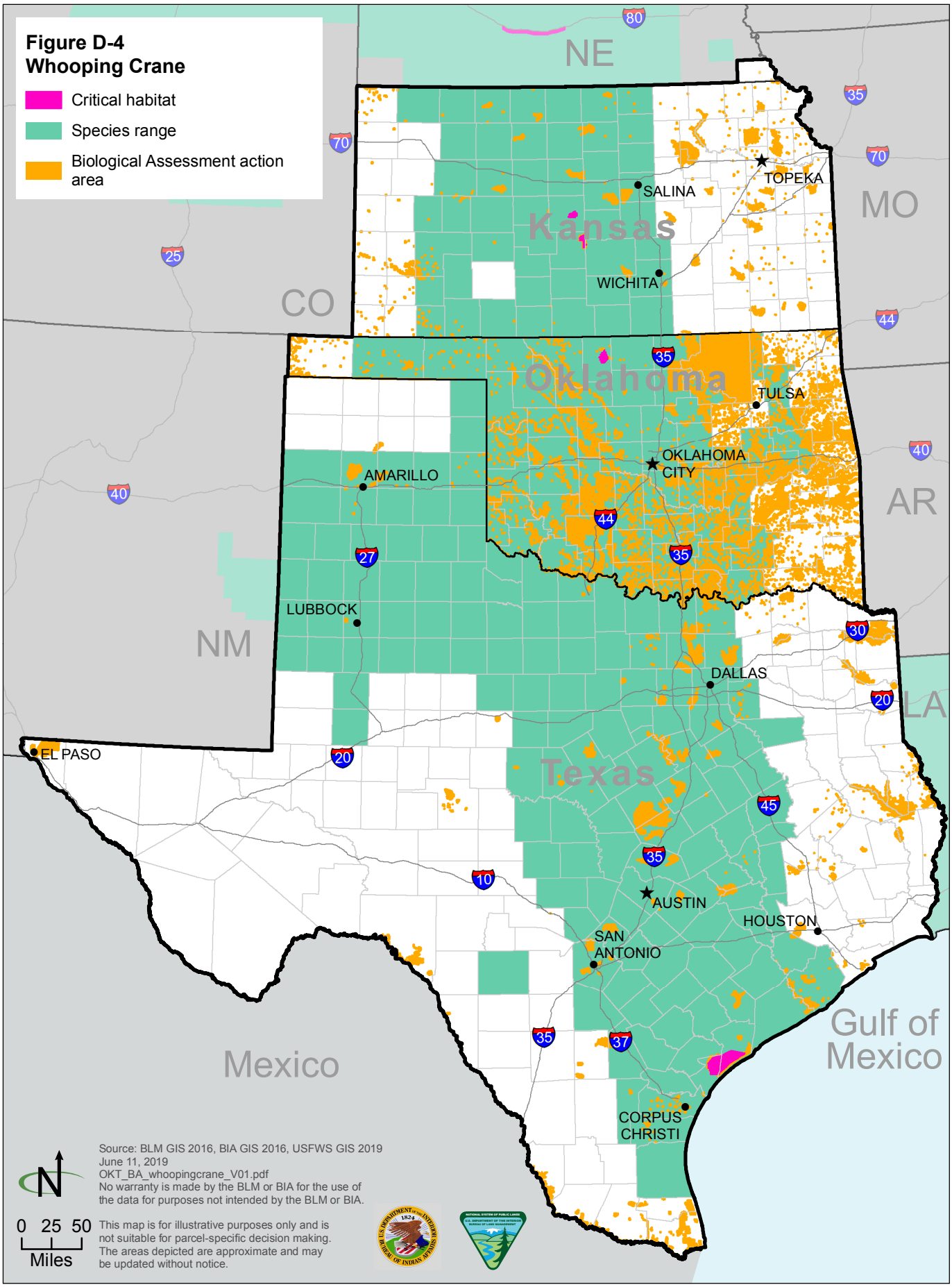
Figure D-4
Whooping Crane
Critical habitat
Species range
Biological Assessment action area
NE
CO
NM
MO
AR
LA
Kansas
Oklahoma
Texas
Mexico
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
45
10
37
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_whoopingcrane_V01.pdf
No warranty is made by the BLM or BIA for the use of the data for purposes not intended by the BLM or BIA.
0 25 50
Miles
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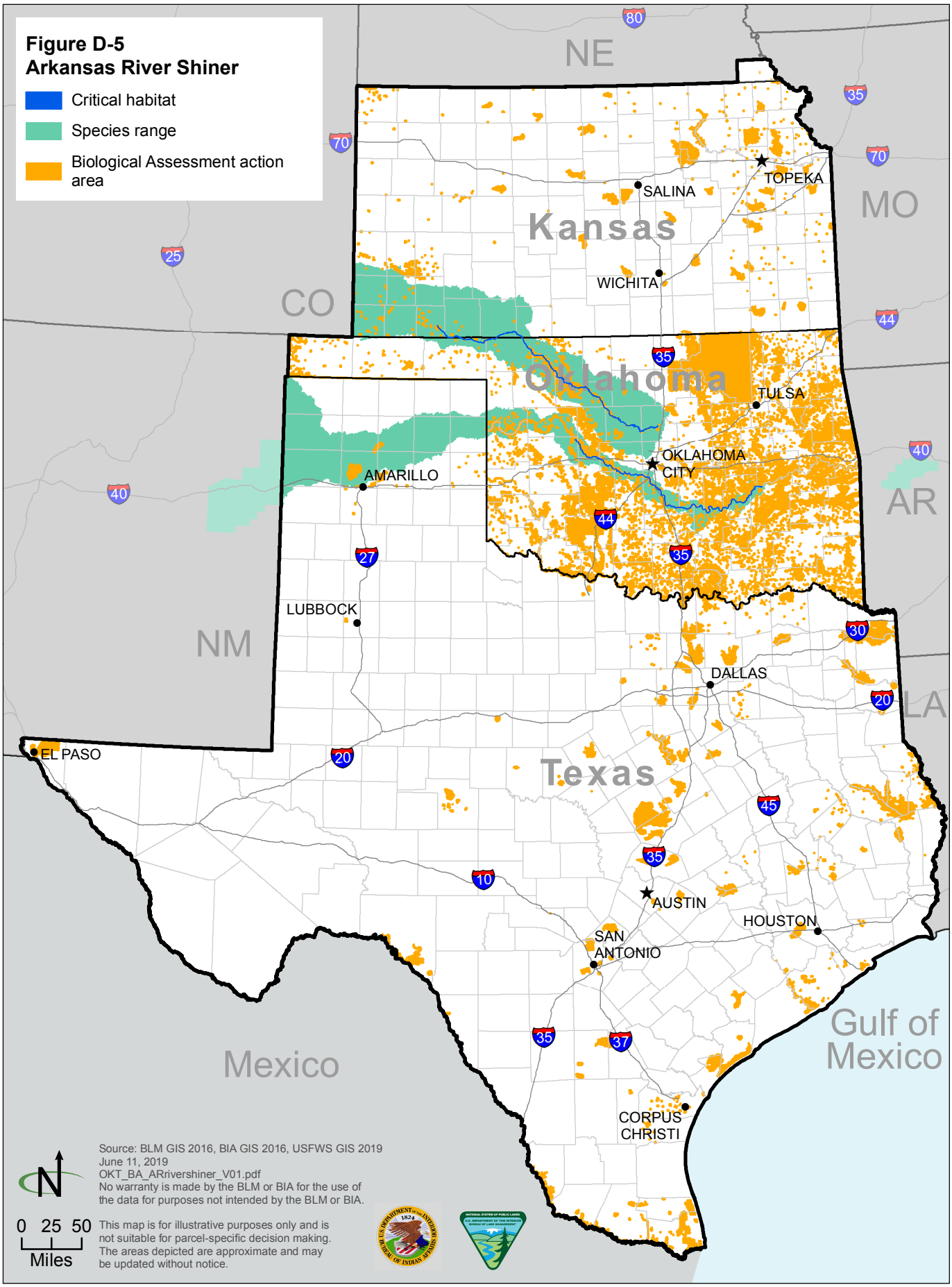
Figure D-5
Arkansas River Shiner
Critical habitat
Species range
Biological Assessment action area
NE
MO
CO
NM
AR
LA
Kansas
Oklahoma
Texas
Mexico
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
10
45
37
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_ARrivershiner_V01.pdf
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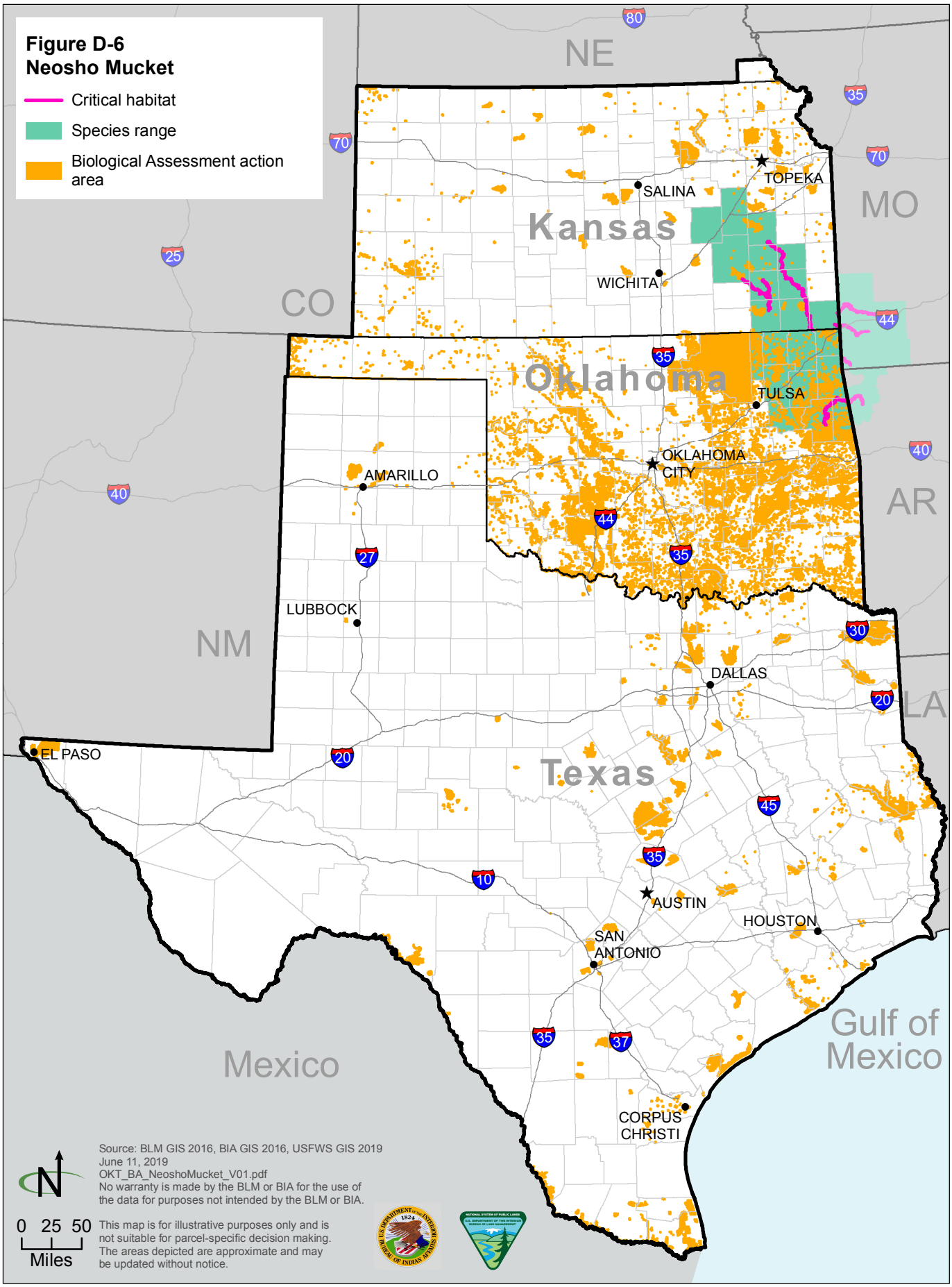
Figure D-6
Neosho Mucket
Critical habitat
