

ENVIRONMENTAL ASSESSMENT

Modernizing the Fire Program at Texas Chenier Plain National Wildlife Refuges

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Table of Contents

1.0	INTRODUCTION	3
2.0	PROPOSED ACTION	3
3.0	BACKGROUND	3
3.1	Texas Chenier Plain NWR Complex.....	3
3.2	National Wildlife Refuge System (NWRS) Mission Statement and Goals	6
3.3	Texas Chenier Plain Refuge Complex Vision Statement and Goals.....	7
3.3.1	Vision Statement.....	7
3.3.2	Goals	8
3.4	Texas Chenier Plain Refuge Complex Programmatic Burn Plan.....	9
3.5	Fire Management.....	10
4.0	PURPOSE AND NEED FOR THE PROPOSED ACTION.....	13
4.1	Purpose	13
4.2	Need	16
5.0	ALTERNATIVES CONSIDERED	17
5.1	Alternative A – Permit Prescribed Burns in Excess of 4,500 Acres and Address Changes to the CCP as a Result of Outdated Information:.....	17
5.2	Alternative B – No Action Alternative:	18
6.0	AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES	18
6.1	Wildlife and Aquatic Species	19
6.2	Threatened and Endangered Species and Other Special Status Species	27
6.3	Vegetation and Habitats	30
6.4	Geology & Soils	36
6.5	Water Resources.....	41
6.6	Air Quality.....	47
6.7	Visitor Use and Experience	52
6.8	Cultural Resources	55
6.9	Refuge Management & Operations	58
6.10	Socioeconomics.....	60
7.0	MITIGATION MEASURES AND CONDITIONS	61
8.0	MONITORING.....	62
9.0	SUMMARY OF ANALYSIS	63
9.1	Alternative A – Proposed Action Alternative.....	63

9.2	Alternative B – No Action Alternative	63
10.0	LIST OF SOURCES, AGENCIES, AND PERSONS CONSULTED	63
11.0	REFERENCES	63
12.0	LIST OF PREPARERS.....	73
13.0	STATE COORDINATION	73
14.0	TRIBAL CONSULTATION	74
15.0	OTHER APPLICABLE STATUTES, EXECUTIVE ORDERS & REGULATIONS.....	74
16.0	DETERMINATION	74

List of Figures

Figure 1:	Texas Chenier Plain Refuge Complex.....	5
Figure 2:	Texas Chenier Plain Refuge Complex Burn Units.....	15

List of Tables

Table 1:	Summary of Prescribed Burns and Wildfires on the Refuge Complex from 2013 to 2022	10
Table 2:	TCEQ Water Quality Segments on or Adjacent to the Refuge Complex.....	43
Table 3:	Water Quality Impairments	44

List of Appendices

Appendix A: Other Applicable Statutes, Executive Orders, & Regulations

Environmental Assessment

Modernizing the Fire Program at Texas Chenier Plain National Wildlife Refuges

1.0 INTRODUCTION

This Environmental Assessment (EA) is being prepared to evaluate the effects associated with the proposed action and complies with the National Environmental Policy Act (NEPA) in accordance with Department of the Interior (43 CFR 46; 516 DM 8) and U.S. Fish and Wildlife Service (550 FW 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment¹.

2.0 PROPOSED ACTION

Consistent with the United States Fish and Wildlife Service's (USFWS or Service) Texas Chenier Plain Refuge Complex *Final Environmental Impact Statement, Comprehensive Conservation Plan and Land Protection Plan* (USFWS, 2008), hereinafter referred to as the CCP, USFWS is proposing to amend its Fire Program to allow for effective maintenance and enhancement of existing grassland habitats within the Refuge Complex, as well as safe and effective wildland fire suppression. The USFWS proposes to burn units that exceed the current categorical exclusion (43 CFR 46.210) threshold of 4,500 acres, assess additional considerations regarding the Fire Program, and make necessary adjustments to the CCP as a result of outdated data/information.

3.0 BACKGROUND

3.1 Texas Chenier Plain NWR Complex

The USFWS identified a need to retain and intensively manage a significant block of the coastal marsh for waterfowl habitat in the upper coastal region of Texas. As the coastal region of Texas became settled, marshlands were modified to meet the demand for farmland, and later for industrial needs. Waterfowl suffered loss of nesting, feeding, and resting areas when vast tracts of marshland were drained, but they thrived on the feed available from the rice fields and cultivated pasture lands which replaced those marshlands. As more industry flourished in the Galveston-Houston-Beaumont metropolitan area, economic expansion created a demand for more land to

¹ Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, Ending Illegal Discrimination and Restoring Merit-Based Opportunity (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The USFWS verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum.

accommodate the continued growth. Coastal marshes have been filled to provide sites for factories, refineries, roads, commercial, and residential areas.

Land acquisition to form the Refuge began in 1954. Currently, the Refuge Complex administers a total of 116,000 acres in combined fee title and conservation easements. As additional parcels were added to the National Wildlife Refuge System for the protection of coastal waterfowl habitat through the Migratory Bird Conservation Act, these acquisitions created a closely linked cluster of Refuges along the coast. In the early 1980s, the USFWS decided that this closely related group of four refuges could be more efficiently administered as one Refuge Complex. Subsequently, the Refuge Complex was named for the geologic/geographic feature called “cheniers” found along this part of the Louisiana and Texas coastline. Location and boundaries of each Refuge within the Texas Chenier Plain NWR Complex are depicted in **Figure 1**.

The management focus of these refuges is to retain and intensively manage this significant block of the coastal marsh for migrating, wintering and breeding waterfowl, shorebirds and waterbirds, and provide strategic and crucial resting areas for neotropical migratory songbirds migrating across the Gulf of America (Gulf-formerly Gulf of Mexico). The Refuge Complex encompasses a diversity of habitats: aquatic habitats (open water and near-shore Gulf habitats); freshwater to saline marshes; riparian habitats; coastal woodlots; rice fields; native prairies, cheniers, and coastal beach; and dune habitats. These areas host a multitude of plant, invertebrate and vertebrate species including over 300 bird species, 75 species of freshwater fish, and 400 species of salt and brackish water fish and shellfish. The Refuge Complex protects quality habitats for migrating, wintering, and breeding waterfowl; shorebirds; and waterbirds and provides strategic and crucial resting areas for neotropical migratory songbirds migrating across the Gulf.

Water management, prescribed burning, and controlled grazing have been traditional tools in the management of coastal marshes in these Refuges.

Rice farming has been continued on Jocelyn Nungaray NWR (formerly Anahuac NWR) to provide valuable foraging habitats for waterfowl. Wildlife recreation, which includes waterfowl hunting, has been a long-standing tradition of the area. Additionally, fishing and bird watching continue to be popular within the Refuge Complex.

The primary authority in establishing the Jocelyn Nungaray NWR (1963), McFaddin NWR (1980), and Texas Point NWR (1979) was the Migratory Bird Conservation Act (MBCA) of 1929 (16 U.S.C. 715d), “...for use as an inviolate sanctuary, and for any other management purposes, for migratory birds.” The refuges are administered by the USFWS as units of the National Wildlife Refuge System. Lands or certain interests in lands added to the Refuges since their original establishment were also acquired under the authority of the MBCA, with the same establishment purpose. Lands have been added to the NWRs under three additional authorities, with the following purposes:

“... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions...” 16 U.S.C. 3901(b), 100 Sta. 3583 (Emergency Wetlands Resources Act);

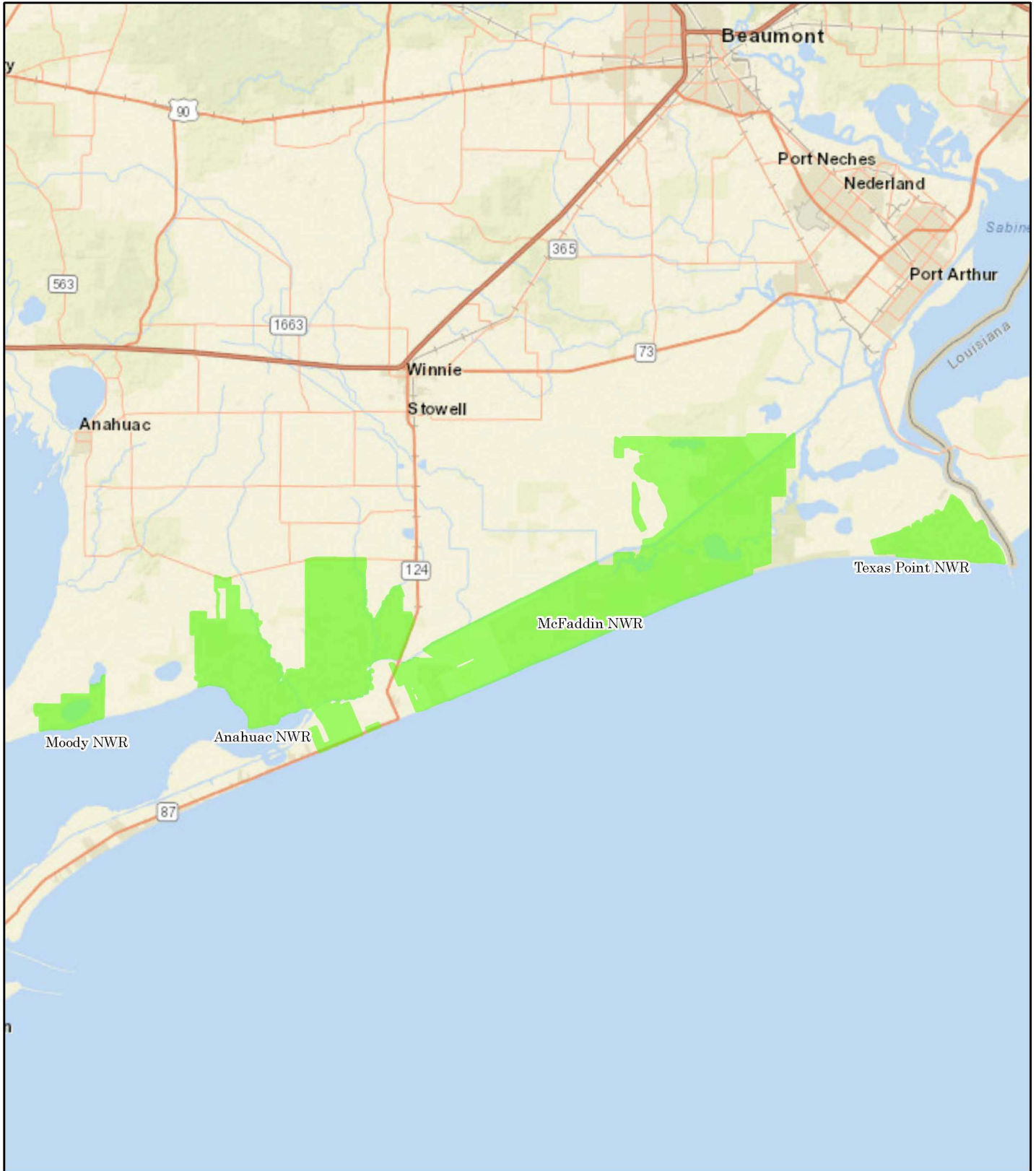


Figure 1: Texas Chenier Plain Refuge Complex
 USFWS Fire Program

Legend

- Texas Chenier Plain Refuge Complex

Chambers, Galveston, and Jefferson Counties, Texas

Map Base: ESRI World Streetmap
 Map Datum: NAD 1983 UTM Zone 15N, meters
 Map Date: September 26, 2023



“...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...” 16 U.S.C. 460K-1 (Refuge Recreation Act); and,

“...for the conservation, maintenance, and management of wildlife, resources thereof, and its habitat thereon...” 16 U.S.C. 661-667e (Fish and Wildlife Coordination Act).

The large majority of lands within the Texas Chenier Plain Refuge Complex were acquired with Migratory Bird Conservation Funds; and, in compliance with the statutory restrictions (1958 Amendment to the Duck Stamp Act), approximately 40% of Jocelyn Nungaray, McFaddin, and Texas Point NWRs are open to waterfowl hunting. Priority recreation uses at the Texas Chenier Plain Refuge Complex includes the six wildlife dependent uses in accordance with the National Wildlife Refuge Administration Act (Administration Act), as amended by the 1997 National Wildlife System Improvement Act: hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

Through his will in 1954, W. L. Moody, Jr. conveyed as a gift to the USFWS an undivided ½ fee interest in 14-acre Lake Surprise, which became Moody NWR on November 9, 1961. In 1982, the USFWS exchanged the fee interest in Lake Surprise with the Moody Foundation for a perpetual non-development conservation easement on a little over 3,500 acres of wetland habitat around Lake Surprise which comprises the current Moody NWR and is otherwise entirely privately-owned and managed.

Consistent with the establishment purpose of its refuges, the primary objective of habitat management on the Refuge Complex is to enhance and restore habitat for wintering, migrating, and nesting waterfowl and other migratory bird species. Management practices for waterfowl, shorebirds, and other wetland - dependent wildlife on the Refuge Complex include structural management for manipulating water levels and salinity within managed wetlands, prescribed burning, controlled livestock grazing, moist soil management, and rice farming. Prescribed burning, controlled grazing, mowing, and haying are tools utilized to manage upland habitats which include remnant stands of native prairie and newly restored native prairie sites. Often, a combination of management activities is applied as appropriate to the various habitats on the Refuge Complex. Almost all acres receive some treatment annually.

3.2 National Wildlife Refuge System (NWRS) Mission Statement and Goals

National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, laws, and international treaties. Relevant guidance includes the National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The mission of the NWRS, as outlined by the National Wildlife Refuge System Administration Act (NWRSA), as amended by the National Wildlife Refuge System Improvement Act (16 U.S.C. 668dd et seq.), is:

“... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

The goals of the NWRS according to USFWS Policy 601 FW 1 (USFWS, 2006) are:

1. Conserve a diversity of fish, wildlife, plants and their habitats, including species that are endangered or threatened with becoming endangered.
2. Develop and maintain a network of habitats for migratory birds, anadromous and interjurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
3. Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
4. Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
5. Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

The proposed changes to the Fire Program would help to achieve the mission and goals of the NWRS by preserving and enhancing a diversity of habitats/ecosystems utilized by a multitude of species, including but not limited to migratory birds and threatened and endangered species. USFWS utilizes prescribed burning in combination with rotational controlled grazing, mowing and haying, and invasive plant control to maintain and enhance existing grassland habitats on the Refuge Complex. USFWS also conducts wildland fire suppression activities with full consideration of natural resource objectives.

3.3 Texas Chenier Plain Refuge Complex Vision Statement and Goals

3.3.1 Vision Statement

The Texas Chenier Plain Refuge Complex will provide healthy and sustainable habitats for the diverse fish and wildlife resources of this rich coastal ecosystem. The full array of the region’s native habitats - coastal marshes and prairie wetlands, coastal tallgrass prairie, and coastal woodlands - will be represented on the Refuge Complex. Protection, enhancement, and restoration of these habitats will help maintain and restore the ecosystem’s rich biological diversity.

Refuge habitats will be enhanced through management and restoration with an emphasis on benefiting waterfowl and other wetland-dependent migratory birds, declining songbird species, and all other species at risk within the ecosystem. Management activities on the Refuges will also seek to maintain and enhance habitat values for coastal fisheries, which support vital recreational and commercial fishing industries. Sound scientific monitoring and research will support an

adaptive approach to management, facilitating continual refinement and improvement of Refuge management practices.

By working with partners both governmental and private, the Refuge Complex will seek to ensure the long-term sustainability of coastal wetlands threatened by erosion, subsidence, rising sea levels, and altered hydrological regimes. Working with the scientific community, the Refuge Complex will actively seek to develop and implement solutions to these complex problems.

The Refuges will provide high quality recreational and educational opportunities for the public. The importance of the Refuge Complex in supporting a rapidly expanding nature tourism industry will be increased. By reaching out to and working within our communities, awareness of the importance of conserving fish, wildlife and habitats will increase and new and innovative opportunities to promote and implement conservation on private lands will emerge. By helping to conserve natural resources, the Refuges will maintain and enhance the quality of life for residents, who have always greatly valued and treasured the region's rich natural heritage.

3.3.2 Goals

The Texas Gulf Coast Ecosystems goals and objectives were considered in developing the Refuge goals. The goals of the Texas Chenier Plain Refuge Complex are:

- Goal 1 - Conserve, enhance and restore the Texas Chenier Plain region's coastal wetlands to provide wintering, migrational, and nesting/brood-rearing habitat for waterfowl, shorebirds, marsh and wading birds, other wetland-dependent migratory birds, and habitat for other native fish and wildlife.
- Goal 2 - Conserve, enhance and restore the Texas Chenier Plain region's coastal prairies and coastal woodlands to provide wintering, migrational, and nesting habitat for resident and migratory landbirds, including neotropical/neartic migratory birds, and habitat for other native wildlife.
- Goal 3 - A comprehensive biological program will guide and support conservation efforts for all species of native fish, wildlife and plants on the Texas Chenier Plain Refuge Complex.
- Goal 4 - By working with others locally and on a landscape level, threats to biological integrity, biological diversity and environmental health on the Refuge Complex will be addressed.
- Goal 5 - All local, national and international visitors will enjoy safe and high-quality outdoor experiences on the Refuge Complex and learn of the Refuge Complex's role in conserving the region's coastal natural resources. New partnerships with our local communities will be forged to highlight, promote and conserve the unique natural assets of the upper Texas Gulf Coast.

The proposed changes to the fire program would help to achieve the goals of the Refuge Complex by conserving and enhancing valuable habitats within the Refuge Complex to provide wintering, migrational, and nesting habitat for resident and migratory landbirds, including neotropical/neartic migratory birds, and habitat for other native wildlife, as well as providing visitors with safe, high-quality outdoor experiences on the Refuge Complex.

3.4 Texas Chenier Plain Refuge Complex Programmatic Burn Plan

The Texas Chenier Plain NWR Complex Programmatic Burn Plan (also referred to as “Plan”) encompasses all burn units within Jocelyn Nungaray NWR, McFaddin NWR, and Texas Point NWR. The Plan does not address Moody NWR because it is an overlay refuge, located on private lands that are under a conservation easement.

The Refuge Complex is broken into six fire management units (FMU’s) that contain multiple individual units. The names and acreages of each FMU are included below:

FMU	Acres
Jocelyn Nungaray East	23,401
Jocelyn Nungaray West	13,386
McFaddin East	12,135
McFaddin West	30,534
McFaddin North	13,399
Texas Point	8,729
Total	101,584

Resource Objectives of the USFWS Fire Program are as follows:

- 1) Maintain and enhance the coastal prairie ecosystem.
- 2) Maintain fresh marsh habitat.
- 3) Provide quality habitat for migratory birds.
- 4) Maintain open water habitat in the impoundments.
- 5) Reduce the amount of hazardous fuels.
- 6) Provide for the safety of the firefighters and the public.

Prescribed Fire Objectives are as follows:

- 1) Open up dense, impenetrable stands of vegetation.
- 2) Remove hazardous fuel.
- 3) Encourage diversity of native herbaceous species.
- 4) Reduce the presence of nuisance vegetation such as eastern baccharis and Chinese tallow.

According to the Plan, the acceptable range of results is to burn 60 % to 80% of the available fuels on 75% of each burn unit and eliminate >75% of woody stems.

Over the past ten years, the USFWS has conducted 85 prescribed burns on over 118,000 acres of Refuge Complex lands. Over the same period of time, USFWS has responded to 147 wildfires, which burned over 104,000 acres. **Table 1** lists the numbers and acreages of prescribed burns and wildfires over the past ten years.

Fiscal Year	Number of Prescribed Burn Days	Prescribed Burn Acres	Number of Wildfires	Wildfire Acres
2013	5	2739.2	10	12290.7
2014	2	207	14	22696.3
2015	18	6984.6	17	7307.5
2016	7	7065.8	9	10228.1
2017	6	13892.2	22	7479.5
2018	9	12250.4	15	11995.5
2019	0	0	8	1334.9
2020	16	38166.9	15	6145.9
2021	0	0	19	16196.8
2022	22	37163.3	18	8969.5
Totals	85	118,469.4	147	104,644.7

Strong barriers to fire spread exist along most of the unit boundaries in the form of roads, bayous, the Gulf Intracoastal Waterway, wide channels, and areas of sparse vegetation.

While both prescribed burns and wildfires can benefit the marshes and prairies within the Refuge Complex, prescribed burns are preferred, as they are planned events conducted in accordance with an approved Programmatic Burn Plan under optimal atmospheric conditions in areas with clear fire breaks, and they are monitored closely by USFWS Fire Program staff.

Wildfire response is an important part of the USFWS’s Fire Program, as it helps to minimize the effects of wildfire on the human environment (i.e., public safety, air quality).

