Environmental Assessment

Cattle Fever Tick Eradication on Laguna Atascosa and Lower Rio Grande Valley National Wildlife Refuges

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Lead Agency

U.S. Department of Agriculture
Animal and Plant Health Inspection Service

Cooperating Agency

U.S. Fish and Wildlife Service
National Wildlife Refuge System
Southwest Region

Table of Contents

1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION ALTERNATIVE

1.1 Introduction

The U.S. Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS) and U.S. Department of Interior, U.S. Fish and Wildlife Service (FWS) have prepared this environmental assessment (EA) to analyze management options for the eradication of cattle fever ticks (CFTs) found on Laguna Atascosa National Wildlife Refuge (LANWR) and Lower Rio Grande Valley National Wildlife Refuge (LRGVNWR). The proposed alternatives for eradication in this EA include: 1) continuation of current management, which we consider to be the No Action Alternative, and 2) conducting additional eradication activities on refuge property, which would include the use of ivermectin-treated corn in feeders and a study involving cattle grazing. These management actions would permit USDA-APHIS and Texas Animal Health Commission (TAHC) via Special Use Permits (SUPs) to eradicate CFTs on units of LANWR and LRGVNWR that fall within established quarantine areas.

The USDA-APHIS established a Cattle Fever Tick Eradication Program (CFTEP) in 1906 as a cooperative State-Federal cattle fever/babesiosis eradication effort. In this EA, USDA-APHIS and FWS analyze the potential impacts associated with treating white-tailed deer with ivermectin-treated corn and introducing treated cattle through an experimental grazing program to control CFTs on FWS lands. Through this EA, USDA-APHIS and FWS will provide sufficient evidence and analysis for determining whether there is potential for significant impact, thus requiring an environmental impact statement (EIS), or whether there is justification to prepare a finding of no significant impact (FONSI). The EA has been prepared in accordance with the National Environmental Policy Act of 1969 (Public Law [PL] 91 190), regulations of the Council on Environmental Quality 40 CFR 1508.9, USDA-APHIS implementing procedures (7 CFR pt. 372), and the National Wildlife Refuge Improvement Act of 1997, as amended (Public Law 105-57).

1.2 Action Area

LANWR and LRGVNWR are part of the South Texas Refuge Complex (STRC), which also includes Santa Ana National Wildlife Refuge. The scope of this EA will include all FWS lands that fall within an established quarantine area (permanent, temporary, or control purpose/buffer) on LANWR and LRGVNWR (see Figure 1).

LANWR lies along the Gulf of Mexico at the southern tip of Texas, along the northeastern edge of Cameron County and the southeastern edge of Willacy County. The 97,007-acre refuge consists of four main units: Laguna Atascosa Unit, Bahia Grande Unit, South Padre Island Unit, and Coastal Corridor Unit. LANWR is a unique blend of temperate, subtropical, coastal, and Chihuahuan desert habitats. Mexican plants and wildlife reach their northernmost limits here such as the endangered ocelot and jaguarundi, while migratory birds stop to rest and feed during the spring and fall. The refuge topography is typical of the Texas Coastal Plain, which is basically flat with a slope toward the Laguna Madre at about 17 inches per mile. The highest elevations at Laguna Atascosa occur on “lomas” (natural silty clay mounds), reaching heights from 20 to 36 feet, yet the majority of the refuge is less than 10 feet above mean sea level. The landscape of the refuge consists of an irregular pattern of meandering resacas, brushy lomas,

coastal salt prairie (grasslands), tidal flats, sand dunes, freshwater and estuarine wetlands, and impoundments.

The Lower Rio Grande Valley is not actually a "valley" but part of the Rio Grande's international delta. The delta was active roughly between the towns of La Joya and Port Mansfield in Texas, and San Fernando in Tamaulipas, Mexico. The LRGVNWR is located within the larger South Texas Plains physiographic area, an immense area often generalized as being comprised of rolling grasslands and oak or mesquite-dominated woodlands (Gould 1975, Scifres 1980, Scifres and Hamilton 1993). The LRGVNWR is located in the southern four-county area of Texas that includes Cameron, Hidalgo, Starr, and Willacy Counties. To the north, the refuge tracts are bounded by relic prairie and large ranches dominated by brushland in various degrees of succession. To the south, refuge tracts, many of which harbor endangered species, are adjacent to the Rio Grande.