Species range
Biological Assessment action area
NE
MO
CO
NM
AR
LA
Kansas
Oklahoma
Texas
Mexico
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
45
10
37
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_NeoshoMucket_V01.pdf
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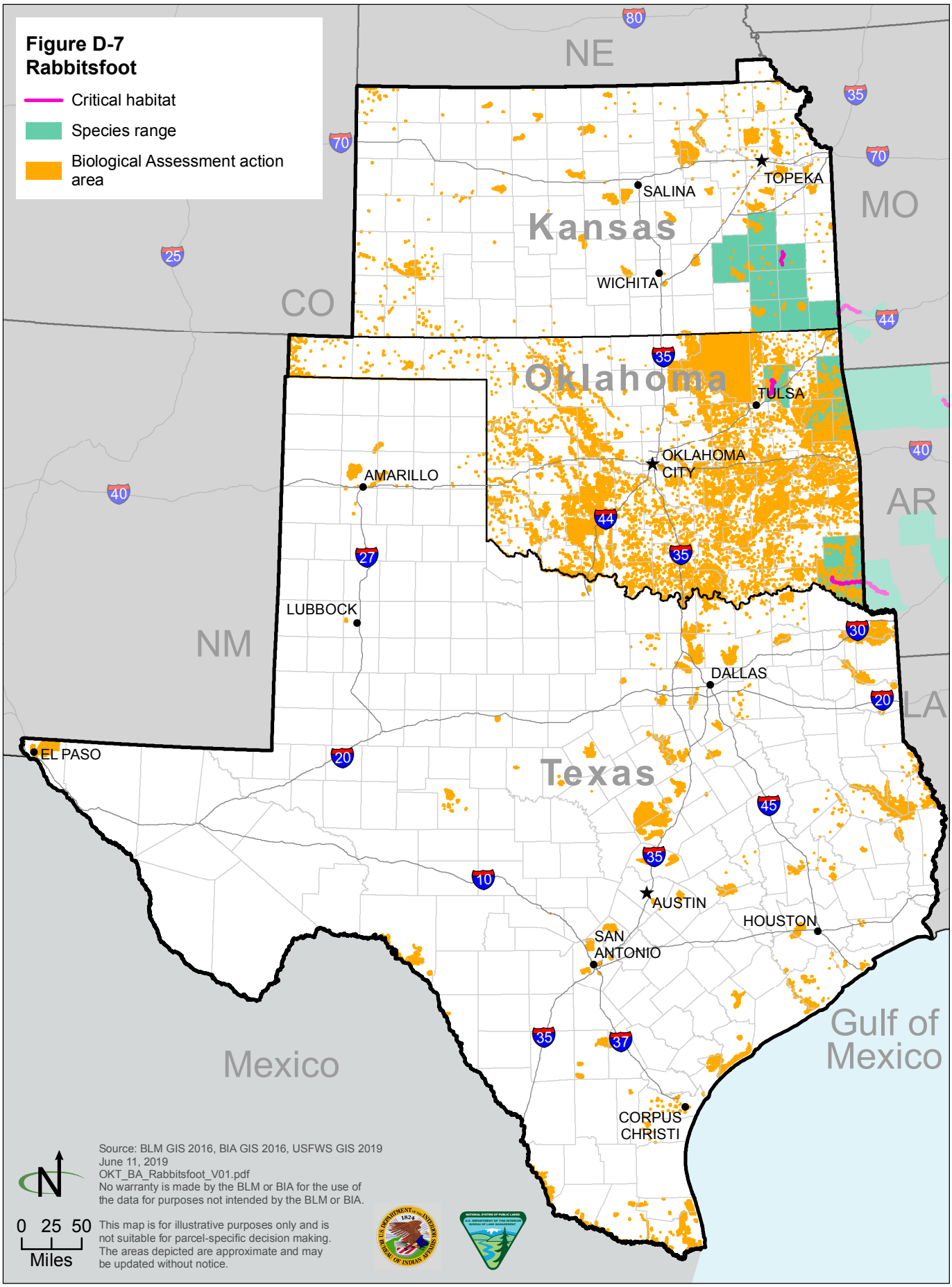
Figure D-7
Rabbitsfoot
Critical habitat
Species range
Biological Assessment action area
NE
CO
NM
MO
AR
LA
Kansas
Oklahoma
Texas
Mexico
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
45
10
37
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_Rabbitsfoot_V01.pdf
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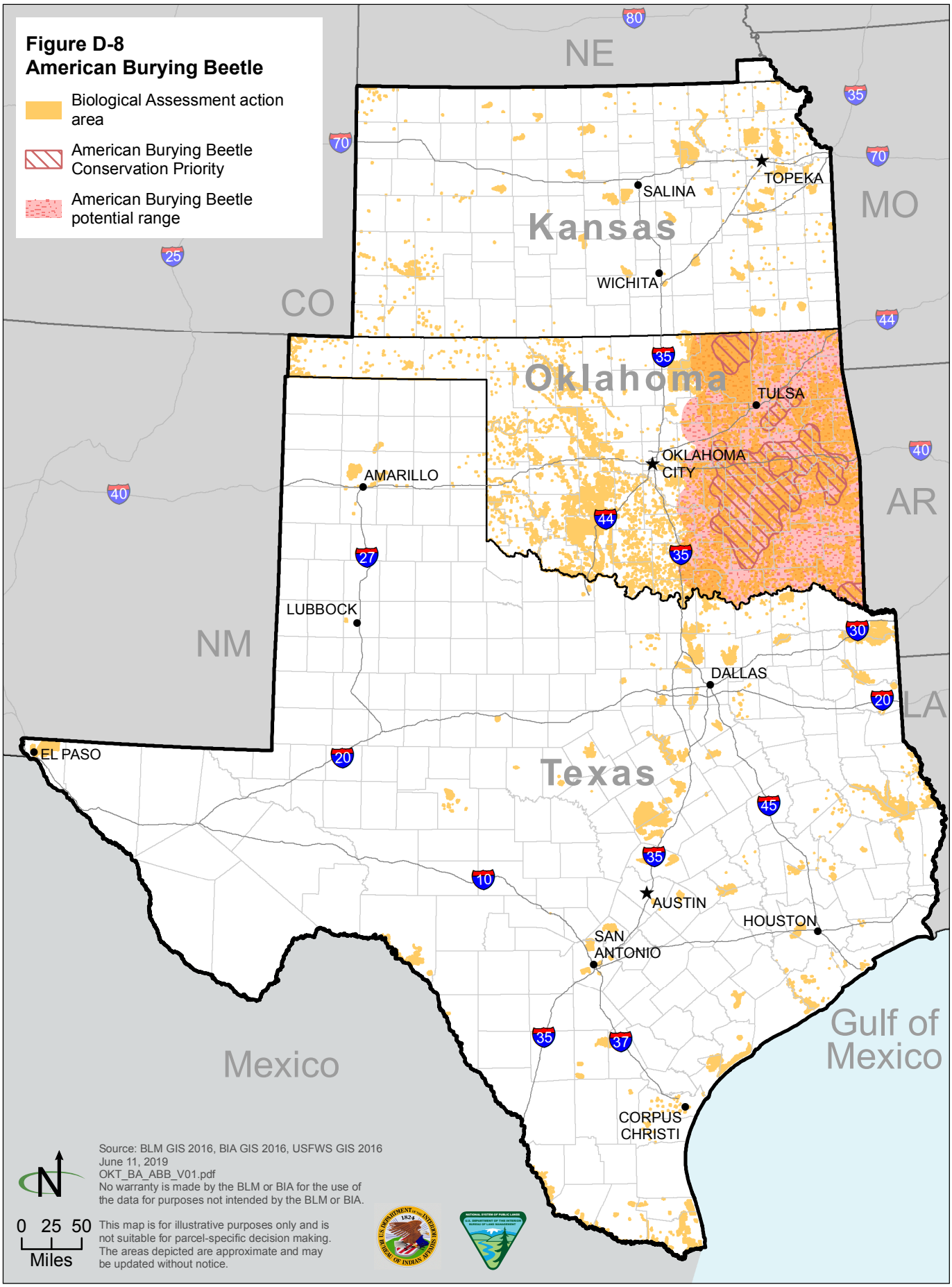
Figure D-8
American Burying Beetle
Biological Assessment action area
American Burying Beetle Conservation Priority
American Burying Beetle potential range
NE
MO
AR
LA
CO
NM
Mexico
Kansas
Oklahoma
Texas
Gulf of Mexico
TOPEKA
SALINA
WICHITA
TULSA