3.5 Fire Management

The coastal prairies and marshes of the Chenier Plain region are a fire-adapted ecosystem. Although little is known of the historic fire regime, natural wildfires are thought to have been regularly occurring and widespread due to the region’s year-round electrical storm activity and lightning strikes. Fire is thus a major part of the natural disturbance regime which influenced the region’s habitats and plant and animal communities under which these resources evolved.

Fire has long had a role in the ecology of the Chenier Plain region’s marshes and prairies. Pre-European settlement, fire frequency for these marshes is estimated to be 1-3 years (Frost 1995). Lightning-caused wildfires were common in coastal marshes (Hoffpauer 1968, Frost 1995). Additionally, Native Americans used fire to facilitate hunting and travel (O’Neil 1949, Givens 1962). Fire has been used by people to enhance agricultural lands and wildlife habitats on public and private lands in the Chenier Plain region. For example, prescribed fire has been used on area national wildlife refuges since the 1940’s, when it was first used on Sabine NWR in southwestern

Louisiana (Walther 1982). It has since been considered an important habitat management tool on most coastal national wildlife refuges in the region.

In the past, fires in the Gulf coast prairies and marshes probably varied greatly in spatial extent. Natural firebreaks existed in many forms. Bayous, tidal creeks, animal trails, and areas previously disturbed by fire or animal herbivory all may limit the spread of wildfires. Weather, fuel conditions, and water levels influence the effectiveness of the natural firebreaks and ultimately the size of the fire.

Anecdotal data suggest that prior to the settlement and the major changes in hydrological regimes which followed, much of the vegetation that dominated these fresher marshes (i.e. Sawgrass (*Cladium mariscus* subsp. *jamaicense*), maidencain (*Panicum hemitomon*), giant cutgrass (*Zizaniopsis miliacea*), and bullwhip (*Schoenoplectus californicus*)) was less pyrogenic than common vegetation found today, such as marshhay cordgrass. This may have reduced the frequency and size of historical fires in the region's marshes compared to current vegetative conditions. Conversely, natural fire ignitions in the region have undoubtedly been significantly reduced because of the landscape-level conversion of upland prairie habitats to agricultural uses. Navigation canals, ditches, levees, and roads constructed throughout upland and wetland habitats effectively serve as firebreaks and have greatly affected fire spread and the ultimate size of present-day natural fires.

Generally, three types of fires in coastal marshes are recognized: cover, root, and peat burns (Lynch 1941). Soil moisture and organic content, as well as surface water at the time of the fire, determine the type of burn that occurs. Water levels and soil conditions must be considered carefully to meet management objectives of prescribed burns (Bacchus 1995, Hungerford et al. 1995). The USFWS carefully considers these parameters in implementing its fire management program on the Refuge Complex.

The most common and widely used fire in coastal marshes is the cover burn (Hoffpauer 1968). This type of fire, taking place when water levels are at or near the marsh surface, removes the aerial portions of the vegetation. Recommended water levels for a cover burn range from marsh surface to five inches (Lynch 1941, O'Neil 1949, Hoffpauer 1968). Cover burns temporarily remove dense emergent vegetation and attract wildlife and cattle to the new growth (Lynch 1941, Hoffpauer 1968). Cover burns would be thought of as a surface fire by most fire researchers.

Marshes recover quickly after winter cover burns. Soil moisture or surface water protects the subterranean plant parts from damage. Gabrey and Afton (2001) found in the Chenier Plain of Louisiana, that the total above ground biomass was reduced for two years while dead above ground biomass was reduced for three years post fire compared to unburned control plots. In addition, they found that plant species composition in burned plots was the same as unburned plots, with a slight increase in richness during the first growing season post-fire.

Root burns occur in marshes under dryer conditions. The roots of plants may move into the litter layer in marshes that have not burned in several years (Lynch 1941). If the litter layer is dry enough to support combustion, a root burn may occur. Root fires burn away the litter layer and destroy shallow root systems. This type of burn can create significant changes in the plant community.

Climax species such as maidencane and marshhay cordgrass are often set back, allowing subclimax species to increase. Because the fire is in the litter layer and soil is not consumed, this type of burn would also be classified as a surface fire by most fire researchers, though the results of the fire would be very different.

The last type of marsh fire is the peat burn. This takes place under the driest soil conditions. In a peat burn, the fire removes the organic subsurface fuels and, in some instances, will burn down to the underlying clay pan. This type of fire typically removes existing vegetation and creates open water conditions that may last for decades (Lay and O'Neil 1942, O'Neil 1949, Hoffpauer 1968). Peat burns can create quality waterfowl habitat by burning holes into the marsh that later become open water (Lynch 1941, Uhler 1944, Baldassare and Bolen 1994). Despite this, peat burns are not a management goal in most instances. The prolonged smoldering involved in peat burns would likely cause smoke management problems in surrounding communities. With the alarming loss of coastal wetlands to sea-level rise and subsidence, these types of burns cannot be justified in most situations (Nyman and Chabreck 1995). The general fire management community would classify peat burns as a ground fire.

The objective of the Refuge Complex fire management program is to manage prescribed fire and unplanned wildland fires in a manner beneficial to native plant and animal communities and ecological functions, while providing for public and employee safety and protecting surrounding communities through the effective management of hazardous vegetative fuels. Suppression of wildland fires on the Refuge Complex involves utilization of "Appropriate Management Response", with the priority placed on protecting safety of firefighters and the public and protecting natural resources (USFWS 2001). Reducing smoke impacts to surrounding communities is an important consideration in planning and implementing suppression actions on all wildland fires occurring on the Refuge Complex.

Patterns of fire occurrence on the Refuge Complex are most heavily influenced by climate, proximity of hunting/grazing season, and previous occurrence of wildland fires or prescribed burns. Fire models (FIREBASE) implemented in developing the Refuge Complex Fire Management Plan (USFWS 2001) defined the fire season for the Refuge Complex as June 30 to April 10, but the vegetative fuels on the Refuge Complex are capable of supporting fire spread year-round. Analysis of a recent 10-year (2013 to 2022) fire occurrence history for the Refuge Complex documented an average of 23 fires per year (prescribed fire and wildfire) with an annual average burned area of 22,311 acres.

In marsh habitats, prescribed fire is used in combination with water management and controlled livestock grazing to provide high quality wintering habitat for waterfowl, shorebirds, and other marsh and waterbirds. Fire helps to maintain early successional plant communities which provide food for wintering and migrating waterfowl. Fire also creates openings in otherwise dense stands of vegetation, which include areas of sheet water utilized by ducks feeding on invertebrates and annual seeds. The desired plant diversity includes several seed-producing annual grasses (sprangletops, millets), and tuber producing plants such as Olney bulrush. Snow geese heavily use recent marsh burns because they can readily access roots, tubers, and young green shoots of the regrowth. Both geese and ducks use burned areas as roosts or loafing areas. In prairie grassland habitats, prescribed fire is used to encourage the growth of many native grasses and forbs which

have evolved with fire, while simultaneously helping to reduce woody vegetation. Without disturbance, both marsh and prairie habitats on the Refuge Complex are subject to invasion by several woody plants, which in turn reduces habitat quality for many avian species and other wildlife. Fire is used to reduce woody species such as Eastern baccharis and big-leaved sumpweed and is an important tool (among several used) in control efforts for Chinese tallow (a highly invasive exotic plant species).

The USFWS minimizes potential for smoke impacts from prescribed burning operations through strict adherence to legal requirements of the Texas Commission on Environmental Quality (TCEQ) included in the Outdoor Burning Rule [Title 30, Texas Administrative Code (TAC) Sections 111.201-221] which regulates outdoor burning in Texas. The requirements of the Outdoor Burning Rule (TCEQ and TAC, 2017) include but are not limited to (1) burning shall be commenced and conducted only when wind direction and other meteorological conditions are such that smoke and other pollutants will not cause adverse effects to any public road, landing strip, navigable water, or off-site structure containing sensitive receptor; (2) burning must be conducted downwind of or at least 300 feet from any structure containing sensitive receptors located on adjacent properties unless prior written approval is obtained from the adjacent occupant with possessory control; (3) burning must occur no earlier than one hour after sunrise and no later than one hour before sunset and must be attended by a responsible party at all times during the active burn phase when the fire is progressing; (4) burning is not permitted when surface winds are less than six miles per hour (mph) or more than 23 mph; and (5) burning is not permitted during periods of persistent (actual or predicted) low level atmospheric temperature inversions.

To further mitigate negative impacts from prescribed burns, the USFWS implements an independent smoke screening process which includes a 360-degree review of potential smoke sensitive targets. Current and predicted weather and atmospheric conditions are monitored using National Weather Service Fire Weather Forecasts, Spot Weather forecasts from the Houston/Galveston, Texas Office, and on-site weather stations. Smoke movement and dispersal is modeled using smoke modeling software such as Smoke Impact Spreadsheet (SIS), Simple Approach Smoke Estimation Model (SASEM), and First Order Fire Effects Model (FOFEM) to verify that prescribed atmospheric parameters will prevent smoke from adversely impacting sensitive targets. These are days that the smoke will move quickly up into the atmosphere and over and above smoke sensitive targets. Every prescribed burn on the Refuge Complex is planned and executed within TCEQ and USFWS parameters (USFWS, 2022).

4.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

4.1 Purpose

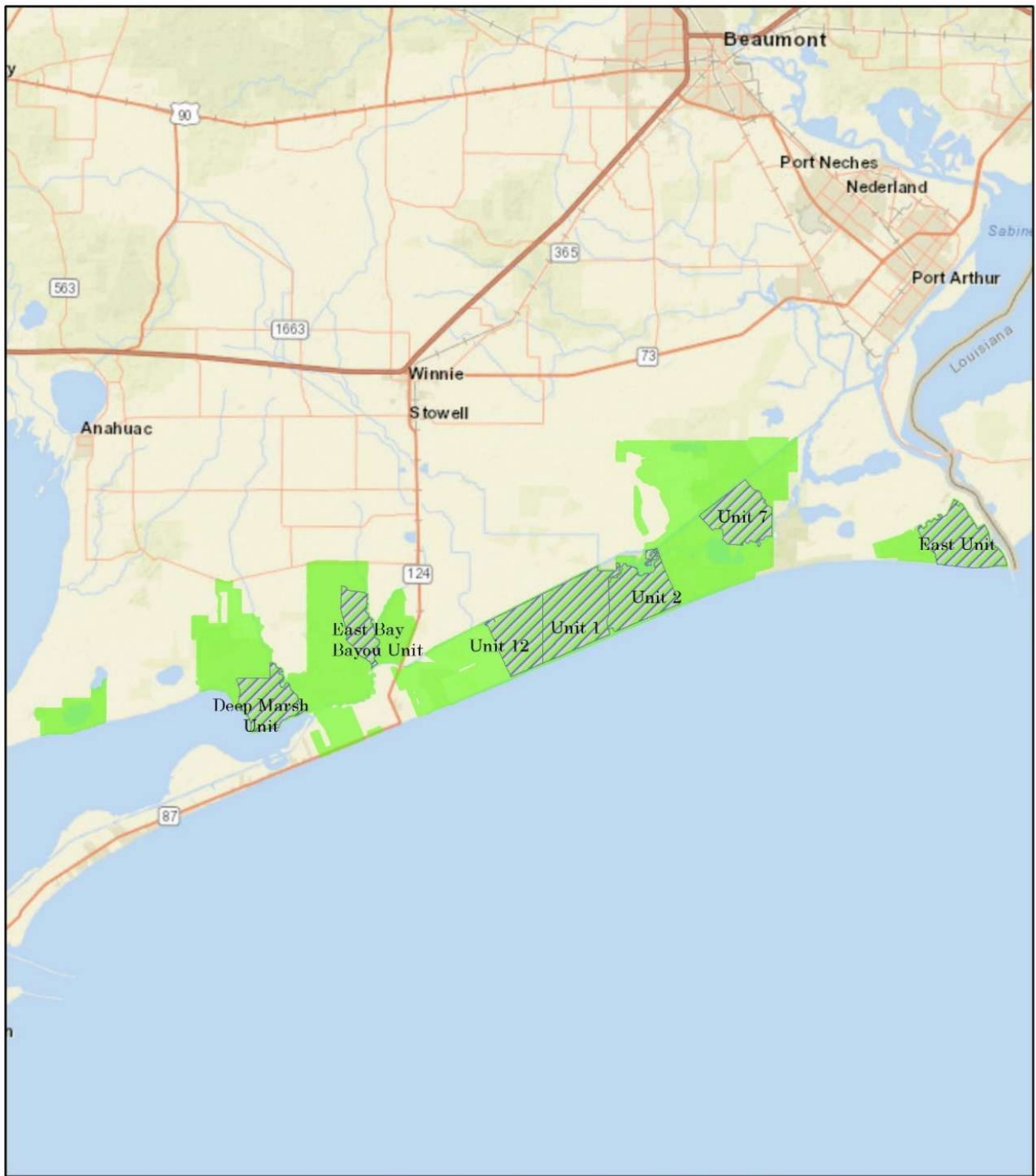
The purpose of this proposed action is to evaluate and enact changes to the Refuge Complex's Fire Program to allow for effective maintenance and enhancement of existing grassland habitats within the Refuge Complex, as well as safe and effective wildland fire suppression, and to make necessary adjustments to the CCP as a result of outdated information related to the Fire Program.

The USFWS is currently limited by categorical exclusion (43 CFR 46.210) to burning up to 4,500 acres at a time with each prescribed fire. There are currently three circumstances that could require burning in excess of this acreage threshold:

1. Several current management units within the Refuge Complex already exceed 4,500 acres. FMU boundaries are depicted in **Figure 2**.
 - McFaddin NWR
 - Unit 1: 8,935 acres
 - Unit 2: 6,112 acres
 - Unit 7: 5,573 acres
 - Unit 12: 5,702 acres
 - Texas Point NWR
 - East Unit: 6,392 acres.
 - Jocelyn Nungaray NWR
 - Deep Marsh Unit: 5,021 acres.
2. Safety and/or containment may require that multiple management units are treated with the same prescribed burn, resulting in treatment areas exceeding 4,500 acres.
3. New land acquisition may result in management units that exceed 4,500 acres.

The CCP contains outdated information related to the Fire Program as follows:

1. The CCP lists annual prescribed fire objectives as 12,000 to 15,000 total acres. Current fire intervals are every 3-5 years and there are currently approximately 33,000 acres to be burned on this rotation. Annual prescribed fire acreage objectives can vary greatly. Several variables can affect these objectives including but not limited to the following:
 - Weather can affect ability to safely and effectively implement prescribed fire (i.e. too wet, atmospheric conditions not optimal for burning)
 - Funding constraints
 - Changes to Refuge Management Objectives
 - Consultation guidance for endangered or threatened species
2. The CCP lists the primary seasonal timing of prescribed burning to be from late September to late November. Chiefly due to the proximity of large urban areas (i.e., Houston, Galveston, Beaumont), prescribed burns are typically conducted with northerly wind directions that move the associated smoke away from these urban areas. These wind directions are normally associated with frontal passages that primarily occur in the fall and winter months. Consequently, most of the refuge acreage receives prescribed burn treatment in January and February. If management objectives can be achieved safely and avoid negatively impacting the public, prescribed burns can be conducted at any time of the year. Throughout the year refuge management monitors the weather and other parameters needed to successfully conduct prescribed burns.



Legend

- Texas Chenier Plain Refuge Complex
- Burn Units

Figure 2: Burn Units
USFWS Fire Program

Chambers, Galveston, and Jefferson Counties, Texas

Map Base: ESRI World Streetmap
Map Datum: NAD 1983 UTM Zone 18N, meters
Map Date: September 26, 2023

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1:437,839



3. The CCP currently does not address the operation of manned and unmanned aircraft, which have many uses on the Refuges. These uses include, but are not limited to, aerial ignition, fire detection, mapping, damage assessment, and law enforcement missions. The USFWS currently uses their maintenance facility in Winnie for helicopter staging. The helicopter is an important tool in wildfire suppression and prescribed burns. It speeds up response times and can drop water to help suppress fires. A Plastic Sphere Dispenser, operated within a helicopter, drops balls that with a chemical reaction (potassium permanganate and ethylene glycol) ignite after reaching the ground to start fire. This allows USFWS to burn units quicker by igniting them with fire in multiple areas at a time rather than waiting for fire to spread naturally from a single area.
4. The CCP currently does not address the use of Class A foam in fire containment efforts. Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations (NIFC, 2023) includes DOI policy and definitions related to foam use. USFWS is currently required to carry Class A foam on Engines as per guidance.
5. The CCP currently does not address maintaining established fire-lines and/or creating new fire-lines in efforts to aid with the implementation of prescribed burns and the containment of wildfires.
6. The CCP currently does not address Eastern Black Rail (EBR) concerns. The USFWS is currently operating under an existing consultation/Biological Opinion (BO): *Intra-Service Section 7 Biological Opinion on Refuge Complex Management Effects for the Eastern black rail (Laterallus jamaicensis jamaicensis)*, which covers fire-line construction and maintenance, regardless of whether the fire-line is in black rail habitat or not. Requirements/restrictions/measures for protection of EBR may change if the science changes, and USFWS expects this EA/NEPA analysis to survive longer than the period of change.

4.2 Need

The need of the proposed action is to allow the USFWS to effectively manage Refuge Complex habitats utilizing prescribed fire to meet the Service's priorities and mandates as outlined by the NWRSA 16 U.S.C. 668dd(a)(4) as follows:

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the NWRS;
- Ensure that the biological integrity, diversity, and environmental health of the NWRS are maintained for the benefit of present and future generations of Americans; and
- Ensure that the mission of the NWRS described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out.

Continuing to operate under the current categorical exclusion (prescribed burns under 4,500 acres) and CCP limits USFWS's ability to effectively manage Refuge habitats utilizing prescribed fire as outlined in the *Texas Chenier Plain NWR Complex Programmatic Burn Plan* to manage Refuge Complex habitats for wildlife, including waterfowl, and diminishes its capacity to effectively respond to wildfires.

5.0 ALTERNATIVES CONSIDERED

5.1 Alternative A – Permit Prescribed Burns in Excess of 4,500 Acres and Address Changes to the CCP as a Result of Outdated Information:

The USFWS proposes to manage Refuge habitats utilizing prescribed fire in accordance with an approved Programmatic Burn Plan, which is reviewed on an annual basis. Under this alternative, prescribed fires may exceed the current Categorical Exclusion limitation of 4,500 acres per prescribed fire event, the USFWS would target a fire return interval that would treat 20 – 40% of the total acreage of all Refuge Complex management units on an annual basis rather than the 12,000-to-15,000-acre objective listed in the CCP.

USFWS would have the ability to conduct prescribed fires any time of the year if optimal atmospheric conditions exist and management objectives can be achieved safely without negatively impacting the public, rather than only conducting fires from late-September to late-November as indicated in the CCP. Throughout the year refuge managers would monitor the weather and other parameters needed to successfully conduct prescribed burns.

USFWS would utilize tools including but not limited to manned and unmanned aircraft and Class A foam during implementation of prescribed burns and wildfire response, should these technologies prove to be safe and effective. These tools would be used in accordance with all relevant department and bureau policies and guidance.

The USFWS currently uses their maintenance facility in Winnie for helicopter staging and would continue to do so under this alternative. The helicopter is an important tool in wildfire suppression and prescribed burns. It speeds up response times and can drop water to help suppress fires. A Plastic Sphere Dispenser, operated within a helicopter, drops balls that with a chemical reaction (potassium permanganate and ethylene glycol) ignite after reaching the ground to start fire. This allows USFWS to burn units quicker by igniting them with fire in multiple areas at a time rather than waiting for fire to spread naturally from a single area.

USFWS would use Class A Foam, if necessary, in accordance with Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations (NIFC, 2023), which includes DOI policy and definitions related to foam use with the following restrictions:

1. No aerial application of foams is permitted on federal lands.
2. Mapped avoidance areas may be designated by an individual agency.
3. Whenever practical, as determined by the fire incident commander (IC), use of water or other less toxic wildland fire chemical suppressants for direct attack or less toxic, approved fire retardants in areas occupied by threatened, endangered, proposed, candidate or sensitive species (TEPCS) or their designated critical habitats.
4. Avoid terrestrial application of all wildland fire chemicals within 300 feet of waterways.

Class A Foam fire suppressants are supplied as liquid concentrates (similar to liquid dishwashing products), which are mixed with water and then aerated to produce foam (AMS, 2020). Approved foam concentrate may be used to improve the efficiency of water, except near waterways where

accidental spillage or overspray of the chemical could be harmful to the aquatic ecosystem. Foam may be applied by engines and portable pumps.