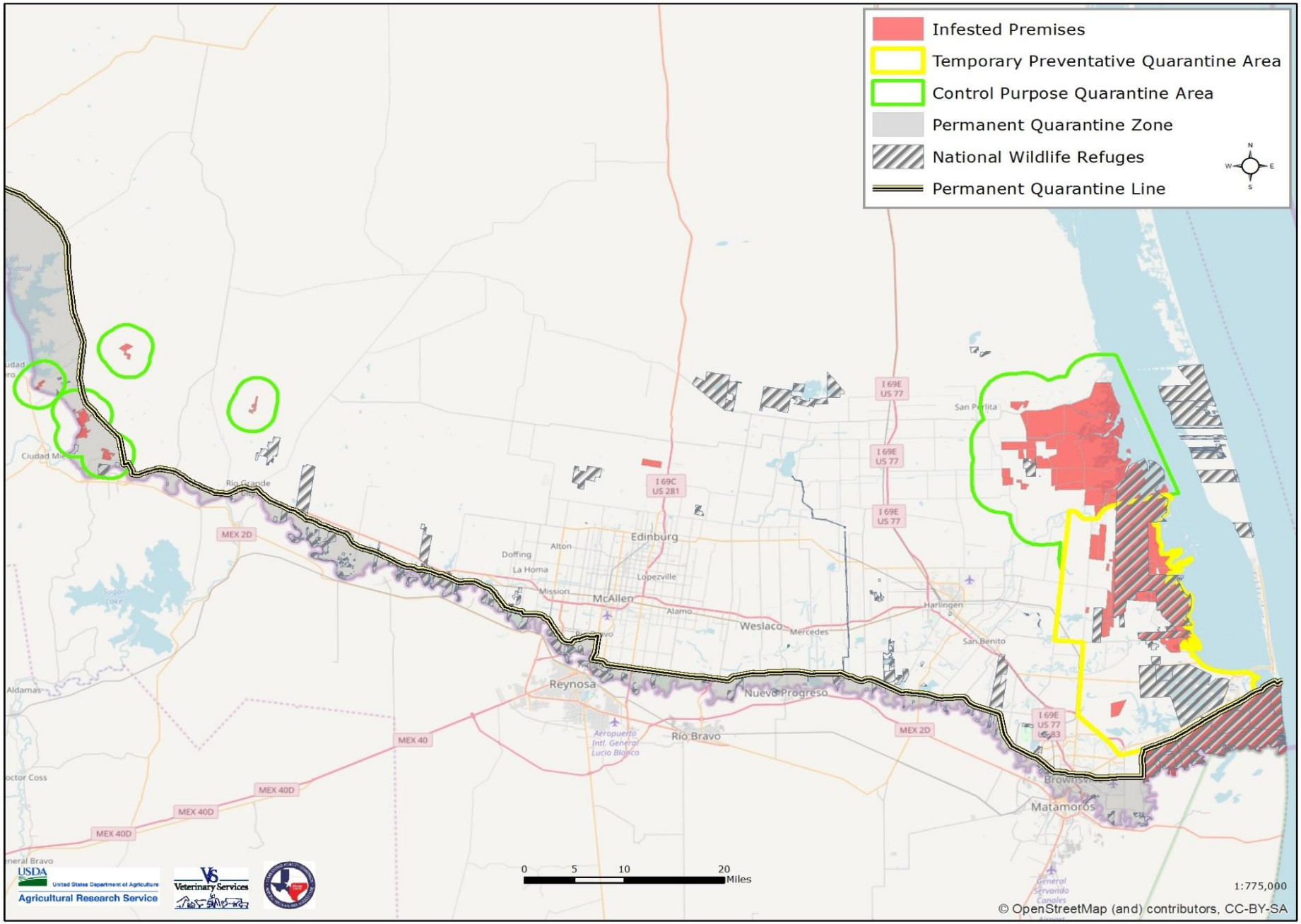

Figure 1. National wildlife refuges in South Texas and their proximity to an established cattle fever tick quarantine area.

1.3 Background

The CFT, known scientifically as *Rhipicephalus* (formerly *Boophilus*) *annulatus* and *R. microplus*, are uniquely capable of carrying and transmitting the protozoa, or microscopic parasites, *Babesia bovis* or *B. bigemina*. Without the presence of the CFT, there is no biological transmission of the Babesia organisms. Infected CFTs release the protozoa into the bloodstream of cattle as they feed. The Babesia organisms invade and destroy red blood cells ultimately resulting in an 80-90 percent mortality rate of susceptible naive cattle. The CFTs do not pose a human health or safety issue.

1.3.1 USDA-APHIS Efforts to Eradicate Cattle Fever Ticks

In the 1940s, USDA-APHIS eradicated CFTs in the United States and established a permanent quarantine zone that ranges from 200 yards to 10 miles wide along the Rio Grande River. This strip of land extends 500 miles, through eight South Texas counties, alongside the Rio Grande River from west at Devils River, east to the Gulf of Mexico. The purpose of the permanent quarantine zone is to rapidly respond to CFT incursions from Mexican cattle and ungulates that cross the Mexico-U.S. border. When these CFT incursions are detected in the permanent quarantine zone, they are quickly eliminated by USDA-APHIS to prevent the spread of CFTs to the interior of the state and the rest of the United States.

There is additional background information on the CFTEP in the "Cattle Fever Tick Eradication Program - Use of Ivermectin Corn, Final Environmental Assessment - January 2017", which is incorporated by reference (USDA, 2017) and referred to as the USDA-APHIS Ivermectin Corn EA. This document is available online at the following website: https://www.aphis.usda.gov/animal_health/downloads/animal_diseases/ivermectin-corn.pdf.