OKLAHOMA CITY
AMARILLO
LUBBOCK
DALLAS
EL PASO
AUSTIN
HOUSTON
SAN ANTONIO
CORPUS CHRISTI
80
35
70
25
44
40
27
30
20
45
10
37
0 25 50
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2016
June 11, 2019
OKT_BA_ABB_V01.pdf
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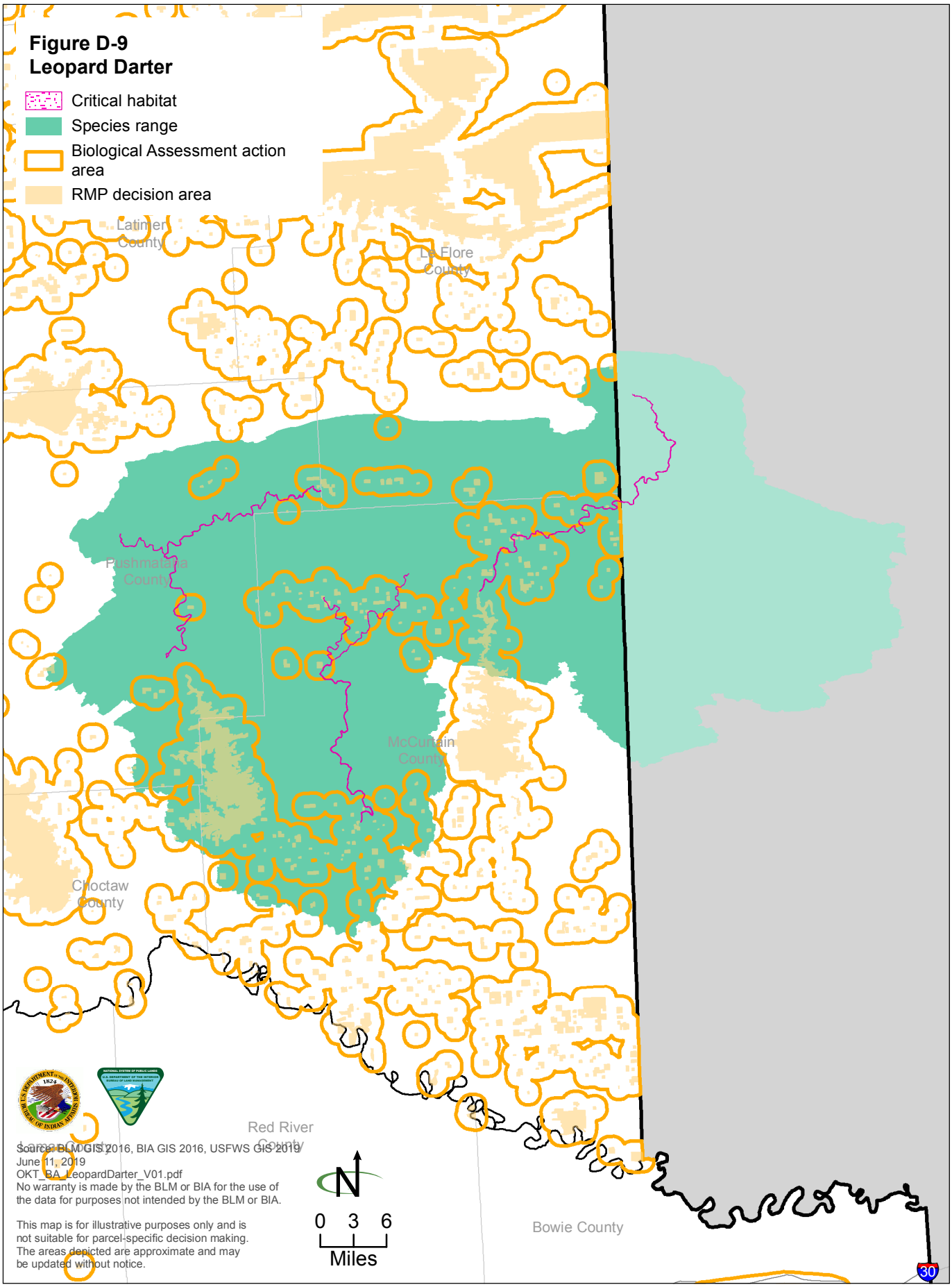
Figure D-9
Leopard Darter
Critical habitat
Species range
Biological Assessment action area
RMP decision area
Latimer County
Le Flore County
Pushmataha County
McCurtain County
Choctaw County
Red River County
Bowie County
30
N
0 3 6
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_LeopardDarter_V01.pdf
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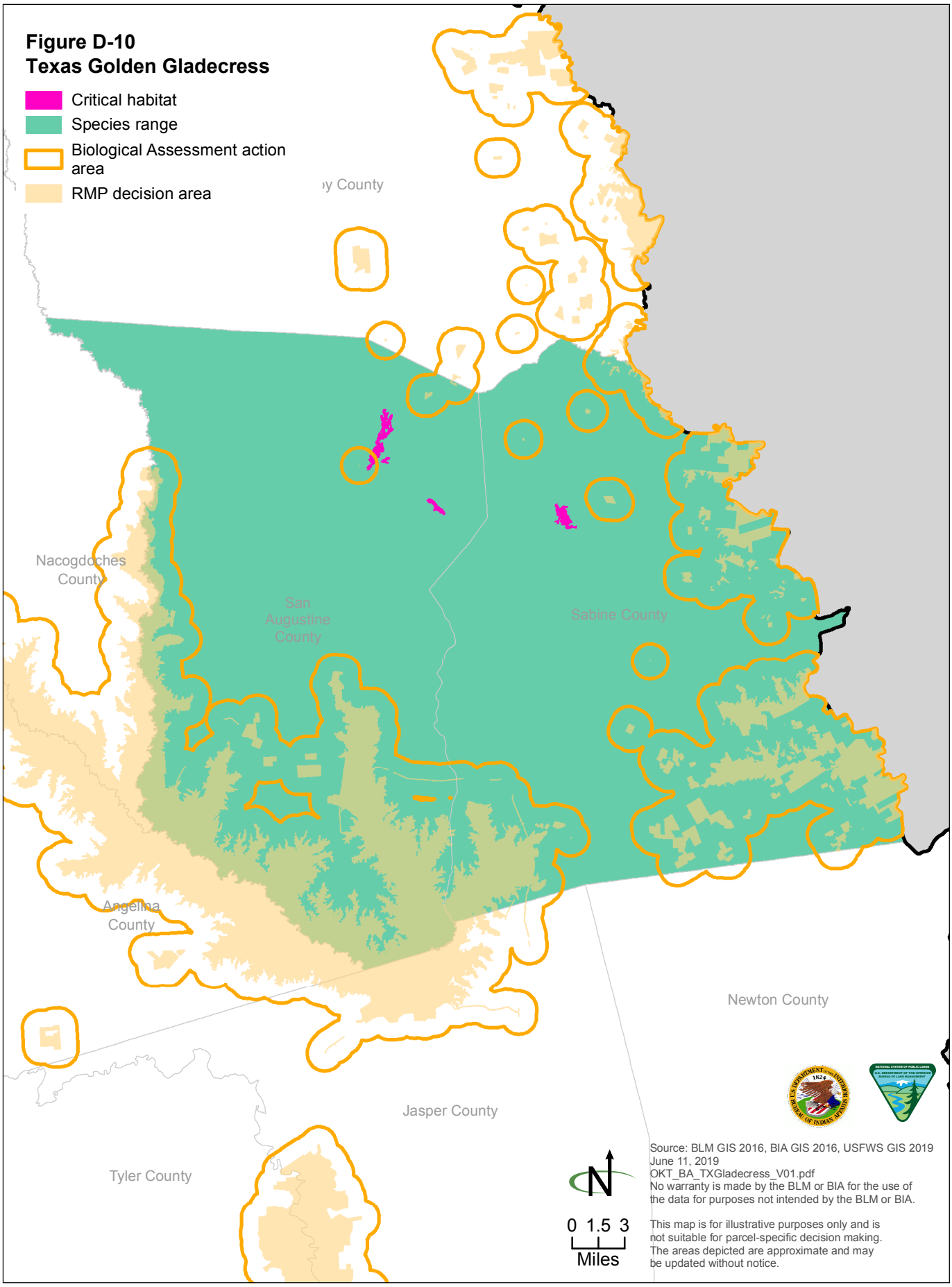
Figure D-10
Texas Golden Gladecress
Critical habitat
Species range
Biological Assessment action area
RMP decision area
Nacogdoches County
San Augustine County
Sabine County
Angelina County
Newton County
Jasper County
Tyler County