USFWS is currently required to carry Class A foam on Engines as per guidance. USFWS would only use foam in accordance with policy limitations.

USFWS would maintain established fire-lines and/or create new fire-lines, as necessary, in efforts to aid with the conduction of prescribed burns and the containment of wildfires. There are currently 74 miles of maintained fire lines in the TX Chenier Plain NWR Complex. USFWS would only need to establish new fire lines for new land acquisitions and for wildfire response (temporary fire lines). Fire-lines are generally either contact-lines or mow-lines. To create/maintain contact-lines, equipment with low ground pressure runs over the vegetation to change its arrangement to horizontally along the ground, but the vegetation remains intact. To create/maintain mow-lines, equipment with low ground pressure cuts the vegetation and leaves the removed materials to lay horizontally along the ground. As needed, the USFWS may create fire-lines that remove all burnable materials to the mineral soil.

USFWS is currently operating and would continue to operate under the existing BO in EBR habitat, complying with all required conditions/restrictions contained within the BO. The BO covers fire-line construction and maintenance well, regardless of whether the fire-line is in black rail habitat or not.

USFWS would not conduct prescribed burns in EBR habitat during the critical breeding/nesting season (between March 15 and October) to minimize potential for impact and would maintain current fire lines to prevent habitat from reverting/converting into EBR habitat.

The USFWS acknowledges that requirements/restrictions/measures for protection of EBR may change if the science changes, and the BO is likely to be revised on a 5-year basis as new information/science is considered.

5.2 Alternative B – No Action Alternative:

Under the No Action Alternative, current management objectives, limitations, and methodology of the Fire Program would continue unchanged. Prescribed fires on the Refuge Complex would be conducted in accordance with existing guidance and be limited to 4,500 acres per event. Management of Refuge Complex habitats to benefit waterfowl, shorebirds, wading birds, and other wetland-dependent migratory birds would continue at current levels and intensities using prescribed burning, grazing, water level and salinity management, rice farming, moist soil management, and mowing and haying.

6.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section is organized by affected resource categories and for each affected resource discusses both (1) the existing environmental baseline in the action area for each resource, and (2) the

reasonably foreseeable effects (direct and indirect) and impacts of the proposed action and any alternatives on each resource that have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action or alternatives and may include effects that are later in time or farther removed in distance from the proposed action. The effects and impacts of the proposed action considered here are changes to the human environment, whether adverse or beneficial, that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives. This EA includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an “affected resource.” Any resources that will not be more than negligibly impacted by the action have been dismissed from further analysis.

Texas Chenier Plain NWR Complex is located approximately 70 miles southeast of the Houston metro area. It is on the upper gulf coast of Texas in the counties of Chambers, Galveston and Jefferson. Refuges included in the complex are Jocelyn Nungaray (Chambers Co.), McFaddin (Jefferson Co. and Galveston Co.) and Texas Point (Jefferson Co.). It is part of the Gulf Coast Prairie and Marsh Ecoregion (Gould 1975). (See **Figure 1**). Habitat within this area can be described as Chenier Plain: Salt and Brackish Low Tidal Marsh, Gulf Coast: Salty Prairie, or Open Water (Elliott, 2014).

The prescribed fire area includes 116,000 total acres on Texas Chenier Plain NWR Complex (this includes Moody NWR, an overlay refuge which is not burned). Fire prescription units are broken down as follows:

RX Unit	Acres
Jocelyn Nungaray East	23,401
Jocelyn Nungaray West	13,386
McFaddin East	12,135
McFaddin West	30,534
McFaddin North	13,399
Texas Point	8,729
Total	101,584

For more information regarding the affected environment, please see the sections below and Chapter 3: Affected Environment in Volume 1 of the Texas Chenier Plain Refuge Complex *Final Environmental Impact Statement Comprehensive Conservation Plan and Land Protection Plan*. (2008), which can be found here:

<https://ecos.fws.gov/ServCat/DownloadFile/1460?Reference=1485>.

6.1 Wildlife and Aquatic Species

Description of Affected Environment

The Refuge Complex is home to an incredible diversity of wildlife species that rest, nest, feed and migrate through the area. Between October and March, 27 species of ducks, including green-winged teal, gadwall, shoveler, and northern pintail are likely to be present on the Complex and

huge flocks of snow geese feed in rice fields and moist soil units within the Complex. During spring and fall migrations, warblers and other songbirds are present in small, wooded areas. Roseate spoonbills, great and snowy egrets, white-faced ibis, and mottled ducks can be found throughout the year on the Refuge.

Alligators, river otters, raccoons, skunks, muskrats, and opossums are among some of the more common refuge residents. Bobcats are also frequently seen crossing the roads or slipping through the vegetation in the early morning hours.

Important commercial and recreational finfish and shellfish species in the area include brown shrimp, white shrimp, American oyster, and blue crab. The major gamefish include spotted sea trout, sand sea trout, and red fish or red drum. Other important recreational fishes include southern flounder, black drum, Atlantic croaker, gaftopsail catfish, and sheepshead. Ancillary species include bay anchovy, gulf menhaden, striped mullet, and gizzard shad.

Direct and Indirect Impacts on Wildlife and Aquatic Species **Alternative A**

The USFWS would have the ability to effectively manage Refuge Complex habitats utilizing prescribed fire. Prescribed fire would be implemented in optimal conditions utilizing the best available technology in accordance with an approved Programmatic Burn Plan, without acreage or seasonal limitations, provided that it could be implemented safely and in accordance with all applicable guidance and regulations. Direct impacts on any resident wildlife present within or adjacent to the project area would be localized to the unit(s) where prescribed fire is implemented and any habitats subject to wildfires.

Wildlife species would generally respond to prescribed fire and wildland fire in the same manner, although the degree of effect depends on the intensity of the fire, which varies in response to season, air temperature, wind, relative humidity, fuels, and other variables (NPS, 2014). The effects of prescribed fire on wildlife would be mitigated through careful planning and implementation. Prescribed fires are designed to burn quickly to minimize environmental effects, especially those related to air quality, and fire breaks are in place to aid with containment.

Fire temporarily displaces terrestrial wildlife into adjacent habitats and could temporarily alter the normal behavior of certain species. Wildlife species that do not escape fire could be injured or killed.

Black rail mortality has been observed where large areas are burned with little unburned escape cover available, while mortality was not observed in a burn containing a mosaic of unburned escape cover (Legare et al. 1998). No fire induced mortality was observed for three species of rail during fire operations on the Texas mid-coast, though data were insufficient to draw strong conclusions (Grace et al. 2005). Burns conducted under fuel and weather conditions that allow for patches of unburned habitat within an FMU may minimize wildlife mortality. Burns ignited in a way that maximizes escape options, primarily through the use of backing and widely spaced strip flanking fires, could minimize wildlife mortality while maintaining fire-dependent habitat. The USFWS uses these techniques in prescribed burning operations on the Refuge Complex.

Injury/death to wildlife species during prescribed burns would not likely affect more than a few individuals of any wildlife population. Less mobile species (such as reptiles and amphibians) and life stages of wildlife species (such as nestlings and juveniles) would be most impacted by fire (NPS, 2014). That being said, reptiles and amphibians have species-specific fire adaptations. Amphibians would likely move to wetter areas until the fire has passed. Some reptiles, including turtles and snakes, can escape fire by entering bodies of water (such as sloughs) while other reptiles, including terrestrial snakes and lizards, escape to burrows or other available cover (NPS, 2014).

Wildlife species may experience temporary habitat loss from fire; however, there is a multitude of similar, suitable habitat for use by wildlife within and adjacent to the Refuge Complex, which would be unaffected by fire. Wildlife species are expected to return to disturbed areas following fire events. The response to fire would be species-specific, but in general, herbivores would tend to congregate on recently burned sites to forage on new vegetation and predators would follow the herbivores into new growth areas.

Changes in vegetation structure and composition during and following fire events can affect wildlife, and loss of vegetation structure may lower wildlife species diversity in an area (McMahon and deCalesta 1990). Use of NWR habitats by migratory birds, including waterfowl, shorebirds, wading birds, and songbirds would likely be temporarily reduced in areas subject to fire.

Short-term studies show that the lack of vegetative cover in the months immediately following a burn has a negative effect on King and Clapper Rails (Sikes 1984), Yellow Rails (*Coturnicops noveboracensis*, Mizell 1998), sparrows (Emberizidae) and wrens (Troglodytidae) (Gabrey *et al.* 1999). In some situations, leaving unburned patches of vegetation for cover for Yellow Rails (Mizell 1998), sparrows, and wrens (Gabrey *et al.* 1999) can partially mitigate this negative effect. Fires in coastal wetlands are considered stand-replacing fires (Wade *et al.* 2000). Not surprisingly, these secretive marshland bird species decline in the first year post fire. Other bird species such as Icterids (Gabrey *et al.* 2001) and Wilson's Snipe (*Gallinago delicata*), (USFWS unpublished data) increase immediately post-burn.

Gabrey *et al.* (1999) found that Seaside Sparrows, Nelson's Sharp-tailed Sparrows, Marsh Wrens, and Sedge Wrens declined in the first winter following a burn but returned in the second winter. In some situations, leaving unburned patches of suitable habitat can partially mitigate this negative effect. Baldwin (1995) studied over-wintering passerines in coastal prairies on the Texas Mid-Coast. This study found that Savannah Sparrows were highly associated with prairies the first year post-burn, LeConte's Sparrow were most common in prairies burned within the past two years, and Sedge Wrens were most likely to be found in prairies three years post-fire. These data indicate that a burn regime varied temporally and spatially is the key to providing habitat for native wildlife and that an inactive burn program can be detrimental to grassland dependent wildlife.

Depending on the species and season, a fire can have adverse effects on a species' nesting or reproductive success. Bird nests and their contents (i.e., eggs, young) could be destroyed by fire; however, this would be a short-term local effect because the birds could re-nest or breed again the following year. Species adapted to early seral stages would benefit following a burn (NPS, 2014).

Baker (1983) found that burned areas appeared to be undesirable for mottled duck nesting to three years post-fire. Vegetation heights were comparable to unburned areas after the second year post-fire, but residual senesced vegetation remained low. Fire is necessary in the management of mottled duck nesting habitat, but it must be frequent enough to keep brush at low densities, but infrequent enough to maximize years with dense nesting cover for mottled ducks.

Whitbeck (2002) found densities of singing males 2.8 (2.2-3.2) times higher the second breeding season following fire than the first, third or fourth season. Gabrey et al. (2001) reported that breeding seaside sparrows in Louisiana declined in the first year post-fire, increased in the second, and dropped to levels similar to the first year post-fire by the third.

The primary concerns related to wildland fires or prescribed fires relative to fish and other aquatic species are increases in water temperature and sediment and the long-term loss of woody debris from stream channels (McMahon and deCalesta, 1990). Since prescribed fires are designed to burn quickly, temporary increases in water temperature are not expected to adversely affect aquatic species; however, fire may remove vegetation cover, increasing water temperatures and altering dissolved oxygen concentrations until vegetation cover is re-established. These effects are expected to be short-term, minimal, and localized. Prescribed fire would result in overall improvement of wetland habitats over the long-term, resulting in beneficial effects to aquatic species.

Fire has also been shown to alter invertebrate communities in marshes and prairies. A study conducted in brackish marshes (*Distichlis spicata* being the dominant plant species) found that many dominant macro- and microinvertebrates were at higher densities in burned areas than unburned controls (de Szalay and Resh 1997). A notable exception was lower densities of copepods in burned areas. A review of literature available on the effects of fire on invertebrates (Higgins *et al.* 1989) summarizes by saying “Fire causes an immediate decrease in insect populations (except ants and other underground species), followed by a gradual increase in numbers as the vegetation recovers. The insects eventually reach a population level higher than adjacent areas, then decline to near preburn levels as vegetation and soil litter stabilize.” Research conducted in coastal prairie in Galveston County, Texas found that arthropod diversity increased with frequent burning (Hartley, et. al., 2004). It appears that fire management practices that favor desired vegetation conditions seem to be compatible with maximizing arthropod diversity as long as a mosaic of burned and unburned habitats is maintained.

Wildlife of the Texas Chenier Plain NWR Complex evolved in the presence of fire, and a number of those wildlife species are accustomed to fire and have behavioral and other adaptations to fire. Foraging opportunities may even increase following fire for some species.

Because fires create a mosaic with vegetation in different stages of recovery from fire, the overall effects to wildlife and aquatic species as a result of implementation of the proposed action would be long-term and beneficial.

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Effects on wildlife due to increases in the amount of acreage burned per event and/or per year would increase the total area of effect but should not change the nature of effects on wildlife or aquatic species described above.

Use of Manned and Unmanned Aircraft

As explained earlier, the helicopter is an important tool in wildfire suppression and prescribed burns. It speeds up response times and can drop water to help suppress fires. A Plastic Sphere Dispenser, operated within a helicopter, drops balls that with a chemical reaction (potassium permanganate and ethylene glycol) ignite after reaching the ground to start fire. This allows USFWS to burn units quicker by igniting them with fire in multiple areas at a time rather than waiting for fire to spread naturally from a single area. Shortening the duration of the fire event results in a shorter period of disturbance to wildlife and aquatic species in and adjacent to prescribed burn treatment areas. Helicopters are currently and would continue to be operated in accordance with all applicable rules, regulations, and guidance.

Should the USFWS choose to utilize unmanned aircraft (drones) as part of the fire program and or to aid in management actions, the aircraft(s) would be operated in accordance with all applicable rules, regulations, and guidance at the time of use.

Noise resulting from the use of manned (helicopters) or unmanned aircraft (drones) to help facilitate prescribed burns, wildfire control, and/or Refuge management could temporarily disturb terrestrial wildlife in the immediate vicinity of operations; however, disturbance would be temporary, there is a multitude of adjacent suitable habitat available for species to move into, and species would be expected to return to the affected areas once aircraft use is discontinued.

There is a potential for bird strikes with helicopter and/or drone use; however, the potential is low. Should bird strikes occur, they would only affect a small number of individuals and would not be expected to impact populations of any affected species.

Use of Class A Foam

Auxilio Management Services (AMS, 2020) conducted an ecological risk assessment of Class A Foams. AMS's risk assessment process had a two-part approach: (1) toxicity data on the whole product were considered, to account for any effects due to the product being a mixture (synergism or antagonism); and (2) each and every ingredient in the product formulations was screened, and risk from any ingredient with higher toxicity was separately quantified. AMS's assessment resulted in the following identified risks/conclusions:

Summary of Estimated Risks to Terrestrial Wildlife from Foams

- None of the foam products were predicted to pose a direct toxicity risk to terrestrial wildlife based on the toxicity data for the formulated product.
- None of the foam product ingredients that were screened for individual analysis were associated with a direct toxicity risk to terrestrial wildlife.

Based on this risk assessment, the use of Class A Foam is not expected to adversely affect terrestrial wildlife species.

Summary of Estimated Risks to Aquatic Wildlife from Foams

- Four ingredients found in six foam products were predicted to pose risks to sensitive aquatic species from runoff to small streams when applied at a rate as low as 2 gallons per 100 square feet (gpc) and to large streams at 6 gpc. One of these ingredients was predicted to pose risks to non-sensitive species from runoff to small and large streams when applied at rates of 2 gpc and higher.
- Based on the toxicity data for the formulations as a whole, risks to aquatic species were predicted for oversprays across a small stream from multiple products. Evaluation of specific ingredients in the accidental overspray scenario estimated that five ingredients in ten products would pose a risk to aquatic species at rates as low as 1 gpc.
- For some products, a spill of a limited amount of concentrate (5 gallons) or mixed-for-use product (50 gallons) was predicted to pose risks to aquatic species in streams.

Based on this risk assessment, Class A foams can cause adverse effects on aquatic ecosystems and species.

According to Woodward (2018), firefighting foams have very high biological oxygen demand (BOD) values as a result of the biodegradation of the organic compounds present in foam formulations, and this biodegradation results in the rapid depletion of dissolved oxygen in water. The depletion of dissolved oxygen in an aquatic ecosystem can have severe impacts on aquatic life through asphyxiation and/or stress and asphyxiation. Studies have shown that the introduction of firefighting foams to aquatic ecosystems can result in toxicity and potential mortality to a variety of aquatic species (Buhl & Hamilton 2000 as referenced in Woodward, 2018). Compounds found in firefighting chemicals are also known to bioaccumulate in the bodies of aquatic species if exposed (Moody et al. 2002 as referenced in Woodward 2018).

While the risk assessment indicated that Class A Foams can pose a risk to both sensitive and non-sensitive aquatic species, the risk as a result of the use/application of Class A Foams as part of the Texas Chenier Plain NWR Fire Program is extremely low based on the following protection measures that would be implemented in accordance with Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations (NIFC, 2023).

1. Whenever practical, as determined by the fire incident commander (IC), USFWS would use water or other less toxic wildland fire chemical suppressants for direct attack or less toxic, approved fire retardants in areas occupied by threatened, endangered, proposed, candidate or sensitive species (TEPCS) or their designated critical habitats.
2. No aerial application of foams would be conducted at any time to prevent accidental application into waters/wetlands.
3. Ground application of chemicals would only be permitted in upland areas to avoid runoff and/or accidental application into waters/wetlands.
4. USFWS would not apply any wildland fire chemicals within 300 feet of waterways.

Maintenance/Creation of Firelines

The USFWS currently maintains 74 miles of established fire-lines in the TX Chenier Plain NWR Complex. USFWS would only need to establish new fire lines for new land acquisitions and for wildfire response (temporary fire lines).

Fire-lines are generally either contact-lines or mow-lines. To create/maintain contact-lines, equipment with low ground pressure runs over the vegetation to change its arrangement to horizontally along the ground, but the vegetation remains intact. To create/maintain mow-lines, equipment with low ground pressure cuts the vegetation and leaves the removed materials to lay horizontally along the ground. Rarely, the USFWS may create fire-lines that remove all burnable materials to the mineral soil.

The presence of and noise from equipment required to maintain fire-lines can temporarily displace wildlife from the immediate area of operations; however, animals are expected to return once operations are completed. Since fire-lines are linear features and encompass only small portions of habitat utilized by terrestrial species within the Texas Chenier Plain NWR Complex, the likelihood of negative effects on any terrestrial wildlife species is so low as to be discountable.

The proposed action is expected to result more efficient management of, as well as preservation and enhancement of, Refuge habitats. As a result, there should be overall beneficial effects to the wildlife and aquatic species that utilize this habitat.

Alternative B

Direct impacts to wildlife and aquatic species under the no action alternative would be similar to those of the proposed action since the Refuge would still conduct prescribed burns. Under this alternative, USFWS would be restricted to burning 4,500 acres or less per prescribed fire event, which would limit its ability to effectively manage Refuge Complex habitats using prescribed fire. Fuel loads in the Refuge Complex would likely increase in some FMUs as would the likelihood of wildfires. Wildfires pose a greater risk to wildlife within and adjacent to the project area, as wildfires, depending on their locations, may not be as easy to contain as prescribed fires and tend to burn slower, increasing the duration of effects experienced by wildlife.

Increased fuel loads could ultimately lead to loss of habitat. When there is an accumulation of dead vegetative material, the sunlight is prevented from reaching the ground and stimulating growth in the desired species (Olney bulrush, marsh hay cord grass, and seashore saltgrass). By removing the dead vegetation, the remaining root mass can receive light, which spurs growth and combats root zone subsidence.

The soils of the Chenier Plains area are shallow clay covered with organic soils between 12 and 24 inches. The death of surface vegetation causes root zone collapse and subsidence to occur. This translates to more standing water on the marsh that induces physiological stress on all desirable plant species. Compounded with increased salinities, this situation causes the conversion of emergent marsh into permanent open water. Conversion/loss of marsh habitat could adversely affect a variety of wildlife and aquatic species.

Other Reasonably Foreseeable Impacts on Wildlife and Aquatic Species

The proposed action is not the only action that the USFWS is planning to undertake for management/protection of habitats within the Texas Chenier Plain Refuge Complex. Other reasonably foreseeable impacts on wildlife and aquatic resources within the project area would

continue to occur because of Refuge operations and management, visitor use, hunting, fishing, development including oil and gas operations, and natural processes.

Natural processes such as tidal ingress and egress, wave action, storms, and hurricanes have resulted in erosion and land loss within the Refuge Complex. Shoreline erosion is a natural process; however, a severe sediment deficit in the Gulf's littoral system resulting from altered hydrologic regimes (i.e., construction of navigation channels, jetties and upstream dams on rivers) has greatly accelerated rates of shoreline retreat. Rising sea levels and land subsidence are also causative factors in the accelerated loss of coastal habitats. Loss of habitat would affect both resident wildlife and migratory bird populations in the area.