Despite a permanent quarantine zone on the border, CFTs have occasionally expanded, to include the current concern (Figure 2). The current CFT infestation expansion is due to the following factors: changes in land use, wet-dry climatic cycles providing favorable conditions for CFTs, expansion of native and exotic game species in South Texas (white-tailed deer, exotic nilgai antelope, red deer, etc.), that can serve as hosts and reservoirs of CFTs, lack of a CFT control program in Mexico, and difficulty tracking CFT populations. In 2014, USDA-APHIS and TAHC placed 223,000 acres in Cameron County, Texas under blanket quarantine due to detection of CFTs. This temporary quarantine and control purpose/buffer area extends north of the permanent quarantine line and contains the majority of LANWR, as well as portions of LRGVNWR (see Figure 1). For the control purpose area, a buffer is used to extend control from infested premises and implement eradication strategies. A two-mile buffer is used when there are only white-tailed deer are present and a three-mile buffer is used when both nilgai and white-tailed deer are present. These buffers are developed based on the presumed home range of white-tailed deer and nilgai and the likelihood these two wildlife species will carry CFTs to other areas. In addition to LANWR, the CFT was also found on many nearby private premises in both Cameron and Willacy Counties. Appendix A provides the October 2017 CFT situation report from TAHC. Multiple outbreaks are occurring in South Texas including another large outbreak near Laredo, Texas.

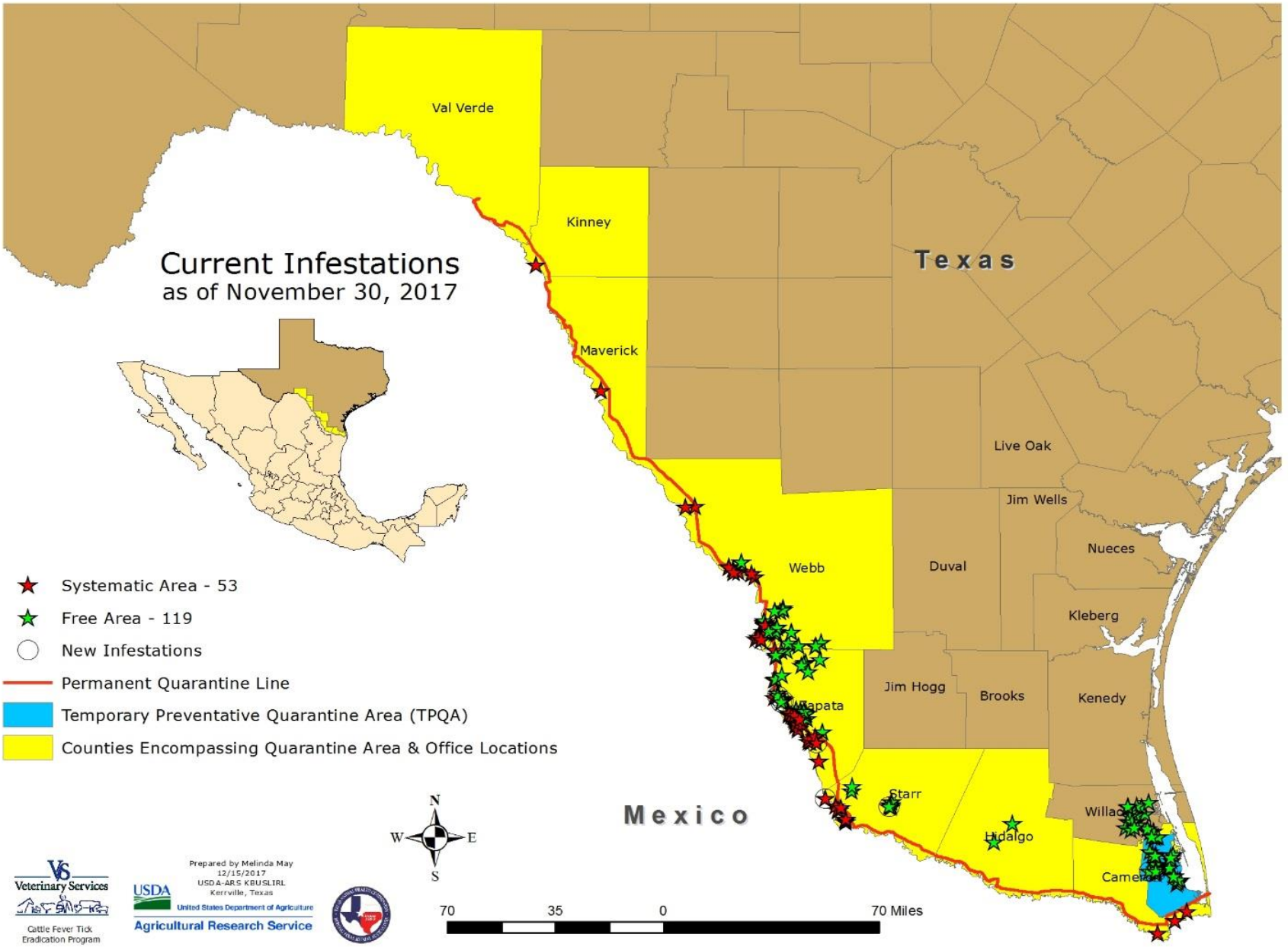
Current Infestations
as of November 30, 2017
Val Verde
Kinney
Maverick
Texas
Live Oak
Jim Wells
Nueces
Duval
Webb
Kleberg
Jim Hogg
Brooks
Kenedy
Zapata
Starr
Hidalgo
Willacy
Cameron
Mexico
Systematic Area - 53
Free Area - 119
New Infestations
Permanent Quarantine Line
Temporary Preventative Quarantine Area (TPQA)
Counties Encompassing Quarantine Area & Office Locations
N
W
E
S
70
35
0
70 Miles
Veterinary Services
Cattle Fever Tick Eradication Program
USDA
United States Department of Agriculture
Agricultural Research Service
Prepared by Melinda May
12/15/2017
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Figure 2. Cattle fever tick infestations in the systematic area (permanent tick quarantine zone) and free area (outside of permanent tick quarantine zone) areas as of October 31, 2017 in South Texas.