N
0 1.5 3
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_TXGladecress_V01.pdf
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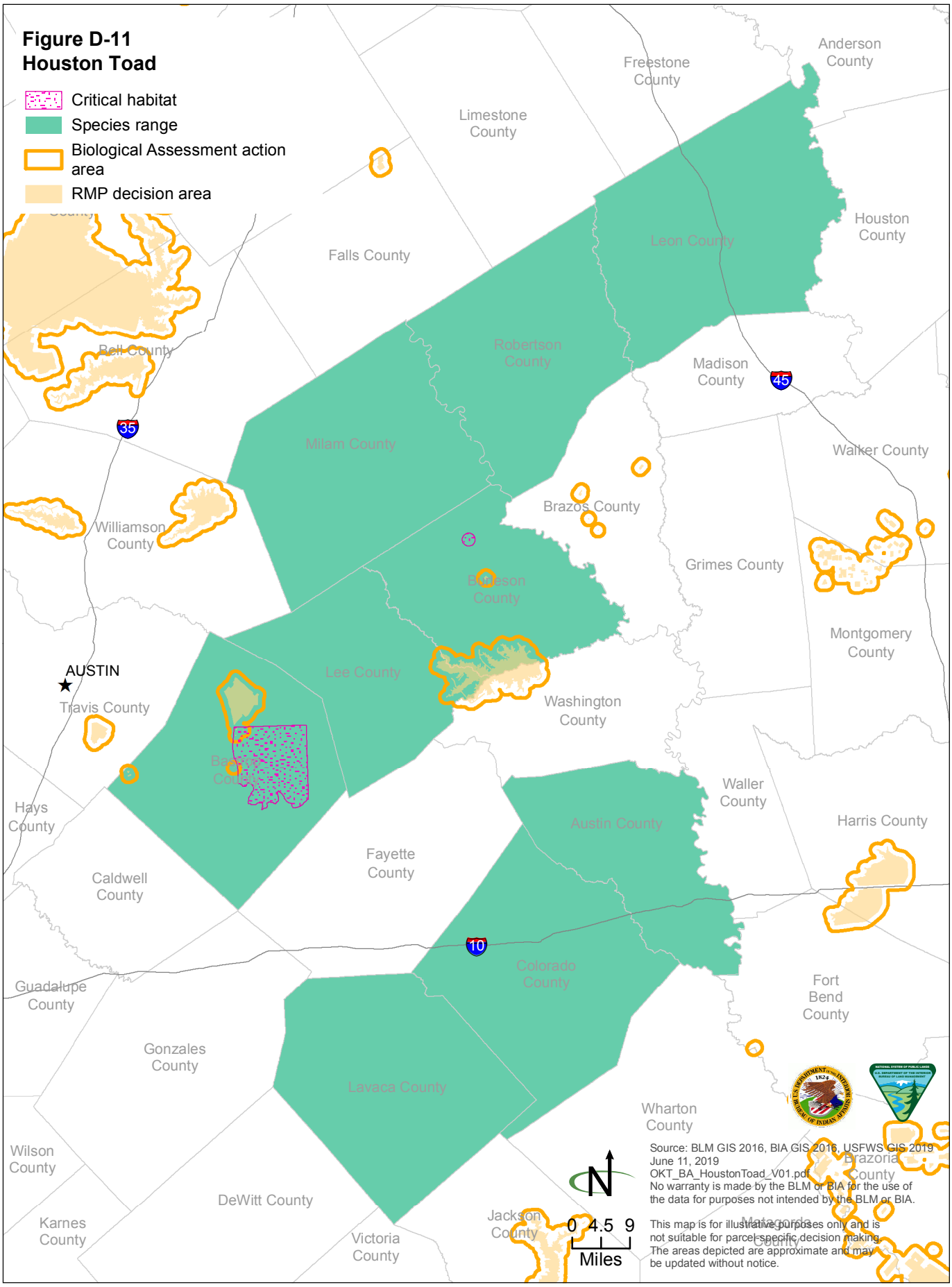
Figure D-11
Houston Toad
Critical habitat
Species range
Biological Assessment action area
RMP decision area
Anderson County
Freestone County
Limestone County
Houston County
Leon County
Falls County
Robertson County
Madison County
45
Bell County
35
Milam County
Walker County
Brazos County
Williamson County
Grimes County
Burleson County
Montgomery County
AUSTIN
Lee County
Travis County
Washington County
Waller County
Hays County
Austin County
Harris County
Fayette County
Caldwell County
10
Colorado County
Guadalupe County
Fort Bend County
Gonzales County
Lavaca County
Wharton County
Wilson County
Brazoria County
DeWitt County
Karnes County
Jackson County
Victoria County
Matagorda County
N
0 4.5 9
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2019