Shoreline erosion is resulting in loss of salty prairie habitat and threatens interior marshes with saltwater intrusion. Increased saltwater intrusion negatively impacts plant productivity and diversity in Texas Chenier Plain NWR Complex marshes.

Implementing changes to the fire program is just one of several measures/projects designed to protect the resources/assets important to the management of the Texas Chenier Plain NWR Complex. The USFWS has recently undertaken several actions that will aid in the management and conservation of Refuge resources using funds appropriated for Hurricane Harvey Recovery under Bipartisan Budget Act of 2018 (Public Law 115-123). These actions include repair of interior levees and water control structures within the complex that were damaged due to Hurricane Harvey. The Cattlewalk Levee, Lone Tree Levee, Frozen Point Levee, East Bay Bayou Levee, and associated water control structures were repaired/replaced within ANWR; the Perkins Levee, White's Levee, and O-Ditch Levee, and their associated water control structures were repaired within MNWR; and the Texas Point Cattlewalk Levee was repaired within the TPNWR. The USFWS also plans to construct breakwaters in the Gulf Intracoastal Waterway (GIWW) along the shorelines of the ANWR and MNWR and in East Bay along the shoreline of ANWR utilizing the afore-mentioned funding to slow and/or prevent erosion. The USFWS hopes to construct each of the breakwater projects by February of 2024 due to funding requirements.

The USFWS also has plans to construct an inverted siphon system under the Gulf Intracoastal Waterway (GIWW) on MNWR lands to restore freshwater inflows from north of the GIWW to south of the GIWW. On ANWR marsh will be restored on the Roberts Mueller tract through the beneficial use of dredged material on up to 3,500 acres. Funding will be provided in support of this partnership with Ducks Unlimited through the Additional Supplemental Appropriations for Disaster Relief Act, 2019 (PL 116-20), which provided funds to restore and rebuild national wildlife refuges and increase the resiliency and capacity of coastal habitat and infrastructure to withstand storms and reduce the amount of damage caused by such storms. These specific projects have been approved by DOI under the Service's Recovery Plan. In addition, a levee system on the East Bay Bayou Unit of Jocelyn Nungaray NWR will be repaired to facilitate more effective marsh management. Funding for this project will be provided through a Refuge Deferred Maintenance appropriation.

All of the above-mentioned projects should result in beneficial, reasonably foreseeable effects on wildlife and aquatic resources, as each of the projects is designed to preserve and enhance areas

that provide habitat to a multitude of species, including but not limited to migratory birds, waterfowl, and threatened, endangered, and sensitive species.

6.2 Threatened and Endangered Species and Other Special Status Species

Description of Affected Environment

The USFWS ECOS-IPaC system species list for the Refuge Complex (June 1, 2023, Project Code: 2023-0088672) indicates that the following federally listed threatened and endangered species have potential for occurrence in the project area:

- Attwater's greater prairie-chicken
- Piping plover
- Red knot
- Eastern black rail
- Whooping crane
- Green sea turtle
- Hawksbill sea turtle
- Kemp's Ridley sea turtle
- Leatherback sea turtle
- Loggerhead sea turtle
- West Indian manatee
- Tri-colored bat
- Monarch butterfly

In addition, there are several birds of conservation concern with potential for presence in and around the project area.

The project area is outside of the known range of Attwater's Greater Prairie Chicken. Piping Plovers and Red Knots have been seen using the beach areas on the Texas Chenier Plain NWR Complex. Piping Plovers have also been observed utilizing mud flat areas along the GIWW. These species are not likely to be found in burn units due to lack of suitable habitat. The Eastern Black Rail is known to occur within the Texas Chenier Plain NWR Complex year-round and could be present in persistent emergent wetland areas during prescribed burns. The tri-colored bat could be present within the Refuge Complex in areas containing suitable roosting habitat.

Whooping cranes have been seen and documented within the upper Texas coast region in recent years. According to Tim Cooper, Texas Chenier NWR Complex Manager (personal communication, May 30, 2023), whooping cranes in Jefferson and Chambers County are utilizing rice fields inland of the coast. While there is a possibility for whooping cranes to occur as a transient species in burn units, the likelihood of occurrence is low.

There is no suitable sea turtle nesting habitat within the project area; however, juvenile green and Kemp's Ridley sea turtles have the potential for occurrence in waters within and adjacent to the Texas Chenier Plain NWR Complex. The likelihood of presence is low and is greater in the summer months than in the winter months. Similarly, West Indian manatees also have the potential

for occurrence in waters within/adjacent to the burn units; however, the likelihood is extremely low.

The USFWS prepared an Intra-Service Section 7 Biological Evaluation (BE) to assess potential effects of the proposed action on the afore-mentioned threatened and endangered species, which are summarized below. USFWS is currently undergoing interagency consultation with the Clear Lake Ecological Services Office (ESO) for concurrence with species effect determinations.

Direct and Indirect Impacts on Threatened and Endangered Species and Other Special Status Species

Alternative A

Direct impacts to threatened and endangered species, should they be present in the project area, would be similar to those described in **Section 6.1** Wildlife and Aquatic Species.

The project area is outside the known range of the Attwater's greater prairie chicken; therefore, the proposed action would have no effect on this species.

Piping Plovers and Red Knots would not be present in burn units due to lack of suitable habitat; therefore, the proposed action would have no effect on this species.

The Eastern Black Rail is known to occur within the Texas Chenier Plain NWR Complex year-round and could be present in persistent emergent wetland areas during prescribed burns. While eastern black rails are expected to be capable of leaving areas subject to prescribed burns, nests could be destroyed by fire.

Prescribed fire in suitable eastern black rail habitat would result in burning of wetland vegetation used as cover by the species, making it temporarily unsuitable for the eastern black rail until the vegetation recovers. Eastern black rails are expected to move into adjacent suitable habitat until vegetation recovers and the habitat once again becomes suitable for the species. Prescribed fire is used as a management tool as it results in healthier marshes through removal of accumulated fuels that can ultimately lead to loss of habitat, as described in **Section 6.1**.

The USFWS is currently operating and would continue to operate under an existing consultation/Biological Opinion (BO): *Intra-Service Section 7 Biological Opinion on Refuge Complex Management Effects for the Eastern black rail (Laterallus jamaicensis jamaicensis)*, which covers prescribed fire and fire-line construction and maintenance well, regardless of whether the fire-line is in black rail habitat or not. The BO contains conservation measures to be implemented during these activities to minimize impacts to the eastern black rail.

The USFWS acknowledges that requirements/restrictions/measures for protection of EBR may change if the science changes, and the BO is likely to be revised on a 5-year basis as new information/science is considered.

While there is a possibility for whooping cranes to occur as a transient species in burn units during prescribed burns (GBIF, 2022b), the likelihood of occurrence is low, and the cranes would be able

to move out of harm's way and into adjacent, undisturbed suitable habitat during burns and/or fire-line construction/maintenance. For these reasons, the proposed action may affect, but is not likely to adversely affect the whooping crane.

No nesting sea turtles would utilize the project area based on lack of suitable habitat. Should sea turtles be present in waters within or adjacent to burn units, no adverse effects are anticipated. As mentioned in **Section 6.1** above, no effect to aquatic species is expected as a result of implementation of the proposed action.

Prescribed fires would not be expected to impact suitable roosting habitats for tri-colored bats, but smoke or other effects could cause bats to be temporarily displaced to adjacent suitable habitats. There is a multitude of suitable adjacent habitat for the bats to move into; therefore, the USFWS believes that the Proposed Action would not jeopardize the continued existence of the species.

Monarch butterflies have potential for occurrence in the project area. Adult monarchs are mobile and would likely move out of harm's way during prescribed fire events. Their host plants and/or eggs could be burned during fire events. There is an abundance of potentially suitable, undisturbed habitat for monarch butterflies adjacent to the project areas. Once recovered, areas receiving prescribed fire treatment would result in enriched monarch habitat. USFWS analyzed the effects of the proposed action on the monarch butterfly and believe the proposed action would not jeopardize the continued existence of the species, thus resulting in no effect. This determination is due to the short-term, minimal, localized nature of impacts to potentially suitable habitat in relation to the vast geographic range of the species, and the fact that prescribed burning will help to preserve and enhance thousands of acres of potentially suitable monarch butterfly habitat.

Alternative B

Direct impacts to threatened and endangered species under the no action alternative would be similar to those of the proposed action since the Refuge would still conduct prescribed burns. The USFWS would, however, be restricted to burning 4,500 acres or less per prescribed fire event, which would limit its ability to effectively manage Refuge Complex habitats using prescribed fire. Fuel loads in the Refuge Complex could increase in some FMUs as would the likelihood of wildfires, and wildfires pose a greater risk to threatened, endangered, and sensitive species within and adjacent to the project area, as wildfires, depending on their locations, may not be as easy to contain as prescribed fires and tend to burn slower, increasing the duration of effects experienced by threatened and endangered species.

Under the No Action Alternative, there is a risk that wildfires could occur in suitable eastern black rail habitat within the critical breeding/nesting season, potentially resulting in loss of adults, nests, and/or chicks. Increased fuel loads could lead to conversion and/or loss of suitable habitat for threatened and endangered species for the reasons discussed in **Section 6.1**.

Other Reasonably Foreseeable Impacts on Threatened and Endangered Species and Other Special Status Species

Other reasonably foreseeable impacts on threatened and endangered species would be similar to those discussed in **Section 6.1** for Wildlife and Aquatic Species, as the proposed action, as well as other Refuge actions are designed to preserve and enhance areas that provide habitat to a multitude of species, including threatened, endangered, and sensitive species.

6.3 Vegetation and Habitats

Description of Affected Environment

Habitats

Wetland habitats within the project area include coastal bayou systems, natural and man-made wetlands (reservoirs, livestock ponds, rice fields) associated with upland prairies inland of the marshes, and open water of bays, rivers, bayous, and other waterways. Wetland habitats include estuarine, palustrine, riverine and lacustrine wetlands (Moulton et al. 1997).

The intermediate, brackish and saline emergent coastal marshes found in the Refuge Complex are classified as estuarine intertidal emergent wetlands (USFWS, 2023b). Freshwater wetland habitats within the Refuge Complex include palustrine emergent marsh (fresh marsh and wet prairie), palustrine farmed wetlands (rice fields) and some natural “prairie wetlands”, and these are also important habitats on the Refuge Complex.

The primary upland land use within the project area is agriculture, and most upland habitats are now agricultural lands (croplands, improved and unimproved pasture or rangeland). Rice is the primary crop produced in the project area, and livestock production (cattle) is the other primary agricultural activity.

Moist soil management is an intensive habitat management practice on the Jocelyn Nungaray NWR which is aimed at restoring some of the functions of natural prairie wetlands.

Other upland habitats found in the project area and on the Refuge Complex include beach ridges/dunes and small coastal woodlots located on the chenier ridges or on elevated features (both natural and man-made) including bayou banks and levees. A few larger tracts of upland forest are found in the project area.

Coastal prairie/ prairie restoration areas contain native vegetation that includes little bluestem (*Schizachyrium scoparium*), bushy bluestem (*Andropogon glomeratus*), and broomsedge bluestem (*Andropogon virginicus*). Aggressive exotic grasses such as vaseygrass (*Paspalum urvillei*) and Brazilian verbena (*Verbena brasiliensis*) are present but generally do not provide good fuel beds.

Salty prairies consist of primarily gulf cordgrass (*Spartina spartinae*). Other plants in the salty prairie site include knotroot bristlegrass (*Setaria geniculata*), snow on the prairie (*Euphorbia bicolor*), bushybeard bluestem (*Andropogon glomeratus*), and rattail smutgrass (*Sporobolus poiretii*).

Fresh marshes are flooded with fresh water, usually from surface flow from inland runoff. Fresh marsh supports the greatest diversity of plant species on the refuge. Water depth, inflow and outflow characteristics, water quality parameters, soil type, and surface management practices affect species diversity and growth. Common plant species present include maidencane (*Panicum hemitomon*), giant cutgrass (*Zizaniopsis mileacea*), American lotus (*Nelumbo lutea*), watershield (*Brasenia shreberi*), and duckweed (*Lemna* spp.).

The intermediate marsh is interspersed with small open water ponds. Predominate plants in the intermediate marsh include marsh hay (*Spartina patens*), Olney bulrush (*Schoenoplectus americanus*), seashore paspalum (*Paspalum vaginatum*), sand spikesedge (*Eleocharis montividentis*), and common reedgrass (*Phragmites communis*).

The Brackish marsh vegetative community consists of *S. patens*, saltmarsh bulrush (*Bolboschoenus robustus*), seashore saltgrass (*Distichlis spicata*), marshpea (*Vigna lutea*), and waterhemp (*Amaranthus tamariscinus*).

Woody invader species on the non-saline soils include sumpweed (*Iva frutescens*), grounself bush/eastern baccahris (*Baccahris halimifolia*), Chinese tallow (*Sapium sebiferum*), and rattlebox (*Sesbania drummondii*). On the saline soils the dominant woody plants are big-leaf sumpweed (*Iva frutescens*) and Carolina wolfberry (*Lycium carolinanum*).

Patches of marshhay cordgrass (*Spartina patens*) can be found in all habitat types.

There are some man-made freshwater impoundments consisting mainly of emergent freshwater marsh species. Common plant species present include giant cutgrass (*Zizaniopsis mileacea*), cattail (*Typha* spp.), flatsedges (*Cyperus* spp.), softstem bulrush (*Juncus effusus*), and water-hyacinth (*Eichornia crassipes*).

Fuels

Vegetation/fuels both in and adjacent to the FMUs within the Texas Chenier Plain NWR Complex are similar – open grasslands maintained by frequent surface fire. Much of the project area has been both grazed and burned frequently throughout the years.

Fuel loads average over 20 tons per acre and continuous fine fuel loading can occur with a height of 18”- 60” inches. Due to the mostly continuous nature of the fuel bed, a fire in a given unit would be expected to encompass much of the unit removing a majority of the available fuels over 75% of the surface area while leaving pockets of unburned fuel around low lying areas holding water. As the fuels are almost exclusively grass fuels, a unit burned within less than one growing season and one dormant season would not be expected to receive spots or carry fire. Fires of mixed severity create a mosaic of various serial stage communities.

Hydrological influences vary across the Refuge Complex, thus species composition and proportions of marsh to upland species varies accordingly. Fuel loadings can vary across the units depending on species composition.

With the complex being made up of predominately marshes and prairies, the fuel models found are 100% grass fuel models. Using the Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model (Scott and Burgen, 2005), the complex has the following:

- GR9** - Very High Load, Humid Climate Grass
- GR8** - High Load, Very Coarse, Humid Climate Grass
- GR6** - Moderate Load, Humid Climate Grass
- GR5** - Low Load, Humid Climate Grass

During much of the year, most coastal prairie areas are inundated with water; however, at the height of the annual dry period, water levels usually drop below the surface. Despite standing water, coastal prairies burn readily when adequate fuel protrudes above the water surface and weather conditions are conducive.

The parameters set in the Texas Chenier Plain NWR Programmatic Burn Plan help produce the type of fires that are beneficial – slow flanking fires. This type of fire removes more of the vegetation as opposed to a fast-moving head fire. It also produces a longer residence time on woody vegetation resulting in higher mortality rates of unwanted tree and shrub species.

The Complex was hit by Hurricane Ike in 2008, which caused a massive die off of vegetation as a result of saltwater intrusion. Habitat conditions on the Refuges had finally rebounded following that event when the Complex was hit by Hurricane Harvey in 2017. The Complex experienced two years of historic rainfall amounts in 2019 and 2021, each in excess of 80 inches. These unprecedented wet years prevented fire activity, both in the number of prescribed fires and wildfires, which has resulted in there being higher than normal fuel loads across the complex. Completion of prescribed burns is crucial for the health of the marsh in the Refuge Complex.

Direct and Indirect Impacts on Vegetation and Habitats **Alternative A**

Impacts of prescribed burning in wetland habitats (in combination with controlled grazing and water level and salinity management) can include: 1) increasing plant species diversity, 2) maintaining and enhancing desirable emergent marsh plant communities such as Olney bulrush and leafy three-square bulrush, 3) creating openings in otherwise dense stands of emergent marsh vegetation, and 4) helping to control exotic and/or invasive plants.

Prescribed burning (integrated with control livestock grazing and water management) in wetland habitats on the Refuge Complex promotes the germination, growth and reproduction of several “early successional” target plant communities which are especially beneficial to migratory birds as food sources (Allen 1950, Gosselink *et al.* 1979). Target plant communities in intermediate and brackish marsh habitats on the Refuge Complex include Olney bulrush, saltmarsh bulrush, seashore paspalum, seashore saltgrass and annual grasses including millets and sprangletops, several sedges, and several annual forbs such as purple ammenia and Delta duck potato.

Burning makes vegetation more desirable to herbivores and will increase grazing pressure. Post-fire herbivory, whether by geese or cattle, prolongs early successional marshes and creates habitat for other wildlife. Post-fire herbivory will slow the recovery of climax vegetation and prolong early seral stages and open marsh conditions favorable to waterfowl (USFWS 1994). Livestock turn the soil through hoof action and further set back succession (Chabreck 1968, Stutzenbaker and Weller 1989).

Interstitial vegetation, often seed producing annuals such as sprangletops (*Leptochloa* spp.) and millets (*Echinochloa* spp.), increases after a fire, particularly when followed by grazing and suitable hydrology. Burning opens up dense vegetation and allows waterfowl access to seeds and other plant parts (Lynch 1941). Fire can remove plant cover and create open water conditions conducive to Mottled Duck brood-rearing habitat (Stutzenbaker 1988). Generally speaking, burning creates open marsh conditions and sets back succession if timed properly, particularly when followed by herbivory. Burning is an effective tool to manipulate vegetation composition and create a habitat mosaic (Fredrickson and Laubhan 1996).

The impacts of prescribed burning in upland grassland habitats would include: 1) maintaining and enhancing native prairie plant communities, including several native grasses and forbs, by enhancing conditions which encourage reproduction and growth of these species; and 2) helping to control exotic and/or invasive plants, most notably Chinese tallow and Eastern baccharis, which often outcompete and replace native grasses in areas where fire has been excluded or its frequency decreased.

One of the primary objectives of burning non-saline upland grasslands on the Refuge Complex is the control of Chinese tallow. The presence of tallow quickly renders areas non-flammable due to its ability to close off the canopy to herbaceous plants, suppressing them, which limits fuel loading and consequentially decreases the potential for fire (Grace *et al.* 2000). Thus, the invasion of Chinese tallow converts a fire-adapted grassland site to a non-flammable, near monotypic woodland. Work has been conducted on Brazoria NWR in the Texas Mid-Coast region on the relationship between fire and Chinese tallow. Preliminary results indicate that while total control was not realized with one treatment, some mortality was achieved (Grace 1998). Further, sites with fuel characteristics more typical of coastal prairies (high fuel loading, species composition, and continuity of fuels) achieved better control of Chinese tallow using fire than did abandoned agricultural fields.

While fire, whether planned or unplanned, can have positive ecological effects, detrimental impacts to vegetation and habitats ranging from an undesirable change in plant species composition to actual conversion of emergent marshes to open water can also occur. For example, fire under excessively dry conditions can result in plant mortality and/or consume organic matter and decrease marsh soil elevation, either of which could result in permanent conversion to open water. Excessively hot fires may result in root burns, which can cause mortality of desirable marsh plant species. Fire increases the soil erosion potential until regrowth occurs. Recently burned areas are especially susceptible to erosion during storm surges from tropical storms and hurricanes. Hot fires occurring without adequate soil moisture can also cause a temporary reduction in microflora and microfauna in wetland soils. Burning cannot restore lost marsh or counter the effects of

excessive flooding or salinity (Chabreck 1994). Burning is not as beneficial in more saline marshes, because the resulting subclimax plant community is not as diverse (Spencer *et al.* 1986).

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Under Alternative A, USFWS will have the ability to more effectively manage refuge habitats using prescribed fire. There would be no acreage or timing limitations for prescribed fire events, giving the Refuge greater flexibility and allowing for fire return intervals in the FMUs, consistent with the natural fire regime of coastal prairies in the area and management objectives.

Removal of dead vegetative material/fuels through prescribed burns at regular intervals will result in healthier marshes, as it allows remaining root masses of desired species (Olney bulrush, marsh hay cord grass, and seashore saltgrass) to receive light, which spurs growth and combats root zone subsidence.

Use of Manned and Unmanned Aircraft

As explained earlier, the helicopter is an important tool in wildfire suppression and prescribed burns. Effective fire control/management is important for containing fires and/or suppressing wildfires to help the Refuge implement desired fire return intervals required to maintain healthy marsh/prairie habitat. Should the USFWS choose to utilize unmanned aircraft (drones) as part of the fire program and/or to aid in management actions, the aircrafts would be operated in accordance with all applicable rules, regulations, and guidance at the time of use.