1.3.2 FWS Efforts to Control CFT

The FWS is committed to management of lands within STRC in a manner that advances the purposes for which these refuges were established and is supportive of efforts to eradicate the CFT. The FWS has been working with USDA-APHIS and TAHC to control CFTs. Efforts to date are outlined below.

Prescribed Fire

The STRC will continue to use prescribed fire in fire-dependent communities to control CFTs. Burning the habitat not only kills CFTs but also removes the vegetation that harbors CFTs, reducing the likelihood of CFTs attaching to animals in burned areas. In 2016, STRC burned approximately 6,000 acres at LANWR and approximately 20,000 acres in 2017 to reduce CFTs and their habitat. The STRC will continue to maximize the acreage that could be logistically and safely burned to address infested areas.

Nilgai reduction

Nilgai are exotic antelope introduced by private ranchers in South Texas and continue to increase regionally. Non-native nilgai are already managed on refuges as invasive species because they compete with native herbivores and create trails through dense/sensitive habitat that could have lasting negative impacts to the ocelot. Due to CFT infestation rates in the area and the lack of an effective treatment for CFTs on nilgai, the USDA-APHIS/TAHC recommended that all property owners in South Texas reduce nilgai populations to control the spread of CFTs. Nilgai have the ability to travel 30-40 miles per day, especially females, and this is one of the main factors for the spread of CFTs in Cameron and Willacy Counties. In the last two years alone, over 550 nilgai were harvested from LANWR and LRGVNWR. The FWS will continue to support USDA-APHIS /TAHC through harvests of nilgai on STRC lands.

There is additional background information on nilgai reduction efforts by the CFTEP in the "Population Reduction of Nilgai in the Boca Chica Beach, Bahia Grande, and Brownsville Navigation District Areas, Cameron County, Texas; Environmental Assessment", which is incorporated by reference (USDA, 2014). This document is available online at the following website:
https://content.govdelivery.com/attachments/USDAAPHIS/2014/07/11/file_attachments/306647/DraftNilgaiEAComplete.pdf.

White-tailed deer hunting regulations and opportunities

The STRC has over 10 years of spotlight survey data that estimate the population of white-tailed deer at LANWR average approximately 1 deer per 110 acres, with a wide range in densities dependent upon habitat. In 2015, the FWS implemented changes to hunter check-station procedures to include CFT inspection of all harvested animals. In 2016, LANWR increased their white-tailed deer bag limit from 2 to 5 deer (the maximum, per State hunting regulations). This increase in potential harvest of white-tailed deer was done solely to help eradicate the CFT. Implementation of additional emergency white-tailed deer hunts on STRC tracts may be initiated as soon as State seasons allow. In addition to regular hunts, emergency action hunts will focus on LANWR tracts where a hunt program does not currently exist. An emergency firearm public hunt is proposed for Unit 7 of LANWR (a previously non-hunted unit) and will include white-tailed deer and nilgai.

1.4 Purpose and Need for the Proposed Action

As further described in the USDA-APHIS Ivermectin Corn EA, since 1968, there has been increasing concern about the role of white-tailed deer in CFT outbreaks. Numerous studies have shown that white-tailed deer are suitable hosts and reservoirs for CFTs (Graham et al., 1972, in Pound et al., 2010; George, 1990). Failure to control ticks on wildlife hosts, particularly white-tailed deer and nilgai, compromises efforts to eradicate ticks on livestock.

USDA-APHIS and TAHC find CFT eradication particularly challenging in Cameron and Willacy Counties due to their populations of white-tailed deer and nilgai. It has been hypothesized that where cattle and deer comingle, regular treatment of cattle may be sufficient to eradicate CFTs while negating the need for elimination of deer (George 1990; reviewed in Pérez de León et al. 2012). Therefore, grazing cattle under treatment on infested premises has historically been employed for 'mopping' up ticks (Gray et al., 1979; Kistner and Hayes, 1970).

Studies also show that feeding corn treated with ivermectin to white-tailed deer could be an effective tool in minimizing the movement and maintenance of CFTs (Pound et al., 1996; Miller et al., 1989). In January 2017, the FWS issued a Biological Opinion (BO) for the use of ivermectin-treated corn in deer feeders on private property, and USDA-APHIS published its Ivermectin Corn EA and Finding of No Significant Impact. The current proposed action extends the use of ivermectin-treated corn to refuge lands.