June 11, 2019
OKT_BA_HoustonToad_V01.pdf
No warranty is made by the BLM or BIA for the use of the data for purposes not intended by the BLM or BIA.
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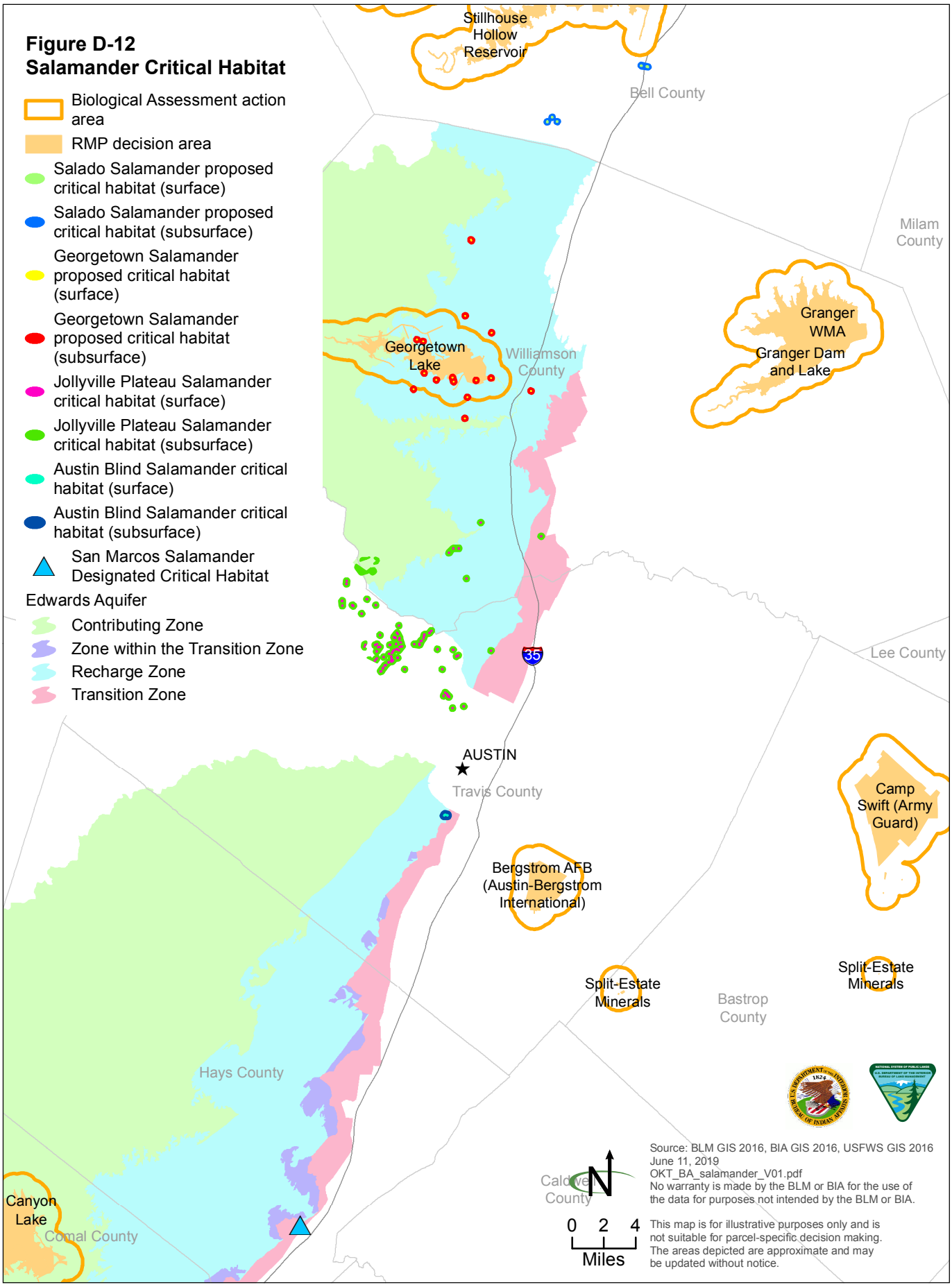
Figure D-12
Salamander Critical Habitat
Biological Assessment action area
RMP decision area
Salado Salamander proposed critical habitat (surface)
Salado Salamander proposed critical habitat (subsurface)
Georgetown Salamander proposed critical habitat (surface)
Georgetown Salamander proposed critical habitat (subsurface)
Jollyville Plateau Salamander critical habitat (surface)
Jollyville Plateau Salamander critical habitat (subsurface)
Austin Blind Salamander critical habitat (surface)
Austin Blind Salamander critical habitat (subsurface)
San Marcos Salamander Designated Critical Habitat
Edwards Aquifer
Contributing Zone
Zone within the Transition Zone
Recharge Zone
Transition Zone