No adverse effects to vegetation are anticipated as a result of the use of manned or unmanned aircraft.

Use of Class A Foam

According to Kalabokidis (2000), fire suppression chemicals do not generally harm terrestrial vegetation. These ammonium formulations have long been considered to have minimal toxicological or ecological effects (Kalabokidis, 2000). In rare occasions, an overdose application of retardant can be damaging to plants; however, these risks are small in scale and are not likely to have lasting effects (Kalabokidis, 2000).

Adams and Simmons (1999) reported field observations of suppressed flowering and leaf damage resulting from use of Class A foam in woody Australian species. Experimental data also indicates weed invasion and reduced species richness in mixed-grass prairie habitat in North America (Larson and Newton 1996), as well as reduced number of stems per square meter in some riparian plant communities (Larson *et al.* 1999). The afore-mentioned reports and data suggested that Class A foam was having an impact on some species and on plant community structure (Adams *et al.*, 2004). However, a study conducted by Hartskeerl *et al.* (2004) using seven Australian plant species from five representative and widespread families detected no growth response attributable to Class A foam treatment for any of the species. Applications of four levels of foam to seedlings of each of the species showed no detectable impacts on a range of vegetative growth characteristics. Significant changes were recorded for most characteristics over time, but according to Hartskeerl *et al.* (2004), the changes can be explained by normal phenological changes. Even two species from a family (Proteaceae) frequently sensitive to environmental changes (particularly

edaphic changes), showed no detectable effect from Class A foam application (Adams et. al., 2004).

According to Adams et al. (2004), riparian zones and aquatic habitats are known to be more vulnerable to the negative effects of foams, but where stream protection plans are in place, applications of Class A foams outside these habitats are likely to have minimal long-term effects on surrounding vegetation (Norris and Webb 1989 as referenced in Adams et. al., 2004).

The following measures would be implemented for protection of riparian and aquatic species in accordance with Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations (NIFC, 2023).

1. Whenever practical, as determined by the fire incident commander (IC), USFWS would use water or other less toxic wildland fire chemical suppressants for direct attack or less toxic, approved fire retardants in areas occupied by threatened, endangered, proposed, candidate or sensitive species (TEPCS) or their designated critical habitats.
2. No aerial application of foams would be conducted at any time to prevent accidental application into waters/wetlands.
3. Ground application of chemicals would only be permitted in upland areas to avoid runoff and/or accidental application into waters/wetlands.
4. USFWS would not apply any wildland fire chemicals within 300 feet of waterways.

With implementation of the above measures, no adverse impacts to aquatic habitats and/or vegetation species are anticipated.

Maintenance/Creation of Fire-lines

As explained above, The USFWS currently maintains 74 miles of established fire-lines in the TX Chenier Plain NWR Complex and would only need to establish new fire lines for new land acquisitions and for wildfire response (temporary fire lines). Fire-lines are maintained and established utilizing low ground pressure equipment, and in most cases the vegetation and/or root systems remain intact. In rare cases, USFWS may remove all burnable materials to the mineral soil.

The maintenance and establishment of fire-lines is a crucial component of the Fire Program, helping to contain and/or suppress both prescribed fires and wildfires. Since fire-lines are linear features and encompass only small portions of habitat within the Texas Chenier Plain NWR Complex, negative effects to vegetation would be short-term, localized, and so minor as to be discountable. Maintenance and establishment of fire lines would remove smaller areas of vegetation relative to unplanned wildfires or prescribed fires; whole vegetation communities would not be removed, and the vegetation would recover rapidly after the fire management actions are complete.

Alternative B

Direct impacts to vegetation under the no action alternative would be similar to those of the proposed action since the Refuge would still conduct prescribed burns. Under this alternative,

USFWS would be restricted to burning 4,500 acres or less per prescribed fire event, which would limit its ability to effectively manage Refuge Complex habitats using prescribed fire. Fuel loads in the Refuge Complex would likely increase in some FMUs, and increased fuel loads could ultimately lead to loss of habitat. When there is an accumulation of dead vegetative material/fuels, the sunlight can't reach the ground to stimulate growth in the desired species. Increased fuel loads also increase the likelihood of wildfires, which often occur under less than optimal burning conditions. Wildfires could occur during periods of drought and/or be of high enough intensity to result in adverse effects to vegetation.

Additionally, if current CCP limitations hinder the Refuge's ability to effectively implement prescribed burns on natural fire return intervals, undesirable woody species could infringe into wetland/prairie habitats, affecting habitat quality.

Other Reasonably Foreseeable Impacts on Vegetation and Habitats

Prescribed fire implemented at regular intervals increases the health of marsh/prairie habitats. The proposed action, combined with other Refuge actions described in **Section 6.1**, are designed to preserve, enhance, and/or create a variety of vegetative habitats within the Texas Chenier Plain NWR complex; therefore, the proposed action should result in overall beneficial impacts on vegetation.

6.4 Geology & Soils

Description of Affected Environment

The existing physiography, soils, and geomorphology of the region are a result of complex interactions of hydrological, meteorological, and geological processes that occurred during two epochs of the Quaternary period. River, Gulf, and subsurface aquatic systems are the primary medium for transporting and mixing sediment and nutrients. Rivers transport sediments and nutrients from inland catchment basins to the mixing and receiving basins of the estuaries, marshlands, and the Gulf. The main source of sediment for the Chenier Plain region was reworked former delta sediments of the Mississippi River, combined with sediments of adjacent active distributaries (channels) of the Mississippi. In the Texas portion of the Chenier Plain region, sediments were also supplied by the Sabine, Neches and Trinity rivers. Depositional and erosional processes have resulted in land gain or loss over time.

Reconstruction of the geologic history of southeastern Texas illustrates how meteorological or climate and sea level fluctuations influenced the structure of the area that is currently near sea level but which was far upstream when the sea level was much lower. Climatic influences on precipitation, sediment yield, sediment discharge, and load of the fluvial systems are all factors that interacted to produce the preserved strata. Tidal and climatic interactions with weather fronts and wind patterns generated currents, waves, and flood tides that affected surface water and constantly influenced coastal habitats.

Geomorphology

During the last Ice Age, the coastal shoreline moved seaward and then retreated inland depending on the erosional and depositional forces and shifting sea levels. During the onset of the Ice Age, the sea was dramatically lower, approximately 440 feet below its present level (Fisk and McFarlan

1955, Gould 1970). The shoreline was approximately 124 miles seaward of its present position which exposed Pleistocene surface sediments to erosion and weathering. Coastal streams cut valleys into the Pleistocene sediment. As glaciers retreated and sea levels rose, sand, silt, and clay sediments were deposited along the coast. The shoreline gradually migrated landward of its present location as evidenced by the inland locations of former beach ridges of the Recent age. The ridges represent paleo shorelines that evolved during the high stand in sea level. Because sediment supply was abundant as sea level reached its present level 3,000 to 4,000 years ago, the shoreline advanced seaward of its present location. As sediment supply decreased, the shoreline began retreating and it is still eroding today.

The coastal water bodies such as Galveston Bay, Sabine Lake, and Calcasieu Lake resulted from the submergence of relic Pleistocene entrenched valleys (Fisk 1944). Marsh ponds enlarged when salinity changes or other stresses interrupted the marsh building process and gradually evolved into small lakes. Many irregularly shaped lakes represent old river or tidal stream courses that were abandoned.

The geologic formations are divided into three groups according to age: 1) Recent, 2) late Pleistocene or early Recent, and 3) Pleistocene. The geologic substrate of the Chenier Plain region is primarily composed of sediments deposited during the late Recent epoch with some subsurface Pleistocene outcropping. These deposits are overlain at the coast by a geologically recent series of inland ridges representing stranded beaches that align parallel with the coast. Accumulation of fine-grained sediment deposited between these multiple beach ridges formed marshes and mudflats. Tidal channels lie between successive ridges. The shore of the coast is formed by a narrow beach or washover terrace developed over time through the deposition of sand and shell. The coastline is breached by inlets that connect estuaries extending inland up river valleys.

Chenier Ridges

The Chenier Plain region is characterized by ridges composed of sand and shell fragments aligned parallel to the Gulf shoreline. These ridges originated from accumulations of sand sized particles deposited near river mouths that were reworked by waves and currents into multiple bars or ridges that formed concave seaward. The chenier ridges at the historic mouth of the Sabine River in both Texas and Louisiana are an example of this process. Away from the river mouths, cheniers represent ancient beach ridges that were formed through erosion processes along sections of the coast undergoing coastal retreat. Storm surges and wave action eroded existing beachfronts and nearshore deposits and deposited them inland over marsh and bay deposits forming the cheniers (Gosselink *et al.* 1979). Given the region's significant annual rainfall, wetlands isolated from the Gulf by the cheniers developed into highly productive freshwater coastal marsh habitats.

Soils

The Chenier Plain region is part of a recent geologic plain. Most soils within the Refuge Complex are remnants of ancient floodplains and Gulf beaches and consist of old alluvium and marine sediment deposited by ancient streams and the Gulf. These deposits are mostly clayey and sandy soils and exhibit a wide range in textural differences due to their origin within historic floodplain systems (Crout, 1976). All Refuge Complex lands are located within the 100-year floodplain. The soil types, both acidic and alkaline, are poorly drained with slow permeability, moderate to high salinity, and a high shrink-swell potential (Crout, 1976 and NRCS, 2019).

Three principal soil associations are found on the Refuge Complex and include: Morey-Crowley-Hockley Association consisting of silty soils of the coastal prairie; Harris-Made Land Association comprised of clay soils of the coastal marsh and spoil from dredging and similar operations; and the Sabine-Coastal Land Association consisting of mixed soils of the coastal prairies and coastal marshes (NRCS, 2019).

The most prevalent soil association is the saline Harris-Made Land Association found within the Refuge Complex' intermediate, brackish, and saline marsh habitats. These areas consist of broad flats covered with coarse, salt tolerant vegetation. The flats are occupied mostly by Harris Soils. This is the predominant soil type found in the South Unit of McFaddin NWR. Other wetland soils located in pockets within the Refuge Complex consist of the Crowley-Waller complex. Both the Crowley and Waller soil series are level, deep, poorly drained, loamy soils which have mottled lower layers and moderately high available water capacity. Salty prairie habitats are underlain with both natural soils which are deep moderately saline clays, and the Made Land soils, which are stratified clay and loamy materials that have been excavated from canals, ditches, bayous and the GIWW. These soils are affected by salt spray, storm tides, and salty high water tables restricting the kind and density of plants present.

The upland habitats (prairies and coastal ridges) of the Refuge Complex are composed of the well-drained Sabine soils (predominantly acid Moray silt loam, Jocelyn Nungaray silt loam, and saline Veston loam). Coastal Land soils are found on the lower slopes of these sandy ridges and along the Gulf. These soil types form the Sabine-Coastal Land Association. The shoreline of Jefferson County is made up of this Association and the Saltwater Marsh Tidal Association. Coastal soils generally consist of deep, dark colored and slightly acidic sands. As remains of ancient Gulf beaches, they are relatively low in nutrients. Specifically, the coastal soils differ dramatically in PH, color, texture, available water capacity, and drainage.

The project area's Gulf beaches are composed primarily of tidal marsh and Galveston fine sand which have virtually no organic matter, are excessively drained, and have a low available water capacity. The Gulf beach within the McFaddin NWR has a high percentage of shell material, reflecting a scarcity of sand. Clay outcroppings from the underlying strata are exposed in many areas following erosive events such as tropical storms and winter frontal passages.

The entire Texas Gulf Coast has been identified by the U.S. Geological Survey as having geothermal potential.

Direct and Indirect Impacts on Geology & Soils

Alternative A

Prescribed burning and wildfires can affect soils and vertical accretion in marshes. Smoke particles eventually fall back to earth following fire events, and these particles often contain nutrients like potassium and nitrogen from the plants, which can help fertilize the soil (Mock, 2020). Insufficient data exists to fully evaluate the effects of fire on marsh accretion. Evidence exists suggesting root mass is a significant contributor to vertical accretion via peat formation (DeLaune *et al.* 1983, Nyman *et al.* 1993). In a study on the McFaddin NWR, both root volume and sediment elevation

recovered faster in a burned area relative to an unburned area after saltwater flooding (M. Ford and D. Cahoon, unpubl. data). Gabrey and Afton (2001) found that unburned and cover-burned Chenier plain marshes showed no differences in belowground biomass. Fire has been shown to increase primary productivity in some Gulf coast marshes (Hackney and Cruz 1981, Gabrey and Afton 2001). While these studies examined the effects of cover burns (burns conducted when sufficient water is present in the marsh to restrict biomass consumption to aerial plant material), root and peat burns can have a profound impact on marsh accretion. Root fires consume the litter layer and shallow root systems, while peat fires burn deeper into the soil consuming available organic matter (Lynch 1941). In most situations, root and peat fires are avoided by carefully monitoring water levels and soil moisture.

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

As explained in **Section 6.3** Vegetation, USFWS will have the ability to more effectively manage refuge habitats using prescribed fire under Alternative A, the proposed action. There would be no acreage or timing limitations for prescribed fire events, giving the Refuge greater flexibility and allowing for fire return intervals in the FMUs, consistent with the natural fire regime of coastal prairies in the area and management objectives.

Removal of dead vegetative material/fuels through prescribed burns at regular intervals is expected to result in healthier marshes, as it allows remaining root masses of desired species (Olney bulrush, marsh hay cord grass, and seashore saltgrass) to receive light, which spurs growth and combats root zone subsidence. Healthy root systems help to anchor soils.

Under normal conditions prescribed fire and wildfire would consume the above ground plant matter but would not burn or cause oxidation of soils, and soils would not be adversely affected by fire (NPS, 2014). Fire returns nutrients to soils that were previously stored in plants (such as calcium and magnesium). The effects of cycling of nutrients would be short-term and beneficial to soils.

Fires occurring under extreme drought conditions could burn deep into the soil consuming available organic matter and affect low lying pockets containing organic soils that would otherwise normally be inundated and protected from fire. Fires in organic soils could result in loss of peat, potentially exposing another substrate, and can result in a change in the plant community. Under Alternative A, prescribed fires would not be conducted in extreme drought conditions; however, wildfires could occur at any time.

Implementation of the proposed action should reduce fuels over a larger area and decrease the likelihood of occurrence of wildfires, which would in turn reduce the likelihood of negative effects to soils within the Texas Chenier Plain NWR Complex.

Use of Manned and Unmanned Aircraft

Under this alternative, USFWS would have the ability to utilize manned and/or unmanned aircraft to implement prescribed fire and control/suppress wildfires. Buckets of water are often transported by helicopter to assist with fire control/suppression. Bucket drops may compact soils in limited areas, lowering soil elevation. This could cause temporary ponding. While effects of this nature could occur, they are unlikely, as USFWS Fire Program managers and staff take care to implement

all aspects of the fire program in a manner consistent with Refuge management objective. Any compaction resulting from bucket drops is expected to be short-term and negligible.

Use of Class A Foam

Class A foams have the potential to change ecological processes such as nutrient cycling, as surfactants are known to affect soil physical and biological properties including changes to structural stability (Cardinali and Stoppini 1981 as referenced in Adams et al. 2004). Soils may become hydrophobic, altering infiltration rates (Batyuk and Samochvalenko 1981; Sebastiani et al. 1981 as referenced in Adams et al. 2004), and soil microorganism growth may be stimulated (Simonetti et al. 1981 as referenced in Adams et al. 2004) and microorganism mobility altered (Overcash 1981 as referenced in Adams et al. 2004).

According to a study conducted by Perry and Bennett (2001), the surfactant content in Class A foam concentrates is typically 10-20%. Field investigations show that the surfactants applied at recommended concentrations (1%) persist in soil for about three weeks; however, actual application rates are often as much as four times the recommended rate due to equipment variability and widespread confusion during actual fire situations. At these higher concentrations surfactant can persist for more than three months. The persistence of foam generally decreases after exposure to fire, suggesting that surfactants volatilize or decompose during the fire (Perry and Bennett, 2001).

While the use of Class A Foams could potentially affect soils, effects from its use/application as part of the Texas Chenier Plain NWR Fire Program are expected to be minor, short-term, and limited to areas of application because it would be used in accordance with Chapter 12 of the Interagency Standards for Fire and Fire Aviation Operations (NIFC, 2023), with contains several mitigation measures for protection of resources.

Maintenance/Creation of Fire-lines

Maintenance and/or creation of fire-lines, as well as other wildland fire management actions including walking and use of tracked equipment and/or utility vehicles may compact soil in limited areas. As explained earlier, soil compaction could lower the soil elevation, which could cause temporary ponding. The effects of soil compaction due to the afore-mentioned activities are expected to be short-term and negligible because USFWS Fire Program managers and staff take care to implement all aspects of the fire program in a manner consistent with Refuge management objective. Any compaction resulting from maintenance and/or creation of fire-lines is expected to be short-term and negligible.

Alternative B

Direct impacts to geology and soils under the no action alternative would be similar to those of the proposed action since the Refuge would still conduct prescribed burns. Under this alternative, USFWS would be restricted to burning 4,500 acres or less per prescribed fire event, which would limit its ability to effectively manage Refuge Complex habitats using prescribed fire. As discussed in **Section 6.3** Vegetation and Habitats, fuel loads in the Refuge Complex would likely increase in some FMUs, and increased fuel loads could ultimately lead to loss of habitat. When there is an accumulation of dead vegetative material/fuels, the sunlight can't reach the ground to stimulate

growth in the desired species and exposed soils are more likely to erode than those in vegetated areas. Increased fuel loads also increase the likelihood of wildfires, which often occur under less than optimal burning conditions. Wildfires could occur during periods of drought and/or be of high enough intensity to result in adverse effects to soils.

Other Reasonably Foreseeable Impacts on Geology & Soils

Prescribed fire implemented at regular intervals increases the health of marsh/prairie habitats. The proposed action, combined with other Refuge actions described in **Section 6.1** Wildlife and Aquatic Species, are designed to preserve, enhance, and/or create a variety of vegetative habitats within the Texas Chenier Plain NWR complex; therefore, the proposed action should result in overall beneficial impacts on geology and soils.

6.5 Water Resources

Description of Affected Environment

Hydrology

The historical pattern of hydrology in the Chenier Plain region was critical to the building processes that created and maintained the diversity of its coastal wetlands. Frequent flooding over low bayou banks and large volumes of rainwater flowing slowly across coastal prairies and marshes provided nutrients, sediments, and freshwater to marsh systems. Natural drainage allowed a cyclic pattern of drying and flooding under which wetland plants evolved and adapted. Over the past 5000 years, the Chenier Plain region was predominately a freshwater coastal marsh system but contained a continuum of coastal marsh types associated with a natural salinity gradient. This continuum of freshwater, intermediate, brackish, and saline wetlands supported a diversity of floral and faunal communities.

Modifications of regional hydrology have affected ecological and geological processes critical to the long-term integrity of coastal ecosystems in the Chenier Plain region. In general, the primary human induced activities that have affected coastal wetlands include construction of the GIWW and smaller navigation canals, oil, gas and groundwater extraction, and channelization and deepening of natural waterways for navigation and inland drainage. The consequences of these activities have resulted in various ecological responses, some of which are directly responsible for the onset of others (Stutzenbaker 1990, White and Tremblay 1995):

- Saltwater now reaches farther inland into historically freshwater marshes altering the plant species composition and plant productivity. Overall, biological diversity decreased through the conversion of fresh and intermediate marshes into more brackish regimes and salt-tolerant plant and animal communities. Saltwater intrusion also introduced sulphates to these freshwater marshes, which under conditions of high-water temperatures during summer are reduced to hydrogen sulphide. Sulphide toxicity can cause plant die-offs and has been implicated as a contributing factor in the conversion of vegetated emergent marsh to open water.
- New channels and modifications of natural waterways introduced tidal energies into historically non-tidal or micro-tidal marshes, resulting in decreased plant productivity,

plant mortality, peat collapse and erosive loss of organic marsh soils. All have contributed to the conversion of the vegetated emergent marsh to open water. Introduction of tidal influence also altered marsh hydroperiods or wetting and drying cycles. Non-tidal and microtidal marshes whose soil surfaces were exposed only seasonally or during periods of drought became subject to daily tidal fluctuations.