Failure to control CFTs on wildlife hosts and in pastures greatly compromises efforts to eradicate CFTs on livestock and poses a substantial threat of infestation and disease establishment throughout South Texas. The permitting of USDA-APHIS/TAHC by FWS to conduct these eradication strategies (placement of ivermectin-treated corn and grazing cattle under systematic treatment) is consistent with CFTEP program goals and its adaptive management strategy to eradicate CFTs within a quarantine area.

1.5 Decision to be Made

This EA is an evaluation of the environmental impacts of the CFT treatment alternatives on LANWR and LRGVNWR. It provides information to help USDA-APHIS and FWS fully consider the possible impacts associated with the proposed action and no action alternatives. Using the analysis in this EA, the agencies will decide whether there would be any significant effects on the human environment associated with the preferred alternative that would require the preparation of an environmental impact statement.

2.0 ALTERNATIVES

2.1 Alternative A – Continue current CFT Treatment Modalities on LANWR and LRGVNWR (No Action Alternative)

Under this alternative, USDA-APHIS and FWS would continue CFT eradication efforts to date on LANWR and LRGVNWR (modifications to/expansions of white-tailed deer/nilgai hunting opportunities, nilgai reductions, prescribed burning, and other USDA-APHIS/TAHC CFTEP activities including deployment of ivermectin-treated corn on non-refuge lands). STRC would

not issue the SUPs to treat deer with ivermectin-treated corn and experimentally graze cattle on STRC lands.

2.2 Alternative B –Implement Additional CFT Eradication Strategies (Proposed Action)

Under this alternative, USDA-APHIS and STRC would continue prescribed fire, nilgai reductions, increased hunting opportunities for white-tailed deer and nilgai on the refuges, and other CFTEP activities including the use of ivermectin-treated corn on non-refuge lands. Additionally, USDA-APHIS/TAHC would treat white-tailed deer and conduct experimental cattle grazing on LANWR and LRGVNWR lands that fall within established quarantine areas. These management activities would be administered through SUPs. STRC would evaluate the SUPs for a 5-year period, on a case-by-case basis. In addition, STRC would review the SUPs on an annual basis to determine if any changes are necessary.

Ivermectin-treated corn for white-tailed deer treatment

Through issuance of a SUP, the FWS will permit USDA-APHIS/TAHC to use ivermectin (Ivomec® or Ivomax® pour-on) for cattle formulation mixed with whole kernel corn. All mixing will be completed off-refuge and any spillage will need to be cleaned up per USDA-APHIS standard clean up protocol. Ivomec® pour-on for cattle is sold by Merial, Inc., and Ivomax® pour-on for cattle is a generic product (FDA ANADA 200-272). Dosing will be administered as outlined in the USDA-APHIS Ivermectin Corn EA, which is 200 milliliters (ml) of the formulation containing 5 milligrams (mg) ivermectin/ml pumped into 100 pounds of clean corn to produce 10 mg of ivermectin active ingredient per pound of corn. The daily intake dose of the deer is approximately 0.22 mg/kilogram (kg) assuming a 100 pound white-tailed deer eats 1 pound of corn per day. A previous study concluded that a feeding rate of 0.22 mg/kg should produce maximum blood serum levels of approximately 30 parts per billion (ppb) (Pound et al., 1996). The target concentration of 30 ppb assures a high degree of efficacy even in those deer that may consume as little as one-third of the targeted dosage. Serum levels of just 10 ppb (one-third of the dosage) should produce 100 percent efficacy against ticks attempting to feed on treated animals (Pound et al., 1996; Nolan et al., 1985; Miller et al., 1989).

The treated corn is placed in gravity flow feeding stations from February through July (removed 60 days before hunting season to comply with U.S. Food and Drug Administration standards) to control CFTs in deer populations (nilgai are not consistently attracted to the feeders, thus, are not treated). The gravity flow feeder is a commercially made plastic bin device with three or four feed tubes below the bin, and a lid. Each feed site will include one gravity flow feeder that has a holding capacity of approximately 300-350 pounds of corn and serviced weekly. There will be a minimum 30-foot diameter fenced perimeter barrier, which is 3 feet tall, around feeders, and feeders will be enclosed with welded wire panels and silt fencing at ground level to exclude non-target animals. Game cameras will be strategically placed and rotated annually to observe 50 percent of the feeders on refuges from February-April over the 5-year SUP period, prioritizing feeders close to wetland and thornscrub habitat, to monitor and evaluate the utilization by white-tailed deer, and the occurrence of non-target animal exposure. A 50-meter buffer around wetlands and bodies of water bodies will be implemented as an additional precaution for refuge lands.

Figure 3. Photo of ivermectin-treated corn feeder used by USDA-APHIS/TAHC to treat white-tailed deer

The number of feeder sites will be determined based on number and density of deer (1 feeder per 20–30 deer to minimize excessive competition and social dominance), and density of feeders per area (deer do not have to travel more than ¼- to ½-mile to access feed = 1 per 125 acres to 1 per 500 acres). Existing deer surveys and remote sensing data will be used to identify placement and number of feeders on STRC lands. Selected feeder sites will be relatively flat and level. Feeders will be accessible from refuge roads, any off-road feeder locations will need to be accessed by utility task vehicle (UTV) or all-terrain vehicle (ATV). In general, implementation will be conducted consistent with measures outlined in the BO issued for the USDA-APHIS CFTEP ivermectin-treated corn project (USFWS 2017). Locations and placement of feeders will be closely coordinated with the refuge manager.