Stillhouse Hollow Reservoir
Bell County
Milam County
Granger WMA
Granger Dam and Lake
Georgetown Lake
Williamson County
Lee County
AUSTIN
Travis County
Camp Swift (Army Guard)
Bergstrom AFB (Austin-Bergstrom International)
Split-Estate Minerals
Split-Estate Minerals
Bastrop County
Hays County
Canyon Lake
Comal County
Caldwell County
N
0 2 4
Miles
Source: BLM GIS 2016, BIA GIS 2016, USFWS GIS 2016
June 11, 2019
OKT_BA_salamander_V01.pdf
No warranty is made by the BLM or BIA for the use of the data for purposes not intended by the BLM or BIA.
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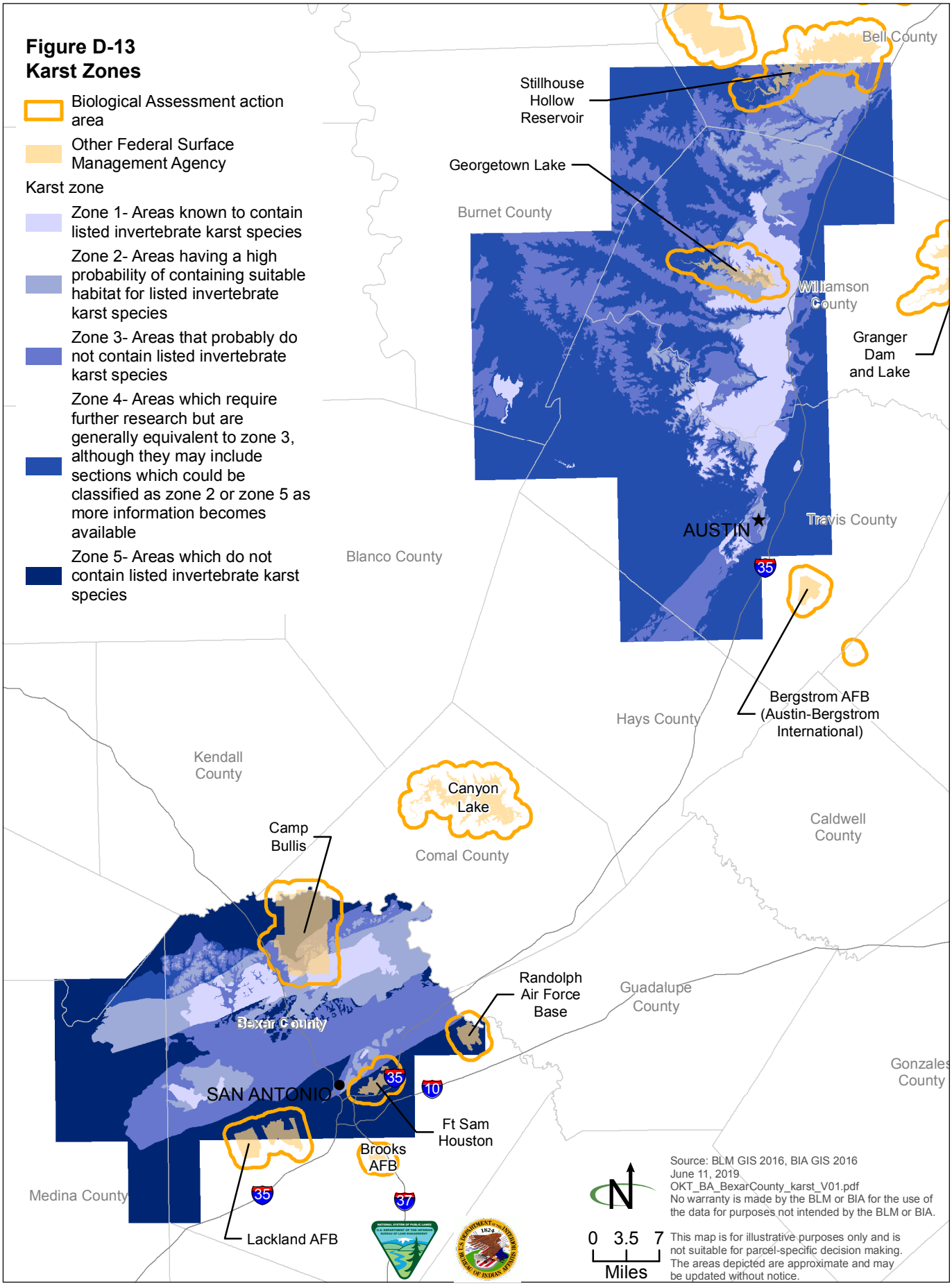
Figure D-13
Karst Zones
Biological Assessment action area
Other Federal Surface Management Agency
Karst zone
Zone 1- Areas known to contain listed invertebrate karst species
Zone 2- Areas having a high probability of containing suitable habitat for listed invertebrate karst species
Zone 3- Areas that probably do not contain listed invertebrate karst species
Zone 4- Areas which require further research but are generally equivalent to zone 3, although they may include sections which could be classified as zone 2 or zone 5 as more information becomes available
Zone 5- Areas which do not contain listed invertebrate karst species
Bell County
Stillhouse Hollow Reservoir
Georgetown Lake
Burnet County
Williamson County
Granger Dam and Lake
AUSTIN
Travis County
Blanco County
35
Bergstrom AFB (Austin-Bergstrom International)
Hays County
Kendall County
Canyon Lake
Comal County
Caldwell County
Camp Bullis
Bexar County
Randolph Air Force Base
Guadalupe County
SAN ANTONIO
35
10
Ft Sam Houston
Brooks AFB
Gonzales County
Medina County
35
37
Lackland AFB
N
0 3.5 7
Miles
Source: BLM GIS 2016, BIA GIS 2016
June 11, 2019
OKT_BA_BexarCounty_karst_V01.pdf
No warranty is made by the BLM or BIA for the use of the data for purposes not intended by the BLM or BIA.