- Increased saltwater intrusion reduces plant productivity in plant communities adapted to fresher hydrological regimes. Plant productivity, especially below-ground biomass in root systems, is an important component of soil formation in the Chenier Plain region's fresher coastal marshes. Reduced plant productivity may reduce soil formation and limit marsh surface elevation gain.
- Alterations to the natural drainage systems in the region have resulted in a rapid transport of freshwater and sediments from inland areas directly to the GIWW, bays and the Gulf, and have generally eliminated the slower historic sheet flow of freshwater from the prairies into the marshes. Historic hydroperiods in the marshes have been altered as rapid drainage of inland flood waters has increased the frequency and depth of precipitation-driven flood events in downstream marshes. Conversely, drainage improvements in and adjacent to the marshes have promoted more rapid drainage and drying during normal or low precipitation cycles.
- Natural and human-caused subsidence has resulted in submergence or "drowning" of emergent wetlands and conversion to deeper, open water. Natural subsidence is the compaction of recent geologic sediments. Human-induced subsidence in the region occurs primarily from groundwater withdrawal and oil and gas extraction. Oil and gas extraction is believed to induce movement of near-surface geologic faults, causing a rapid drop in marsh elevation (White and Tremblay 1995). Subsidence also contributes to saltwater intrusion and is a causative factor in shoreline erosion/retreat and resultant coastal land loss along the Gulf, bays, and larger waterbodies.

Drainage Basins

Several systems of rivers and lakes cross the Chenier Plain from north to south and divide it into six fairly distinct drainage basins. The southeastern Gulf Coast of Texas is located within the East Bay Basin of Galveston Bay and the Sabine Basin (Gosselink et al. 1979). Jocelyn Nungaray NWR and the western portion of McFaddin NWR are located within the East Bay Drainage basin of the larger Galveston Bay system, which is one of the most productive estuaries for fish and shellfish on the Texas Coast (Gosselink et al. 1979). East Bay is bound on the north by fresh and brackish marshes and on the south by Boliver Peninsula which separates it from the Gulf. Jocelyn Nungaray NWR has a seven-mile shoreline on East Bay. The primary freshwater source to this basin is rainwater, indirect freshwater input from the San Jacinto and Trinity Rivers, and freshwater inflows from the Sabine Basin which drain into and flow through the GIWW into this basin. The GIWW traverses the East Bay drainage basin.

This shallow and meandering watershed often has no distinct delineation between the drainage boundaries because of the relatively flat terrain and variability in natural and man-made factors influencing drainage patterns. Robinson Bayou, Oyster Bayou, Onion Bayou, East Bay Bayou,

Elm Bayou, and Mud Bayou constitute the natural drainage system of East Bay. Jocelyn Nungaray NWR receives its freshwater inflows through Robinson Bayou, Oyster Bayou, Onion Bayou, East Bay Bayou and Elm Bayou, and through a series of irrigation canals and ditches. Many small meandering marsh streams also contribute to drainage patterns.

The western third of McFaddin NWR drains to the GIWW via Mud Bayou. Freshwater inflow to the western portion of the McFaddin NWR is restricted to local rainfall and that provided from the GIWW through Mud Bayou when the GIWW is fresh. The central and eastern portions of McFaddin NWR and all of Texas Point NWR are located within the Sabine basin. Salt Bayou drains the South Unit of McFaddin NWR from west to east through Star Lake and Clam Lake, and on to the GIWW or the Sabine-Neches Ship Channel via the Keith Lake Fish Pass. Prior to construction of the GIWW, the Keith Lake Fish Pass and the Sabine-Neches Ship Channel, Salt Bayou was a tributary of Taylors Bayou, which flowed eastward from their confluence to its outlet into Sabine Lake. Texas Point NWR is drained from west to east by Texas Bayou and several man-made canals and ditches to the Sabine-Neches Ship Channel.

Water Quality

There are six TCEQ water quality segments on or adjacent to the Refuge Complex (TCEQ, 2023c). **Table 2** below shows these segments and associated segment information.

Table 2: TCEQ Water Quality Segments on or Adjacent to the Refuge Complex						
<u>Station</u>	<u>Segment</u>	<u>Segment Name</u>	<u>Segment Class</u>	<u>Segment Type</u>	<u>Basin Name</u>	<u>Impaired</u>
18708	2423A	Oyster Bayou	Unclassified	Tidal Stream	Bays and Estuaries	Yes
10655	2423A	Oyster Bayou	Unclassified	Tidal Stream	Bays and Estuaries	Yes
17426	0702	Intracoastal Waterway Tidal	Classified	Tidal Stream	Neches-Trinity Coastal Basin	Yes
13463	2501	Gulf of Mexico	Classified	Ocean	Gulf of Mexico	Yes
13462	2501MF	McFaddin National Wildlife Refuge (Recreational Beaches)	Unclassified	Recreational Beaches	Gulf of Mexico	No
13298	2411	Sabine Pass	Classified	Estuary	Bays and Estuaries	Yes
13298	2411OW	Sabine Pass (Oyster Waters)	Unclassified	Oyster Waters	Bays and Estuaries	No

2022 Integrated Report Tx 303(d) list (Cat5)

Table 3 reflects water quality impairments of these segments under Sections 303(d) of the Clean Water Act.

Table 3: Water Quality Impairments				
<u>Segment</u>	<u>Segment Name</u>	<u>Impairment Description</u>	<u>Year First Listed</u>	<u>Impairment Category</u>
2423A	Oyster Bayou	Dioxin in edible tissue; PCBs in edible tissue	2010; 2010	5a; 5a
0702	Intracoastal Waterway Tidal	Bacteria in water (recreation use); Dioxin in edible tissue; PCBs in edible tissue	2012; 2010; 2010	5c; 5a; 5a
2501	Gulf of Mexico	Bacteria in water (recreation use); Mercury in edible tissue	2010; 1998	5c; 5c
2501MF	McFaddin National Wildlife Refuge (Recreational Beaches)	N/A	N/A	N/A
2411	Sabine Pass	PCBs in edible tissue	2012	5a
2411OW	Sabine Pass (Oyster Waters)	N/A	N/A	N/A

Impairments of other waters within the Refuge Complex likely occur due to the proximity to these nearby TCEQ water quality segments. Some of these locations fall under the Texas Department of State and Health Services (TDSHS) consumption advisory (ADV-50) for all species of catfish due to PCBs and dioxins in edible tissue. ADV-50 advises that women of childbearing age and children under 12 years of age do not eat any species of catfish and women past childbearing age and men only consume 1 meal per month (TDSHS, 2013).

The GIWW segment is also under TDSHS consumption advisory ADV-46 for gafftopsail catfish due to polychlorinated biphenyls (PCBs). ADV-46 advises adults should limit consumption to three eight-ounce meals per month and pregnant women, and children less than 12 years of age, should have a limit of one four-ounce meal per month (TDSHS, 2011).

For this reason, Fish Consumption Use is not supported in these regions.

Direct and Indirect Impacts on Water Resources **Alternative A**

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Under this alternative, there would likely be an increase in the frequency and/or size of prescribed burns. During wildfire events, fire intensity and severity can affect the amount of vegetation burned, which often results in the removal of extant and decomposing plant matter in the soil, which can be fully consumed during these events. High severity fires may lead to intense heating of mineral soils which can create hydrophobic conditions in the soils, which increases runoff and soil erosion. This can cause sedimentation downstream, which may affect water resources and overall habitat quality, including increases in nutrients that typically lead to algal blooms in waterways, eventually causing further issues such as fish die-offs, or a reduction in aquatic vegetation biomass and diversity (Hahn, et al. 2019).

While there is ample research into the effects of water quality from wildfires across many regions and habitats, the breadth of study for prescribed fires is much smaller, despite prescribed fires being used frequently for habitat management through the southeastern United States. While it is generally presumed that because prescribed fires are of a lower intensity and severity that they are likely to produce less impacts to adjacent watersheds post-fire, several studies have aimed to verify that information across various habitats.

One study focusing on ephemeral streams in the South Carolina Piedmont found that while runoff and sediment did increase in post burn analysis, it was later attributed to a bark beetle outbreak instead of the prescribed burn. There were also no significant changes in targeted chemical concentrations analyzed after the burn, and all conclusions for this particular study determined that the prescribed burns did not affect changes in water quality of the streams (Douglass and Van Lear, 1983).

Another study that synthesized the results of a series of prescribed burn studies found that groundwater chemistry was not directly affected by prescribed fires due to the lack of intensity needed to change the chemistry of the water. Fire intensity was noted as the most important factor with regard to the impact of a prescribed fire on water quality (Francos and Úbeda, 2021).

The USDA Forest Service's Rocky Mountain Research Station *Wildland Fire in Ecosystems: Effects on Fire on Soil and Water* 2005 technical report analyzed effects of prescribed fires on streamflow changes. It was found that in a 1982 study of the consequences of prescribed fire over a Texas grassland, there was a significant increase in adjacent streamflow discharges in the watershed compared to an adjacent unburned watershed. This was seen as a short-lived occurrence and streamflow's returned to pre-prescribed fire levels relatively quickly. Other analysis associated with the technical report on streamflow found that due to the nature of prescribed fires, they generally did not consume all vegetation and debris, which prevented drastic alterations to streamflow and runoff from occurring as compared to more severe wildfires.

The topography of the Refuge Complex is generally flat, or gently concave in depressional areas associated with wetlands. While there are ample sources of water resources in the form of wetlands, bayous, and small streams, the terrain of the Complex does not generally allow for high

volumes of runoff or streamflow from adjacent, slightly higher terrains during prescribed fires. The changes to the prescribed fire objectives, timing, and acreages under this alternative would allow for the ability for Refuge personnel to plan prescribed burns in conjunction with optimal weather conditions as to minimize potential for soil loss and sedimentation into adjacent streams or wetlands. More frequent, low intensity burning activities would prevent harsher intensity wildfires from becoming more prevalent, reducing the future impact wildfires have on the water resources of the Refuge Complex.

Under this alternative, there will be minimal effects to water quality due to the adjustment of fire objectives, timing, and acreages of the Fire Program.

Use of Manned and Unmanned Aircraft

The use of manned and/or unmanned aircraft under this alternative to conduct prescribed fire activities or control/suppress wildfires would have negligible impacts to water quality on the Refuge Complex. Small spills associated with fueling manned equipment are possible, though unlikely. Best management practices and spill prevention techniques would be implemented to prevent spills and/or cleanup any that do occur. The possibility of an air accident relating to manned aircraft is always a possibility, though also highly unlikely. Should an incident occur, water resources at and adjacent to the site of the accident could be affected if there is a loss of fuel and other fluids that make operation of the aircraft possible.

There would be minimal to no impact relating to water resources from unmanned aircraft under this alternative.

Use of Class A Foam

The use of Class A foams on the Refuge Complex with regard to prescribed burn activities or fire control and/or suppression would be limited to terrestrial use beyond 300' of waterways as per the Interagency Standards for Fire and Fire Aviation Operations requirements. Class A foams pose a significant risk to water quality and manufacturer recommendations outline that these chemicals should be prevented from entertaining drains or waterways. Where practicable, Class A foam would be used only in upland habitats where the possibility that drift into adjacent wetlands or waters would not occur, and no aerial application would be utilized in an effort to protect these wetlands and waters from chemical contamination by the Class A foams.

The analysis of effects to wildlife and aquatic species in **Section 6.1** addresses the impacts of Class A Foam entering the ecosystem via waterways.

Maintenance/Creation of Fire-lines

During routine maintenance or creation of fire lines there is potential for spills or leaks to happen when using gasoline or other fuel powered tools to clear vegetation to access these lines. This could relate to the fuel itself used to power the equipment or any lubricants or chemicals used to properly maintain and run the equipment. Incidental drips from vehicles used to transport crews to the site could also occur, though there is routine maintenance of Refuge Complex fleet vehicles to verify no oil or other chemical leaks are present before use in firefighting to prevent this from happening. Crews would employ best management practices relating to Spill Prevention Controls and Countermeasures (SPCC) in an effort to prevent spills, and cleanup of any spills or leaks would

be conducted in a timely manner in an effort to prevent any runoff into adjacent waterways or wetlands.

There would be minimal impacts to water quality and water resources under this alternative with regard to the maintenance and creation of fire lines when following Refuge Complex SPCC guidelines.

Alternative B

The No Action Alternative would leave the current water resources and water quality on the Refuge Complex unchanged. Impacts to the water resources throughout the Refuge Complex would continue to be impacted by the current Fire Program in the manner it has been implemented since the Program was enacted.

Other Reasonably Foreseeable Impacts on Water Resources

Other reasonably foreseeable impacts on water resources would be similar to those discussed in **Section 6.1** for Wildlife and Aquatic Species, as the proposed action, as well as other Refuge actions are designed to preserve and enhance areas that provide habitat to a multitude of species, including threatened, endangered, and sensitive species.

6.6 Air Quality

Description of Affected Environment

Air pollution sources within the region include petroleum production, chemical production, shipping, and agriculture. Burning for agriculture management is also used within the region to improve the quality of pasture habitat and minimize invasive and unwanted species (USFWS, 2008). In Texas, the Texas Commission on Environmental Quality (TCEQ) is the state agency responsible for air quality regulation. TCEQ has 16 Air Monitoring Regions and the Texas Chenier Plain Refuge Complex is within two regions: Jocelyn Nungaray NWR is within Region 12 while McFaddin and Texas Point NWR are within Region 10.

The current attainment status for the Beaumont-Port Arthur region is listed as Attainment/Unclassifiable for the tracked pollutants of ozone, lead, carbon monoxide, nitrogen dioxide, particulate matter, and sulfur dioxide under the standards assigned by the National Ambient Air Quality Standards (NAAQS) (TCEQ, 2023a). The Houston-Galveston-Brazoria region's attainment status for ozone is moderate/attainment for 0.07 ppm (2015 standard) and severe/non-attainment for the 0.075 ppm (2008 standard) for 8-hour averaging periods. The other tracked pollutants listed above for Beaumont-Port Arthur are also tracked for Houston-Galveston-Brazoria and are all listed as attainment/unclassifiable by the NAAQS standards for the pollutants (TCEQ, 2023b).

In addition, TCEQ is the authority that administers the Outdoor Burning Rule (Title 30, Texas Administrative Code (TAC) Sections 111.201-221) which regulates outdoor burning in Texas. The Outdoor Burning Rule prohibits outdoor burning excepting in certain situations and conditions when the "burning is necessary or does not pose a threat to the environment" (TCEQ, 2015).

Exceptions include fire training; fires used for recreation, ceremony, cooking, and warmth; disposal fires; prescribed burns; and hydrocarbon burning (TCEQ and TAC, 2017).

Within the Texas Chenier Plain Refuge Complex smoke associated with planned and unplanned wildfires on both refuge and adjacent private properties contributes to the primary causes of current and future air quality impacts within the region. Management of smoke associated with these events is considered during planning activities for fire suppression activities and prescribed burning activities within the Complex. Monitoring of these events is done to the best extent practicable and measures are in place to mitigate consequences to the fire events (USFWS, 2008).

Near the Refuge Complex there are rural homes, small towns and communities, rural roads, and larger state roads that see heavier traffic, in addition to large tracts of agriculture such as cattle pastures and rice fields, that are affected by and/or contribute to regional air quality issues pertaining to industry and wildfires.

Direct and Indirect Impacts on Air Quality **Alternative A**

The USFWS fire management program on the Refuge Complex includes both the suppression of unplanned wildland fires and prescribed burning. Suppression involves utilization of “Appropriate Management Response” to each wildland fire, ranging from direct attack to monitoring. Decisions regarding suppression options and tactics consider firefighter and public safety, protection of private or publicly owned structures and other infrastructure, and protection of natural and cultural resources. Prescribed burning is defined by Texas Commission on Environmental Quality (TCEQ, 2015) as “the controlled application of fire to naturally occurring vegetative fuels under specified environmental conditions and confined to a predetermined area, following appropriate planning and precautionary measures.”

The USFWS fire management program has the potential to impact the region’s air quality. Smoke from unplanned wildland fires and from planned prescribed burning can be transported by prevailing winds and affect air quality and transportation safety over a large area. The community of Sabine Pass sits on the northeast boarder of Texas Point NWR. High Island, Texas lies on the west boundary of McFaddin NWR and within a mile of the southeast boundary of Jocelyn Nungaray NWR. There are contiguous beds of vegetation adjacent to both of these communities. The cities of Beaumont, Port Arthur, Winnie, and Jocelyn Nungaray have all been historically impacted by smoke from wildfires on and adjacent to the refuges. There is also potential to affect the air shed of Baytown and Houston. An extended attack wildfire, under prevailing local winds (SW & SE) could have serious air quality and health impacts for many of these communities (USFWS 2022).

Smoke is made up primarily of carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons and other organics, nitrogen oxides, and trace minerals. The composition of smoke varies with fuel type. In general, particulate matter is the major pollutant of concern from wildland fire and prescribed fire smoke. Particulate matter is a general term for a mixture of solid particles and liquid droplets found in the air. Particulate matter from smoke tends to be very small (less than one micron in diameter) and, as a result, is more of a health concern than the coarser particles that

typically make up road dust. Because of their size range, particulates scatter light effectively and therefore, reduce visibility easily.

The human health effects from smoke run from irritation of the eyes and respiratory tract to more serious disorders including asthma, bronchitis, reduced lung function, and premature death. Particulate matter is the main source of health effects, but carbon dioxide and toxic air pollutants from wildfires can also cause health concerns (Therriault 2001).

On average, smoke particles linger in the atmosphere for an average of up to two to three weeks (Mock, 2020). The atmospheric conditions that affect the movement and dispersal of smoke include the following: wind direction, wind speed, mixing height (the elevation in the atmosphere that the smoke mixes and disperses), transport wind speed and direction (the direction and speed of upper level winds responsible for moving the smoke from the immediate area), and Category day/dispersion (a combination of mixing height and transport wind speed to give an overall indicator of smoke dispersion potential).

Because prescribed burning is conducted on the Refuge Complex under strict prescriptions which include implementing smoke management measures, impacts to local and regional air quality from the USFWS fire management program are minimal. Prescription parameters which must be met prior to ignition and for the predicted duration of a prescribed burn specifically aimed at preventing smoke impacts include surface and transport wind direction and speed, mixing height, ambient air temperature and humidity, and fuel moisture. Both current and predicted climatic conditions are considered when deciding whether to proceed with a burn and are regularly monitored for the duration of the burn as a further safeguard. Reducing smoke impacts to surrounding communities is also an important consideration in planning and implementing suppression actions on all wildland fires occurring on the Refuge Complex.

Prescribed burning on the Refuge Complex also reduces the potential for smoke impacts to air quality from unplanned wildland fires by effectively managing vegetative fuels. Most lightning-ignited wildland fires on the Refuge Complex occur during the months of June through October, when prevailing winds typically include a southerly component which transports smoke towards communities and other smoke-sensitive areas. Wildland fires are less likely to start in areas with reduced fuel loads because of prescribed burning, and fires that do start burn with less intensity, produce less smoke, and are easier to suppress than in unburned areas with excessive accumulations of hazardous fuels.

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Under Alternative A, the USFWS would have no timing or acreage limitations, allowing the agency to better manage/mitigate impacts to habitat and neighbors (especially smoke management in urban areas) by picking optimal times/conditions to burn marshes that will eventually burn on their own due to wildfire. Annual prescribed fire treatments could cover larger areas per event and larger total areas and could occur any time of the year, provided that fire could be implemented safely and under optimal conditions.

Larger fires may contribute to increased short term adverse effects to air quality in localized areas. Fires in the natural environment, whether they are prescribed or not, contain particulate matter

(PM) as well as many other gaseous compounds, including but not limited to nitrogen oxide (NO_x), carbon monoxide (CO), methane (CH₄), and many other volatile organic compounds (VOCs). The emissions of these compounds can vary depending upon fuel types and loads, weather patterns, and conditions during the burn. Populated areas adjacent to smoke blowing in from wildland fires can see elevated levels of PM_{2.5} and/or O₃, beyond the levels considered healthy. This smoke can mix with other pollutants in the urban environment, leading to respiratory issues and even premature death in certain situations. Increased exposure to CO is most often a concern for wildland firefighters (Jaffe, et al. 2020).

Between 2002-2012, prescribed fires that escaped their designated boundaries made up 18% of all US wildfires and 25% of the total acreage burned throughout the US during those years (Brunsetsev and Vroman, 2016). In 2017 draft National Emissions Inventory data from the EPA, Texas ranked at the top of states for total acreage amount burned at 632,470 ha. Central and southeastern prescribed fires typically appear to have similar magnitudes as western wildfires, though their PM_{2.5} was lower, owing to fuel type differences and management practices within the region which were not burning canopies or duff fuels. Prescribed fires in this region typically had much lower emissions per ha for these reasons. Health effects from smoke from fires are always a concern with regard to nearby and downwind communities. Estimates from 2008-2012 reflected annual short-term exposures to smoke at 3900-6300 respiratory hospitalizations and 1700-2800 cardiovascular hospitalizations. These numbers have likely increased in subsequent years with increased wildfires throughout the US. For public health concerns, PM_{2.5} is considered to be the more important level to look at with regard to public health. Wildfires generally produce exposures levels magnitudes higher than usual levels in typical day-to-day situations. (Jaffe, et al. 2020).