Experimental Cattle Grazing

Under this alternative, the STRC will issue SUPs to permit USDA-APHIS/TAHC to conduct an experimental grazing program on STRC lands within the quarantine area to test efficacy of CFT eradication techniques on STRC lands. Eradication techniques on FWS lands will be evaluated by observing presence or absence of CFTs. Infestation rates will be recorded by the type of

eradication treatment strategy to determine trends. These trends will be used to assess the effectiveness of any one or combination of CFT treatments on FWS lands. The CFT presence/absence data will be collected for areas under the following conditions:

1. Control (areas where there are not CFT eradication actions)
2. Nilgai population reduction
3. Cattle grazing under systematic treatment (as defined below)
4. Ivermectin-treated corn feeding
5. Combination of 2 & 3
6. Combination of 2 & 4
7. Combination of 3 & 4
8. Combination of 2, 3, & 4

Laguna Atascosa National Wildlife Refuge

LANWR is comprised of several different ecological sites. These sites vary from clays, clay loams up to saline areas. The herbaceous vegetation and production is very diverse and varies throughout both refuges. Low producing areas are dominated by bushy sea oxeye while the more productive areas are dominated by gulf cordgrass (saline areas) and buffelgrass in some areas. Woody vegetation is just as diverse and varies from mesquite/huisache thickets to dense communities of blackbrush/cenizo/pricklyash thickets. Grazeable acres (areas where livestock have access to the herbaceous vegetation) vary throughout the refuge. Some areas are open with little or no brush whereas other areas are extremely dense and access of cattle is non-existent. Herbaceous production in these dense areas is limited as well. In February 2017, USDA-Natural Resources Conservation Service (NRCS) completed a Grazing/Production Report to determine forage production and possible recommended stocking rates for three units on LANWR - Unit 5 (3,595 acres), Unit 8 (5,600 acres), and Boswell-Jenkins (1,700 acres). Based on the NRCS Grazing/Production Report, production on the refuge varies from less than 100 pounds per acre up to 4,000 pounds per acre in some areas. Total grazeable area for Unit 5 and Unit 8 is approximately 2,337 acres and the recommended stocking rate is 25 animal units for both units combined. The majority of Boswell-Jenkins is grazeable, but the recommended stocking rate was also 25 animal units. The report provides recommendations for fencing, livestock rotation, and use of prescribed fire too.

Lower Rio Grande Valley National Wildlife Refuge

The 2002 Grazing Management Plan for LRGVNWR describes how exotic grasses threaten Refuge resources, and how an experimental grazing program can be used to achieve refuge objectives by reducing these threats. There are two primary reasons exotic grasses pose a management problem at the LRGV: 1) they increase the potential for ignition and spread of fires on refuge properties, and 2) they impede the establishment and recovery of native brushland vegetation. Permitting USDA-APHIS/TAHC to conduct an experimental grazing program for CFT control on LRGVNWR would be in grazeable grasslands, particularly on Willamar and Boca Chica tracts.

Though specific areas have not yet been identified, along with the criteria outlined on the next page, range conditions, substrate, feasibility of maintaining fencing, availability of cattle and a cattle operator, and presence or absence of reliable water sources on a particular site may all

contribute to ultimately determining where experimental cattle grazing is deployed. The experimental grazing program would be continuously monitored by FWS staff with recommendations from USDA-NRCS and adjustments made based on forage and water conditions. Stocking rates and grazing schedules will be flexible and adjusted based on an evaluation and recommendation from NRCS. The STRC will use an adaptive management approach for the experimental cattle grazing program and retains the right to remove or adjust stocking rates of cattle if there is resource damage or conflicts with other operations of the refuge.

Experimental grazing on quarantined areas within LANWR and LRGVNWR will be evaluated and permitted on a case-by-case basis as determined by the refuge manager based on the following criteria:

- Stocking rates have been determined through a USDA-NRCS Grazing/Production Report
- Necessary buffer zones and avoidance measures have been identified to protect areas to include thornscrub habitat, wetlands, threatened and endangered species considerations, cooperative farm fields, thornscrub restoration sites, core ocelot monitoring sites, high public use and administrative areas
- Fencing needs have been identified (wildlife-friendly fencing (safe for mammals and ground-nesting birds) for all interior areas; more durable exterior/perimeter fencing may be considered to reduce need for frequent maintenance)
- Water sources/needs have been identified (water for cattle operations must be provided by using a water line from a private well from an adjacent landowner, having water trucked into the refuge, or using an existing irrigation canal)
- Cattle grazed must be gentle steers and/or heifers (the goal is to graze the type of cattle that would be the easiest to gather)

Grazing cattle under systematic treatment, as outlined below, on infested pastures where CFTs are present is an important tool in an integrated approach in the successful eradication of CFTs. The systematic treatment for the experimental grazing program is outlined below.