This map is for illustrative purposes only and is not suitable for parcel-specific decision making. The areas depicted are approximate and may be updated without notice.

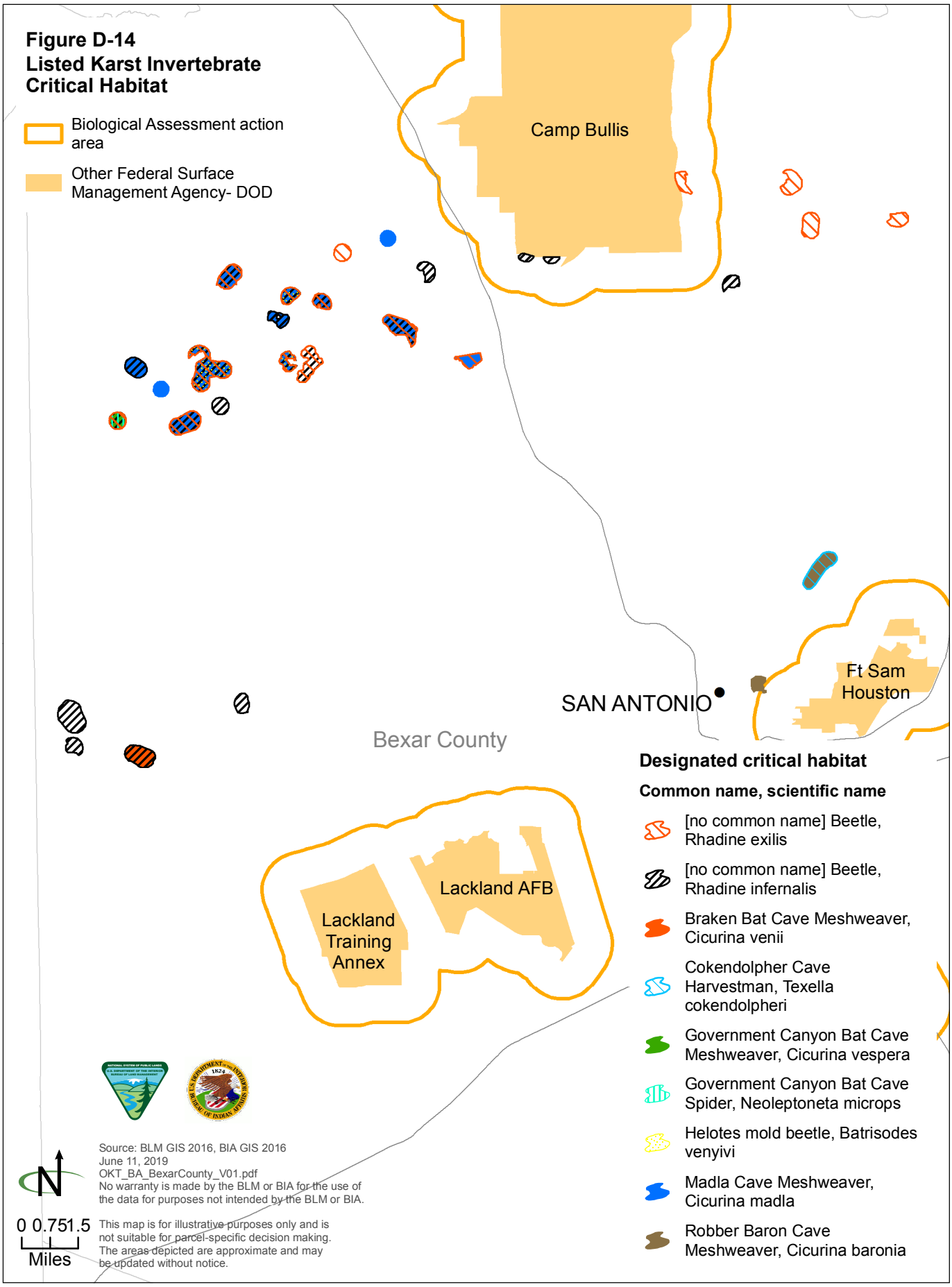
Figure D-14
Listed Karst Invertebrate
Critical Habitat
Biological Assessment action area
Other Federal Surface Management Agency- DOD
Camp Bullis
Ft Sam Houston
SAN ANTONIO
Bexar County
Lackland AFB
Lackland Training Annex
Designated critical habitat
Common name, scientific name
[no common name] Beetle, Rhadine exilis
[no common name] Beetle, Rhadine infernalis
Braken Bat Cave Meshweaver, Cicurina venii
Cokendolpher Cave Harvestman, Texella cokendolpheri
Government Canyon Bat Cave Meshweaver, Cicurina vespera
Government Canyon Bat Cave Spider, Neoleptoneta microps
Helotes mold beetle, Batrisodes venyivi
Madla Cave Meshweaver, Cicurina madla
Robber Baron Cave Meshweaver, Cicurina baronia
Source: BLM GIS 2016, BIA GIS 2016
June 11, 2019
OKT_BA_BexarCounty_V01.pdf
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Miles
This map is for illustrative purposes only and is not suitable for parcel-specific decision making. The areas depicted are approximate and may be updated without notice.