Implementing the proposed changes to the Fire Program would allow for more control over which areas of the Refuge Complex are burned at any given time as well as to burn during more efficient and hospitable climatic conditions, allowing for wind movements to provide the highest air quality possible to adjacent and downwind communities near the burn area(s). Increasing the burning rotation would allow for less buildup of plant matter which would decrease the chance for uncontrolled wildfires that have the potential to impact local air quality in a more detrimental way than prescribed fires typically do.

Each year, the Refuge Complex provides TCEQ with an estimated location and number of prescribed burns that will be conducted for the Complex. Notices are given which include TCEQ, local law enforcement and fire departments prior to the start of all prescribed fires.

Use of Manned and Unmanned Aircraft

Under this alternative, the USFWS would utilize manned and/or unmanned aircraft during prescribed fire events and to control/suppress wildfires. There are several small county and city airports as well as helipads within Chambers and Jefferson Counties, within the region of the Refuge Complex, which provide services for local and regional use of aircraft. Air traffic within the Refuge Complex is relatively light compared to the urban areas around Houston and Beaumont/Port Arthur. Chambers County Airport located in Jocelyn Nungaray, Texas reports an average of 46 aircraft operations per week, with 67% being local general aviation and 33% transient general aviation (AirNav, 2023a). The Chambers County/Winnie Stowell Airport reports an average of 115 aircraft operations per week with 75% being local general aviation and 25%

transient general aviation (AirNav, 2023b). There would likely be a negligible increase in emissions in the region from these manned aircraft associated with fire management events as they fly to and from the landing zone at the USFWS maintenance facility in Winnie and work around the Refuge Complex during these events.

There would be no increase in emissions or effects to air quality with unmanned aircraft under this alternative.

Use of Class A Foam

Class A foam is a surfactant used to make water more effective during firefighting. DOI policy prohibits this from being sprayed aurally over federal lands and must be distributed over fire areas by use of engines and portable pumps. Material Safety Data Sheet information for one Class A foam concentrate, KnockDown® states safe storage of the chemical should be in cool, dry, and well-ventilated areas under cover and out of sunlight (National Foam, 2019). Guidelines for use include adequate ventilation and if large volumes are to be sprayed, local exhaust ventilation should be used. Respiratory protection, including NIOSH approved full face respirators, is suggested for individual protection measures, when there is a risk of exposure to high vapor concentrations, aerosols or when applied to hot surfaces (National Foam, 2019). No relevant studies have been noted as to the respiratory toxicological side effects of this substance.

Under the proposed alternative, there may be minimal localized air quality and respiratory safety concerns for the firefighters deploying Class A Foam materials or to other personnel working in the immediate area. Wildland firefighters and associated crews wear appropriate safety gear associated with firefighting and any negative respiratory effects would be minimal. Overall impacts to the greater Refuge Complex regional air quality are unknown but would also likely be minimal as Class A Foams are primarily used as surfactants and are not known to linger aurally over the long term.

Maintenance/Creation of Fire-lines

The creation and maintenance of fire lines associated with prescribed fires or the containment of wildfires would require use of multiple types of combustible engines. Ground vehicles of various types would be needed to access these locations and to transport personnel to these lines during fire operations and maintenance activities. In addition, equipment such as tractors, lawn mowers, chainsaws, and other outdoor utility equipment would be required to maintain and create these fire lines. Emissions related to this equipment would be localized to the fire line being maintained or accessed at any given time. Minimal contributions to the overall regional air quality would occur. The changes in timing of the rotation of prescribed fires may contribute to overall less maintenance if fire lines are used on a more frequent basis, thereby reducing the amount of equipment emissions over time.

Alternative B

Under the No Action Alternative, current fire management objectives, limitations, and methodologies for the Fire Program would remain unchanged. Because the Refuge is limited to burning 4,500 acres per prescribed fire event, the USFWS would likely burn less acreage each year and longer periods of time would pass between burns, resulting in higher fuel levels in areas within

the Refuge Complex than those expected under the Proposed Action. This would result in a higher likelihood of wildfire occurrence. Wildfires, unlike prescribed burns, could occur in less-than-optimal conditions, and smoke from wildland fires could be transported by prevailing winds and affect air quality and transportation safety over a large area which includes the cities of Houston, Beaumont and Port Arthur and numerous smaller local communities.

Other Reasonably Foreseeable Impacts on Air Quality

Other reasonably foreseeable impacts to air quality are expected to be minimal as a result of the proposed action. USFWS has and would continue to manage Refuge habitats utilizing a variety of methods, including but not limited to prescribed burning, with the ability to manage it more effectively under the Proposed Action. While increasing the acreage and/or frequency of prescribed burns could result in greater short-term, localized, adverse impacts to air quality, it is expected to decrease the frequency of wildland fires, which typically result in greater impacts to air quality than prescribed fires. Fires also produce invisible gases, including carbon dioxide; however, the climatic impact of CO₂ production is expected to be minimal due to the fact that the marsh grass begins growing back quickly following fire within the Refuge Complex and reabsorbs the burned carbon dioxide.

Implementation of the Proposed Action, combined with other Refuge Actions (discussed in **Section 6.1 Wildlife and Aquatic Species**) designed to create, restore, and preserve Refuge habitats could potentially result in minimal beneficial effects on air quality through creation, preservation, and enhancement of vegetated habitats that naturally sequester carbon.

6.7 Visitor Use and Experience

Description of Affected Environment

Guidance for authorizing public uses on NWRs is provided in the National Wildlife Refuge System Improvement Act (the Act) of 1997 (P.L. 105-57). The Act state, “Compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System.....through which the American public can develop an appreciation for fish and wildlife.” The Act recognizes that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, wildlife photography and environmental education and interpretation, when determined to be compatible, are legitimate and appropriate public uses of the Refuge System that should receive priority consideration in refuge planning and management.

The Refuge Complex offers a variety of recreational opportunities to visitors. All six priority wildlife-dependent recreational uses are offered among the three refuges, and include hunting, fishing, wildlife observation, photography, environmental education and interpretation.

Currently, waterfowl hunting is offered on McFaddin, Texas Point, and Jocelyn Nungaray NWRs, ranging from free, first-come, first-serve programs to a more formal fee permit reservation system. Different hunt units are open on different days of the week to provide hunting opportunities throughout the week, as well as periods of rest for waterfowl. Approximately 40% of the Refuge Complex is open for waterfowl hunting, the maximum allowable on lands acquired under authority of the Migratory Bird Conservation Act, (16 U.S.C. 715d.).

Some of the best wade fishing in Texas can be found on the refuge shorelines along East Galveston Bay. Jocelyn Nungaray and McFaddin NWRs offer free access 24 hours a day. Access is limited in Texas Point NWR, and there is no public access allowed in the Moody NWR.

Two boat ramps provide access to East Bay and Oyster Bayou at Jocelyn Nungaray NWR. In addition, a canoe launch access to East Bay Bayou is accessible via the Honeysuckle Trail. Several trails, including but not limited to, Willows Trail, Hackberry Trail, and the Woodlot Trail provide access to the natural areas within the refuge.

There are five miles of roadways within McFaddin NWR that allow access for wildlife and nature viewing, as well as hunting, fishing, and crabbing (USFWS, 2023a).

Direct and Indirect Impacts on Visitor Use and Experience **Alternative A**

Possible impacts to visitor experience during or following a fire event include reduced visibility (wildlife viewing, alteration of wildlife patterns, night sky), adverse health and safety effects (comfort, smoke exposure), road/trail closures, noise intrusions (aircraft), increased interpretative opportunities (fire management observation, pre- and post- burn areas), and potential loss of interpretative media such as signs, boardwalks, and infrastructure.

Impacts of fire management activities within the Texas Chenier Plain NWR Complex on visitor experience would be highly localized and dependent on individual perceptions of fire in the refuges. Impacts to visitor experience would be primarily associated with high use visitor use trails; however, these areas would be protected from fire management activities or cleared prior to management actions. Smoke may obstruct viewsheds and impact visibility causing short-term, localized adverse effects.

Impacts to the refuges' natural soundscapes are expected as mechanized equipment and firefighters manage fire within the refuges resulting in short-term, adverse effects. Sensitive groups (those with respiratory illnesses or asthma) may experience irritation from smoke, causing short-term, adverse effects; however, these would be highly variable based on individual condition.

Visitor use areas near and within fire management activities would be cleared prior to management actions as needed to reduce impacts to visitor experiences. Interpretive opportunities would also provide beneficial effects as fire management activities would provide opportunities to educate visitors about the refuges' fire-adapted ecosystems and resource management goals, providing short- and long-term beneficial effects. Conversely, short-term, adverse effects may occur as interpretive programming is cancelled or relocated as a result of fire management activities.

Overall, impacts to visitor experience as a result of management actions under Alternative A would have some short-term, adverse impacts, but would have long-term beneficial effects, as it would improve Refuge habitats utilized by visitors, and decrease the likelihood of unplanned wildfires which can be hazardous to visitors.

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Under Alternative A, the USFWS would have no timing or acreage limitations, allowing the agency to better manage/mitigate impacts to visitors (especially smoke management) by picking optimal times/conditions to burn marshes that will eventually burn on their own due to wildfire. Annual prescribed fire treatments could cover larger areas per event and larger total areas and could occur any time of the year, provided that fire could be implemented safely and under optimal conditions.

As mentioned in other sections, increasing the burning rotation would also allow for less buildup of plant matter which would decrease the chance for uncontrolled wildfires that have the potential for greater impacts to visitors than prescribed burns from both an experience and safety standpoint.

Use of Manned and Unmanned Aircraft

Under this alternative, the USFWS would utilize manned and/or unmanned aircraft during prescribed fire events and to control/suppress wildfires. Helicopter noise could temporarily disturb visitors; however, these impacts would be short-term, minimal, and localized, as visitor use areas near and within fire management activities would be cleared prior to management actions as needed to reduce impacts to visitor experiences. Visitors in the vicinity of the helicopter landing zone at the Winnie, TX maintenance facility and/or the access routes utilized to reach prescribed or wildland fire locations are most likely to experience noise disturbance.

Unmanned aircrafts typically don't produce much noise; therefore, the effect of utilizing them as part of the Fire Program are expected to be negligible.

Use of Class A Foam

Under this alternative, Class A foams would be utilized as necessary to make water more effective during firefighting. As mentioned in the discussion of air quality impacts, above, DOI policy prohibits this from being sprayed aerially over federal lands and requires it to be distributed over fire areas by use of engines and portable pumps.

While no relevant studies have been noted as to the respiratory toxicological side effects of this substance, no effects to visitors are anticipated because the foams would only be applied as surfactants during firefighting efforts and no visitors are expected to be present in actively burning areas within the Refuges. Additionally, components of the foams are not known to linger aerially or over the long-term.

Maintenance/Creation of Fire-lines

The creation and maintenance of fire-lines associated with prescribed fires or the containment of wildfires would require use of mechanized equipment (i.e., tractors, lawn mowers, chainsaws, and other outdoor utility equipment). Equipment noise could temporarily disturb visitors in the vicinity of the fire-lines during maintenance or creation activities; however, disturbances would be short-term, minimal, and localized.

Alternative B

Under the No Action Alternative, current fire management objectives, limitations, and methodologies for the Fire Program would remain unchanged. Because the Refuge is limited to burning 4,500 acres per prescribed fire event, the USFWS would likely burn less acreage each year and longer periods of time would pass between burns, resulting in higher fuel levels in areas within the Refuge Complex than those expected under the Proposed Action. This would result in a higher likelihood of wildfire occurrence. Wildfires, unlike prescribed burns, could occur in less-than-optimal conditions without prior warning to visitors, which could result in disturbance, affect visitor use and experience, and/or present safety issues.

Other Reasonably Foreseeable Impacts on Visitor Use and Experience

The proposed action is designed to better manage refuge habitats, reducing the quantity of fuels and likelihood of wildland fires. Additionally, the action, combined with other Refuge actions discussed in **Section 6.1**, is designed to preserve and enhance areas that provide habitat to a multitude of species, which would result in overall beneficial effects to visitor use and experience.

6.8 Cultural Resources

Description of Affected Environment

Cultural resources are expressions of human cultural history in the physical environment, which are considered to be important to a culture, subculture, or community. Cultural resources can include prehistoric or historic archaeological sites, buildings, structures, objects, districts or other places including natural features and biota. Cultural resources also include traditional life ways and practices and community values and traditions.

DESCO conducted a search of the Texas Archaeological Research Laboratories (TARL) and Texas Historical Commission's online databases to determine locations of known cultural resources within the project area.

One site listed in the National Register of Historic Places (NRHP) and 2 archeological districts were identified in Chambers County. Twelve NRHP listed sites, thirteen archaeological districts, and three state historic sites were identified in Jefferson County. Sixty NRHP archaeological sites and 21 historic districts are listed in Galveston County. No properties have been identified to date on the Refuge Complex that are listed on the NHRP. A total of 32 cultural resource sites have been recorded within the Texas Chenier Plain NWR Complex. Of these 32 sites, only 4 shell middens were recorded as having potential for eligibility in the NRHP due to the amount of material intact at the sites; however, the sites have not been submitted for consideration.

The Refuge Complex has not been fully surveyed for cultural resources. Surveys that have occurred were usually initiated on a project-specific basis, such as for oil and gas and/or water projects infrastructure repair projects, and wetland and/or beach restoration projects to comply with the requirements of Section 106 regulations of the National Historic Preservation Act (NHPA), 36 CFR Part 800. Shell middens are the primary cultural resource identified through previous project-specific surveys. The shell middens are hardly noticeable since they are buried under dense vegetation and are typically not identified until a field survey is initiated.

Direct and Indirect Impacts on Cultural Resources
Alternative A

Fires can damage cultural resource sites by destroying or degrading building materials; or by burning down into the soil, charring bone, shell, and pottery. These impacts can, in turn, skew attempts at dating archeological resources, rendering identification and documentation more difficult. Low-intensity burns are usually associated with lightly burned grasslands during prescribed burns. Low-intensity burns are not anticipated to affect cultural resources but may cover the resources in soot. High-intensity burns are typically associated with wildfires in dry areas that have abundant litter accumulation due to unnatural fire suppression. High-intensity fires may char or consume cultural resources leading to a potential impact. There is very little likelihood of a high-intensity fire occurring since the Refuge Complex is primarily wet, has high soil moisture content, and was subject to burning by Native Americans, present-day natural resource managers, and lightning-ignited fires. Additionally, larger areas would be burned on a more frequent rotation under the Proposed Action. This would result in a reduction of fuels within the Refuges and further reduce the likelihood of high-intensity prescribed burns and/or wildfires.

While intentional impacts to archeological resources would obviously be avoided to the greatest extent possible, the potential for impacts resulting from high intensity fires cannot be completely eliminated. Avoidance techniques and other typical mitigation measures can generally reduce the effects of planned events with good success, while unplanned events pose the potential for increased impacts. As such, heat damage to archeological resources could result in minor to moderate adverse impacts to cultural resources.

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Under the proposed action, USFWS would have the ability to more effectively manage Refuge habitats utilizing prescribed fire, as there would be no acreage or timing limitations. Prescribed fire and wildland firefighting efforts would be conducted under an approved Programmatic Burn Plan.

Effective management of Refuge habitats utilizing prescribed fire would decrease the quantity of fuels in the Refuge Complex and thus decrease the likelihood of wildland fires, which, as mentioned above, are typically of higher intensity than prescribed burns, and have a greater likelihood of adversely impacting cultural resources. The proposed action could also offer protection over the long term to cultural resource sites with the Refuge Complex through protection of the habitats in which they are located. Absent Refuge management activities, including prescribed fire, cultural materials could be lost as a result of deterioration and/or loss of habitat due to natural processes.

Use of Manned and Unmanned Aircraft

The use of manned and unmanned aircraft in prescribed burning and/or wildland fire-fighting efforts would not adversely affect cultural resources, as these aircraft would not land on or within cultural resource sites. Conversely, the use of aircraft in the Fire Program would help facilitate effective and controlled prescribed burning and could speed up response times in wildlife firefighting efforts, which could help to prevent adverse impacts to cultural resources.

Use of Class A Foam

No adverse effects to cultural resources are anticipated as a result of use of Class A Foams during prescribed burn events or wildland firefighting efforts. Conversely, application of Class A Foams to cultural sites could offer protection from fire when used in accordance with NFPA 1145 guidelines for the use of Class A Foams in firefighting (NFPA, 2022). These guidelines outline methods for providing exposure protection for untreated wood and other absorbing surfaces as well as for non-absorbing surfaces, such as vinyl, metal, glass, painted wood, or fiberglass.

Maintenance/Creation of Fire-lines

Maintenance and/or creation of fire-lines could involve ground-disturbing activities, which may mix soil strata and expose or fragment archeological resources. Such ground disturbance could result in permanent, minor adverse effects to any sites present in the area of effect. USFWS management of the Refuge Complex includes protection of cultural resources. Maintenance and/or creation of fire-lines would not occur within known sites listed in or eligible for listing in the National Register of Historic Places; therefore, no adverse impacts are anticipated as a result of fire-line maintenance or creation.

The USFWS completed a formal project review under Section 106 of the National Historic Preservation Act from the State Historic Preservation Officer (SHPO), Texas Historical Commission (THC) during preparation of the *Final Environmental Impact Statement, Comprehensive Conservation Plan, and Land Protection Plan* (USFWS, 2008), which included prescribed fire as a management tool, among others. A copy of the SHPO's review document, dated June 8, 2004, is contained in Appendix I of the EIS.

Effects on cultural resources as a result of changes to the Prescribed Fire Program under the Proposed Action are expected to be similar to those analyzed in the EIS and reviewed by the THC.

The USFWS also completed a Cultural Resource Review & Project Initiation Form for the Texas Chenier Plain Fire Update related to maintenance of fire lines on April 25, 2024, which is the action with the most potential for impacting cultural resources. USFWS determined that there are no known historic properties located within the area of potential effect and this project has low potential to impact historic properties.

Alternative B

Under the No Action Alternative, current fire management objectives, limitations, and methodologies for the Fire Program would remain unchanged. Because the Refuge is limited to burning 4,500 acres per prescribed fire event, the USFWS would likely burn less acreage each year and longer periods of time would pass between burns, resulting in higher fuel levels in areas within the Refuge Complex than those expected under the Proposed Action. This would result in a higher likelihood of wildfire occurrence. Wildfires, unlike prescribed burns, could occur in less than optimal conditions and burn at higher intensities. As discussed above, higher intensity fires have a higher potential of adversely affecting cultural resource sites.

Other Reasonably Foreseeable Impacts on Cultural Resources

While prescribed fire and other Refuge management practices have the potential to affect cultural resource sites, the greatest threats to cultural resources within the Refuge Complex have been and will likely continue to be natural processes. Multiple erosional forces (i.e., tidal scour, saltwater intrusion, subsidence, storm surges, wave action, etc.) have affected and will continue to affect cultural resources in the Refuge Complex over time. Many shell midden sites that were documented along the coast and in wetland areas have been washed away and more sites will continue to be washed away in the future. Shorelines along the Texas Gulf Coast are subject to high rates of erosion, with land loss rates exceeding 40 feet per year in some areas, including the Texas Point NWR.

The proposed action and other Refuge actions discussed in **Section 6.1** are designed to preserve and enhance Refuge habitats and protect sensitive resources within the Refuge Complex, including cultural resources; therefore, overall effects to cultural resources are expected to be beneficial.

6.9 Refuge Management & Operations

Description of Affected Environment

Land management activities on the refuges are focused toward the “conservation and management of migratory birds and their habitats.” (USFWS, 2008).

Wetlands within the refuges are managed more heavily than others, with some of those management practices including water control structures and impoundments such as levees to control water movement within the wetlands in the refuges. In addition, approximately 500-700 acres of rice is organically farmed within the refuge system in wetland areas.

Approximately 500 acres of moist soil units within ANWR are managed for brood-rearing mottled ducks and other moist soil units are managed for migrational shorebirds.

In upland areas, former crop land has been allowed to lie fallow and return to its native prairie habitat. Some management occurs in these areas via grazing, mowing, invasive species removal, and prescribed burning.

Recreational uses of the Texas Point, Jocelyn Nungaray, and McFaddin NWRs include fishing, wildlife observation, photography, education, and interpretation. Hunting is permitted on all three of the afore-mentioned refuges in designated Public Hunting Areas during state-specified seasons. Saltwater fishing and crabbing are popular year-round (USFWS, 2008).

Direct and Indirect Impacts on Refuge Management & Operations

Alternative A

Changes to the Fire Program as a result of the proposed action would improve the Refuge’s ability to effectively manage Refuge habitats in accordance with management objectives.