<u>Cattle Treatment Period</u>:

A. Cattle will be maintained under direct systematic treatment using doramectin injectable while grazing for up to 9 months.
B. Cattle will be gathered every 21-28 days, scratch inspected for CFTs, then injected with doramectin.
C. After the first scratch inspection that is free of CFTs, the systematic treatment period will continue for up to 9 months assuming no CFTs are found on future cattle or wildlife inspections.
D. If CFTs are found during the subsequent scratch inspections, the systematic treatment period will start over.

<u>Cattle Sentinel Period:</u>

A. After the completion of the systematic treatment period listed above, cattle will be grazed for up to 9 months under no treatment.

B. The cattle will be scratch inspected at least every 90 days to assess the risk of CFTs on the pasture.
C. If during this sentinel period the cattle or wildlife are determined to be infested with CFTs, the systematic treatment period will start over.
D. At the conclusion of required sentinel period, USDA-APHIS/TAHC will remove all livestock from the property within 30 days.

Additionally, USDA-APHIS/TAHC may provide range cubes (maximum of 4 pounds cubes/head/week) as a tool to gather cattle. Range cubes are a supplemental feed that provides protein, energy, vitamins and minerals to cattle and are often used to entice cattle to follow, especially into corrals or pens. If this method is not successful, then horses may be used to gather cattle. If these two methods are unsuccessful, with approval from FWS staff, a helicopter may be used. A portable corral system provided by USDA-APHIS/TAHC will be used in the gathering and processing of the cattle. If a corral is placed on the refuge, placement must be approved by the refuge manager to ensure minimal habitat damage and disturbance.

Refuge units do not have consistent and reliable fresh water sources, especially during drought conditions. Water for experimental cattle operations on the refuges must be provided by a permittee using any of three methods: 1) using a water line from a private well from an adjacent landowner; 2) truck water into the property; and 3) use an existing irrigation canal. Each cistern must be separated by at least one mile (straight-line distance). Placement of all water infrastructures must be approved by the refuge manager and should be within 100 feet of a designated refuge road.

Permethrin will be used to treat any exposed equipment (i.e. panels and trailers that move on and off the refuge). Equipment disinfection will take place off-refuge or in a mutually agreeable location on the refuge where run-off can be controlled or prevented. Alternative options may be evaluated and considered such as pressurized water, steam, or other products that are acceptable for cleaning.

3.0 AFFECTED ENVIRONMENT

This section describes the environment affected by the alternatives in Section 2. Aspects of the affected environment here focus on the major issues. Resources unaffected, or concerns with activities outside the refuges, are outside this EA's scope.

3.1 Physical Environment

3.1.1 Air Quality

Air pollution levels here are similar to or lower than other urban and rural areas in Texas, including air pollution coming from across the border in Mexico (EPA, 1999). Air quality data from the Texas Commission on Environmental Quality website show the Brownsville-Harlingen region as ranging from "good" to "moderate" AQI (Air Quality Index) ratings from 2010-2017. This is due in large part to the prevailing southeasterly Gulf breeze. The air quality at or near the LANWR is therefore not considered to have serious air quality issues due to its proximity to the Gulf of Mexico and the Lower Laguna Madre.

Willacy County is designated as an attainment area for National Ambient Air Quality Standards by the U.S. Environmental Protection Agency. Land use over much of the county is agricultural and ranchland. Attainment areas do not exceed any threshold for federally designated criteria air pollutants, CO, SO_2, O_3, NOx, PM_{10}, and Pb.

3.1.2 Soils / Geology

The soils within the project area consist of the Laredo-Lomalta association and occur mainly in and adjacent to the LANWR (Williams et al. 1977). About 4% of Cameron County consists of this soil type. The Laredo-Lomalta soil association consists of areas of gently sloping to level, saline soils at an elevation of about 1 to 5 feet above the slightly depressional Lomalta soils. Lomalta soils are associated with the resascas or old meander channels of the Rio Grande that occur within the project area (Williams et al. 1977). More specifically, the project area is comprised of Sejita silty clay loam on the lower elevations and Laredo silty clay and Lomalta clay that support brush growth on higher elevations.

3.2 Vegetative Communities/Habitat

3.2.1 Laguna Atascosa NWR

The refuge contains 450 documented plant species across a diversity of plant communities, including upland Tamaulipan thornscrub brushland, coastal prairie, sand and clay dunes, tidal flats, and fresh and saline wetlands. The lands surrounding Bayside Wildlife Drive are generally flat, sloping down to the Lower Laguna Madre. Vegetation communities within and near the project area include uplands within the road shoulder, brushlands growing on silty clay dunes known locally as lomas, coastal prairie dominated by expanses of Gulf Cordgrass or upland grasslands, and on lower elevations, salt flats mixed with halophytic vegetation assemblages known as “salt prairie.”

Uplands within the road shoulder itself are typically dominated by the invasive species Kleberg bluestem (*Dichanthium annulatum*) and buffelgrass (*Cenchrus ciliaris*). However, Tamaulipan thornscrub brushlands are dominated by a shrub and tree community with 30 or more species of woody plants. These areas have a different plant community than surrounding areas because of the higher elevation and lower salinity. Common plant species in these brushlands include mesquite (*Prosopis glandulosa*), Texas ebony (*Ebenopsis ebano*), huisache (*Acacia farnesiana*), Spanish dagger (*Yucca treculeana*), cenizo (*Leucophyllum frutescens*), lime prickly ash (*Zanthoxylum fagara*), spiny hackberry (*Celtis pallida*), Berlandier fiddlewood (*Citharexylum berlandieri*), brasil (*Condalia hookeri*), tenaza (*Harvardia pallens*), and many others. The vegetation in these areas is often thorny and nearly impenetrable making ideal ocelot habitat. Slightly lower elevations may include plants such as tornillo (*Prosopisreptans var. cinerascens*), Christmas tree cactus (*Cylindropuntia leptocaulis*), and Texas prickly pear (*Opuntia engelmannii var. lindheimer*).