Impacts from Changes in Prescribed Fire Objectives/Timing/Acreages

Under the proposed action, there would be no acreage or timing limitations. Prescribed burns could be implemented in larger areas under optimal conditions any time of the year, allowing the Refuge to establish a fire-return interval that is consistent with the natural fire regime of the area. As discussed earlier in this document, effective management of Refuge habitats through prescribed fire, combined with other management actions, benefits Refuge vegetation and habitats, geology and soils, wildlife (including threatened and endangered species), cultural resources, and enhances visitor use and experience over the long-term.

Effective management of Refuge habitats utilizing prescribed fire would also decrease the quantity of fuels in the Refuge Complex and thus decrease the likelihood of wildland fires which require Refuge resources (i.e., personnel, equipment, supplies) that would otherwise be utilized for more beneficial management activities.

Use of Manned and Unmanned Aircraft

The use of manned and unmanned aircraft in Refuge management activities, including but not limited to prescribed burning and/or wildland fire-fighting efforts, would help facilitate effective and controlled prescribed burning and could speed up response times in wildlife firefighting efforts, helping to prevent adverse impacts to Refuge resources.

Use of Class A Foam

USFWS is currently required to carry Class A foam on Engines as per guidance. Under the Proposed Alternative, Class A foams would be used, as necessary, to improve the efficiency of water. The use of Class A foams may prove to be beneficial in management actions (prescribed burns and wildfire response) under the right circumstances. USFWS would only use foam in accordance with policy limitations.

Maintenance/Creation of Fire-lines

The ability to maintain and/or create fire-lines, as necessary, is a critical component of the Fire Program with regard to implementing prescribed fire as a management tool and responding to wildland fires. Fire-lines afford Fire Program personnel the ability to contain and/or control fire. Without fire-lines, fires could burn out of control and have adverse effects to Refuge resources. The ability to maintain and/or create fire-lines under the Proposed Alternative should have beneficial effects to Refuge management and operations over the short- and long-term.

Alternative B

Effects of the No Action would be similar to those of the proposed action, as the Refuge would continue to maintain and/or create fire-lines utilizing current policies and limitations.

Other Reasonably Foreseeable Impacts on Refuge Management & Operations

As mentioned above, land management activities on the refuges are focused toward the “conservation and management of migratory birds and their habitats.” (USFWS, 2008). The biggest threat to the resources of the Refuge Complex has been and continues to be land loss/degradation due to natural processes (i.e., tidal scour, storm surge, subsidence, salt-water

intrusion, etc.). Prescribed fire is one of the many Refuge management actions designed to conserve and enhance Refuge habitats (more management actions are discussed in **Section 6.1** Wildlife and Aquatic Species). The conservation of Refuge habitats benefits multiple resources, including but not limited to vegetation, soils, wildlife and aquatic species, and cultural resources. It also enhances visitor use and experience. For these reasons, the Proposed Action would have an overall beneficial contribution to Refuge Management and Operations.

6.10 Socioeconomics

Description of Affected Environment

The Refuges within the Texas Chenier Plain NWR Complex are located in Jefferson, Chambers, and Galveston Counties, TX.

According to the most recent US Census Bureau data, the population of Jefferson County as of July 1, 2022, was estimated to be 250,830 (USCB, 2023e). The largest population centers in Jefferson County are Beaumont and Port Arthur, with populations of 112,089 and 55,579, respectively (USCB, 2023a and 2023f). The 2017-2021 estimated median household income for Jefferson County was \$53,613, and approximately 19.2% of people were estimated to be living in poverty (USCB, 2023e). The median household income for Jefferson County is less than the estimated national average of \$69,021 for the same period, and the percentage of people living in poverty is higher than the national average of 11.5% (USCB, 2023g).

The population of Chambers County as of July 1, 2022, was estimated to be 51,288 (USCB, 2023b). The largest population centers in Chambers County are Beach City and Jocelyn Nungaray, with 2023 population estimates of 3,168 and 1,946, respectively (World Population Review, 2023). The 2017-2021 estimated median household income for Chambers County was \$93,707, and approximately 10.4% of people were estimated to be living in poverty (USCB, 2023b). The median household income for Chambers County is more than the estimated national average of \$69,021 for the same period, and the percentage of people living in poverty is higher than the national average of 11.5% (USCB, 2023g).

The population of Galveston County as of July 1, 2022, was estimated to be 57,117 (USCB, 2023d). The largest population center in Galveston County is Galveston, with a population of 53,089 (USCB, 2023c). The 2017-2021 estimated median household income for Galveston County was \$52,899, and approximately 18.6% of people were estimated to be living in poverty (USCB, 2023d). The median household income for Galveston County is less than the estimated national average of \$69,021 for the same period, and the percentage of people living in poverty is higher than the national average of 11.5% (USCB, 2023g).

The predominant land uses within and adjacent to the Texas Chenier Plain NWR complex are grazing, hunting, fishing, wildlife viewing, and some oil and gas development. According to the USFWS, the MNWR saw 163,376 recreational visitors in 2017. Total expenditures from visitors were \$3.7 million with non-residents accounting for \$2.0 million or 53 percent of total expenditures. Expenditures on non-consumptive activities accounted for 58 percent of all expenditures, followed by fishing and hunting at 36 and 6 percent respectively (USFWS, 2019).

Direct and Indirect Impacts on Socioeconomics

Alternative A

Implementation of proposed changes to the Fire Program under this alternative would have negligible effects to Socioeconomics of the region because the changes are not expected to measurably affect employment, income, or expenditures that occur in the regional economy. USFWS has Fire Program staff who currently facilitate and would continue to facilitate prescribed burns and respond to wildland fires. Expenditures for equipment and supplies could potentially increase as a result of the Refuges ability to burn larger areas with no timing limitations; however, the increase in expenditures would be minor and short-term and would negligibly affect the local economy.

Refuge visitation may temporarily decrease during prescribed fire events; however, it is expected to resume following fire events.

USFWS management of the area, utilizing prescribed fire and other management actions, is geared toward preservation and enhancement of the habitat that is enjoyed by visitors. Since the Refuge would have the ability to more effectively manage Refuge habitats, one could speculate that these habitats and/or the wildlife and fisheries present therein, would draw more visitors and result in greater revenues. For this reason, any losses in revenue as a result of the proposed action are expected to be offset by increased visitation over the long term.

Alternative B

The effects of the No Action alternative would be similar to those of the Proposed Alternative; however, the risk of wildfires would be slightly greater due to the current acreage and timing limitations of the Fire Program. Wildfires could occur under less-than-optimal conditions and have a greater risk of adverse effects to visitors and/or Refuge resources, which could in turn effect visitor-related revenue and have minor, short-term effects on socioeconomics.

Other Reasonably Foreseeable Impacts on Socioeconomics.

Because implementation of the proposed alternative is expected to have a negligible impact on socioeconomics, it is not expected to contribute to other reasonably foreseeable impacts on socioeconomics.

7.0 MITIGATION MEASURES AND CONDITIONS

Prescribed burns are conducted in accordance with an approved Programmatic Burn Plan under optimal atmospheric conditions in areas with clear fire breaks, and they are monitored closely by USFWS Fire Program staff. The Texas Chenier Plain NWR Complex's Programmatic Burn Plan (USFWS, 2022) contains detailed mitigation measures and conditions to be implemented by Fire Program staff and is reviewed on an annual basis.

8.0 MONITORING

Scientists from the USFWS, Texas Tech University, and Ducks Unlimited are currently collecting data for a research study titled *Fire Effects in Gulf of Mexico Marshes: Historical Perspectives, Management, and Monitoring of Mottled Ducks, Black Rails, and Yellow Rails*, which is funded from September 2019 - August 2024 by NOAA RESTORE Science. Supplemental Funding is also being provided by Texas Tech University and USFWS. The study area is the Gulf Coast of Texas, Louisiana, Mississippi, Alabama, and Florida.

Study objectives are as follows:

- (1) Determine the distribution and abundance of black rails, yellow rails, and mottled ducks in marsh habitats across the five Gulf States, during the breeding and wintering seasons
 - (1.1) Map and validate marsh habitat to inform bird monitoring
 - (1.2) Estimate the relative proportion of resident versus migratory black rails.
- (2) Identify prescribed fire practices that support black rail, yellow rail, and mottled duck populations.
 - (2.1) Determine the mechanism of bird response to fire through plants and invertebrates
 - (2.2) Characterize the appropriate fire return interval variation in high marsh
 - (2.3) Determine if weather affecting prescribed fire has changed in frequency over time. Area of emphasis: Exploring trends in multiple species may include, but is not limited to, the investigation of how the trends and variability in multiple species respond to the same driver, trends and variability in food web dynamics, or multi-species stock assessments.

To date, 1,483 official vegetation plots have been established in Texas as part of this research study, including many within the Jocelyn Nungaray and McFaddin NWRs. Multiple vegetation features were measured/estimated at each point [Habitat Type, Percent Cover, Robel Pole Visual Obstruction, Pasture Disc (Duff Layer Estimate), and Clip plots (only collected at a sub-sample of sites in some years)]. Vegetation data will be combined with Fire history to provide resource managers with an understanding of how prescribed fire and wildfire impact marsh ecosystems and the distributions of several birds of conservation concern, as well as provide them with the tools needed to evaluate the tradeoffs between different prescribed fire management choices in northern Gulf marshes.

An additional research effort is also currently underway jointly between USFWS Refuges, USFWS Migratory Birds, Texas Tech University, Louisiana State University, Minnesota Department of Natural Resources, Delta Waterfowl, Texas A&M University-Kingsville, the Gulf Coast Joint Venture, and USGS to assess how fire return interval, time since fire, and other fire characteristics (e.g., patchiness of burn) influence mottled duck habitat use in important habitat types such as fresh and intermediate coastal marsh and wet coastal prairies along the Gulf. This effort started in fall of 2023 and is expected to be available in fall of 2026.

9.0 SUMMARY OF ANALYSIS

The purpose of this EA is to briefly provide sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI).

9.1 Alternative A – Proposed Action Alternative

As described above, the proposed action may result in minor, short-term adverse impacts on water quality, wildlife and aquatic species, and visitor use and experience in localized areas during implementation. However, it would result in long-term beneficial indirect effects when combined with other reasonably foreseeable impacts to vegetation, soils, wildlife and aquatic species, threatened and endangered species, wetlands, and water resources. The beneficial impacts of the proposed action far outweigh the adverse impacts.

9.2 Alternative B – No Action Alternative

As described above, the no action alternative would have effects similar to the proposed action on resources of concern. However, the no action alternative would not provide the USFWS the ability to as effectively manage habitats utilizing prescribed fire as with the proposed action, and could result in more adverse indirect impacts to vegetation, soils, wildlife, aquatic species, threatened and endangered species, wetlands, water resources, and visitor use and experience due to continued accumulation of fuels and higher risk of wildfires.

10.0 LIST OF SOURCES, AGENCIES, AND PERSONS CONSULTED

Jon King, Fire Management Officer, Texas Chenier Plain Fire Zone
Tim Cooper, Refuge Complex Manager, Texas Chenier Plain NWR Complex
David Certain, Chief, Planning Division, Region 2, Southwest
Kristin Fritz, ANWR Manager
Doug Head, MNWR Manager
Ernest Crenwelge, Texas Point NWR Manager
Jena Moon, USFWS Zone Biologist
Joe Marty, Supervisory Wildlife Biologist, Texas Chenier Plain NWR Complex

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12.0 LIST OF PREPARERS

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13.0 STATE COORDINATION

The USFWS completed a formal project review under Section 106 of the National Historic Preservation Act from the THC (SHPO) during preparation of the *Final Environmental Impact Statement, Comprehensive Conservation Plan, and Land Protection Plan* (USFWS, 2008), which included prescribed fire as a management tool, among others. A copy of the SHPO's review

document, dated June 8, 2004, is contained in Appendix I of the EIS. Effects on cultural resources as a result of changes to the Prescribed Fire Program under the Proposed Action are expected to be similar to those analyzed in the EIS and reviewed by the THC.

The USFWS also completed a Cultural Resource Review & Project Initiation Form for the Texas Chenier Plain Fire Update related to maintenance of fire lines on April 25, 2024, which is the action with the most potential for impacting cultural resources. Upon completion of this review, USFWS determined that there would be no effect to historic properties; therefore, no additional consultation with THC is required.

14.0 TRIBAL CONSULTATION

USFWS will contact/consult with the appropriate tribal representations with regard to potential impacts to cultural resources.

15.0 OTHER APPLICABLE STATUTES, EXECUTIVE ORDERS & REGULATIONS

Other statutes, executive orders, and/or regulations that are applicable to the proposed action and were considered during its development are included in **Appendix A**.

16.0 DETERMINATION

This section will be filled out upon completion of any public comment period and at the time of finalization of the Environmental Assessment.

- The Service’s action will not result in a significant impact on the quality of the human environment. See the attached “Finding of No Significant Impact”.
- The Service’s action may significantly affect the quality of the human environment and the Service will prepare an Environmental Impact Statement.

Preparer Signature: _____ Date: _____

Name/Title/Organization: _____

Reviewer Signature: _____ Date: _____

Name/Title: _____

APPENDIX A
Other Applicable Statutes, Executive
Orders, & Regulations

APPENDIX A
OTHER APPLICABLE STATUTES, EXECUTIVE ORDERS & REGULATIONS

STATUTES, EXECUTIVE ORDERS, AND REGULATIONS	
<p>Cultural Resources</p> <p>American Indian Religious Freedom Act, as amended, 42 U.S.C. 1996 – 1996a; 43 CFR Part 7</p> <p>Antiquities Act of 1906, 16 U.S.C. 431-433; 43 CFR Part 3</p> <p>Archaeological Resources Protection Act of 1979, 16 U.S.C. 470aa – 470mm; 18 CFR Part 1312; 32 CFR Part 229; 36 CFR Part 296; 43 CFR Part 7</p> <p>National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470-470x-6; 36 CFR Parts 60, 63, 78, 79, 800, 801, and 810</p> <p>Paleontological Resources Protection Act, 16 U.S.C. 470aaa – 470aaa-11</p> <p>Native American Graves Protection and Repatriation Act, 25 U.S.C. 3001-3013; 43 CFR Part 10</p> <p>Executive Order 11593 – Protection and Enhancement of the Cultural Environment, 36 Fed. Reg. 8921 (1971)</p> <p>Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)</p>	<p>Compliance with the National Historic Preservation Act of 1966, as amended, requires identification of all NRHP-listed or NRHP-eligible properties in the project’s Area of Potential Effect (APE) and development of mitigation measures for those resources adversely affected in coordination with the Texas State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation.</p> <p>The State Historic Preservation Officer (SHPO) of the Texas Historical Commission is responsible for overseeing Section 106 consistency within the State of Texas. DESCO conducted a search of the Texas Archaeological Research Laboratories (TARL) and Texas Historical Commission’s online databases to determine locations of known cultural resources within the project area. No properties have been identified to date on the Refuge Complex that are listed on the NHRP. A total of 32 cultural resource sites have been recorded within the Texas Chenier Plain NWR Complex. Of these 32 sites, only 4 shell middens were recorded as having potential for eligibility in the NRHP due to the amount of material intact at the sites; however, the sites have not been submitted for consideration.</p> <p>The USFWS completed a formal project review under Section 106 of the National Historic Preservation Act from the State Historic Preservation Officer (SHPO), Texas Historical Commission (THC) during preparation of the Final Environmental Impact Statement, Comprehensive Conservation Plan, and Land Protection Plan (USFWS, 2008), which included prescribed fire as a management tool, among others. A copy of the SHPO’s review document, dated June 8, 2004, is contained in Appendix I of the EIS.</p> <p>Effects on cultural resources as a result of changes to the Prescribed Fire Program under the Proposed Action are expected to be similar to those analyzed in the EIS and reviewed by the THC.</p> <p>The USFWS also completed a Cultural Resource Review & Project Initiation Form for the Texas Chenier Plain Fire Update related to maintenance of fire lines on April 25, 2024, which is the action with the most potential for impacting cultural resources. USFWS determined that there are no known historic properties located within the area of potential effect and this project has low potential to impact historic properties.</p> <p>USFWS will contact/consult with the appropriate tribal representations with regard to potential impacts to cultural resources.</p>
<p>Fish & Wildlife</p> <p>Endangered Species Act of 1973, as amended, 16 U.S.C. 1531-1544; 36 CFR Part 13; 50 CFR Parts 10, 17, 23, 81, 217, 222, 225, 402, and 450</p> <p>Fish and Wildlife Act of 1956, 16 U.S.C. 742 a-m</p>	<p>The USFWS is currently operating and would continue to operate under an existing consultation/Biological Opinion (BO): Intra-Service Section 7 Biological Opinion on Refuge Complex Management Effects for the Eastern black rail (<i>Laterallus jamaicensis jamaicensis</i>), which covers prescribed fire and fire-line construction and maintenance well, regardless of whether the fire-line is in black rail habitat or not. The BO contains conservation measures to be implemented during these activities to minimize impacts to the eastern black rail. The USFWS acknowledges that requirements/restrictions/measures for protection of</p>

STATUTES, EXECUTIVE ORDERS, AND REGULATIONS	
<p>Migratory Bird Treaty Act, as amended, 16 U.S.C. 703-712; 50 CFR Parts 10, 12, 20, and 21</p> <p>Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)</p>	<p>EBR may change if the science changes, and the BO is likely to be revised on a 5-year basis as new information/science is considered. The USFWS prepared an Intra-Service Section 7 Biological Evaluation and is currently undergoing interagency consultation for other threatened and endangered species with potential for occurrence in the project area.</p> <p>The Fish and Wildlife Coordination Act directs Federal agencies to consult with USFWS, NMFS, and State agencies before authorizing alterations to water bodies, for any purpose, including navigation, and by any public or private agency under Federal permit or license. USFWS, NMFS, and TPWD are being provided copies of this Draft EA for review and comment.</p>
<p>Natural Resources</p> <p>Clean Air Act, as amended, 42 U.S.C. 7401-7671q; 40 CFR Parts 23, 50, 51, 52, 58, 60, 61, 82, and 93; 48 CFR Part 23</p> <p>Executive Order 13112 – Invasive Species, 64 Fed. Reg. 6183 (1999)</p>	<p>The Clean Air Act (CAA) contains provisions under the General Conformity Rule to ensure that actions taken by Federal agencies in air quality nonattainment and maintenance areas do not interfere with a state’s plans to meet national standards for air quality. Under the General Conformity Rule (the Rule), Federal agencies must work with State, Tribal and local governments in a nonattainment or maintenance areas to ensure that Federal actions conform to the air quality plans established in the applicable state or tribal implementation plan. The regulations codifying the Rule under 40 CFR Part 93, Subpart B, specify that no Federal agency shall engage in, support in any way or provide financial assistance for, license or permit, or approve any activity which does not conform to an applicable implementation plan.</p> <p>Because prescribed burning is conducted on the Refuge Complex under strict prescriptions which include implementing smoke management measures, impacts to local and regional air quality from the USFWS fire management program are expected to be minimal, short-term, and localized. Prescribed burning on the Refuge Complex reduces the potential for smoke impacts to air quality from unplanned wildland fires by effectively managing vegetative fuels.</p>
<p>Water Resources</p> <p>Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et seq.; 15 CFR Parts 923, 930, 933</p> <p>Federal Water Pollution Control Act of 1972 (commonly referred to as Clean Water Act), 33 U.S.C. 1251 et seq.; 33 CFR Parts 320-330; 40 CFR Parts 110, 112, 116, 117, 230-232, 323, and 328</p> <p>Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.; 33 CFR Parts 114, 115, 116, 321, 322, and 333</p> <p>Executive Order 11988 – Floodplain Management, 42 Fed. Reg. 26951 (1977)</p> <p>Executive Order 11990 – Protection of Wetlands, 42 Fed. Reg. 26961 (1977)</p>	<p>Submerged tracts of land owned by the State of Texas and administered by the Texas General Land Office (GLO) are present within the project area; however, the Proposed Action is not expected to adversely affect GLO lands/waters.</p> <p>The proposed action has been analyzed for compliance with Executive Order (EO) 11990, Protection of Wetlands and 11988, Floodplain Management. The project would help to preserve and enhance wetlands that offer flood protection to interior areas and, therefore, any impacts to floodplains as a result of the proposed action would be beneficial.</p> <p>The Clean Water Act (Section 404) and Rivers and Harbors Act (Section 10) afford protection of non-tidal and tidal waters of the United States. The Proposed Action would not result in dredge or fill of any waters of the United States, nor would it interfere with navigation; therefore, no permits are necessary under Section 404 or Section 10 of the Clean Water Act for its implementation.</p>