3.2.2 Bahia Grande Tract of Laguna Atascosa National Wildlife Refuge

The Bahia Grande Unit is approximately 23,000 acres of mostly coastal prairie and estuarine wetlands in varying stages of restoration. The wetland restoration is considered one of the largest in the United States. The coastal prairie habitat is also in the process of being restored and is one of the best examples of near-pristine coastal prairie in South Texas. This Unit is being considered for numerous wetland restoration projects and, therefore, human activity could be high on this

property. In addition, the FWS is currently undergoing the writing of a visitor services plan that would allow the public to hike and bike on the Unit. Eventually, the FWS has plans to allow hunting and fishing on the property.

3.2.3 Boca Chica Tract of Lower Rio Grande Valley National Wildlife Refuge

The Boca Chica Tract of the LRGVNWR is one of the last undeveloped, pristine coastal areas in Texas. About 4,452 ha (11,000 ac) in size, it encompasses wind-tidal flats, mangrove forests, oyster beds, bays, beaches, dunes, including more than 3,237 ha (8,000 ac) of highly productive wetlands near the mouth of the Rio Grande (Turner 1988). Boca Chica Beach is relatively narrow, from as little as 10–100 m wide, and extending for about 12 km from the mouth of the Rio Grande to the South Jetties of the Brazos Santiago Pass. Morton *et al.* (1983) noted this segment of beach is under threat of shoreline erosion due to lack of sand deposition from the Rio Grande due to construction of dams along its course. More inland from the beach and wind-tidal flats are brushy-covered clay "lomas" or hillocks containing dense growths of Tamaulipan thornscrub or "chaparral" (Clover 1937). Lomas are surrounded by wind-tidal flats and halophytic plant associations known locally as "salt prairie." Dune hillocks or lomas themselves are quite rare (only found elsewhere in Russia, Australia, and Africa) and were formed from silt deposited by the Rio Grande shaped by prevailing southeasterly winds over time (Richard 2005).

3.2.4 Willamar Tract of Lower Rio Grande Valley National Wildlife Refuge

The main soil types found on the Willamar tract are Willamar fine sandy loam, Raymondville clay loam, and Lyford sandy clay loam. The Willamar Series soils are very high in salinity content and retain water very well. This soil often provides prime locations for wetlands. The water in these wetlands is high in sodium content and is prime habitat for wading birds and other animals that can withstand the salt. This soil is only fair for growing grasses or herbaceous plants, again because of the sodium content. The Lyford Series soils are well drained loamy soils. This soil is good for growing grasses and herbaceous plants. It also provides prime habitat for openland and rangeland wildlife. The Raymondville Series are well drained clayey soils. This soil is good for growing grasses, but only fair for growing herbaceous plants. It is also good for openland wildlife, but only fair for rangeland.

The Willamar tract is mainly a mesquite (*Prosopis qlandulosa*) /huisache (*Acacia smallii*) savannah. Much of what grows on the tract must be able to withstand the periodic flooding that occurs with heavy rainfall. Wetlands occur on the northeast corner and many of the ditches also retain water. Many of the wetland areas provide sites for water lilies (*Nymphaea odorata*) and other water loving plants. There are also many open fields towards the northeast corner that are covered in Sea Ox-Eye (*Borrichia frutescens*).

3.3 Wildlife

3.3.1 Laguna Atascosa National Wildlife Refuge

The diverse coastal prairies, brushy lomas, and wetlands at the refuge provide habitat to a high diversity of fish and wildlife species, as well as provide important wintering habitat for many migratory shorebirds. The refuge provides habitat for approximately 415 species of migratory and residential birds, approximately 45 types of mammals, approximately 44 species of reptiles and amphibians, and approximately 40 fish species (USFWS, 2010).

Common bird species within the refuge include the northern bobwhite (*Colinus virginianus*), pied-billed grebe *(Podilymbus podiceps*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), white-eyed vireo (*Vireo griseus*), green jay (*Cyanocorax yncas*), black-crested titmouse (*Baeolophus atricristatus*), eastern meadowlark (*Sturnella magna*), northern cardinal (*Cardinalis cardinalis*), chachalaca (*Ortalis vetula*), great kiskadee (*Pitangus sulpheratus*), and many others (Service, 2013). At least 95 nesting bird species have been recorded at the refuge. Located on the southern end of the Central Flyway, the refuge is a major stopover point on the lower Texas coast for migrating waterfowl going to and from Mexico. Peak use occurs in November when more than 250,000 ducks typically show up on the refuge, with thousands more in the nearby Lower Laguna Madre. It is estimated that 80% of the North American population of redhead ducks winter at LANWR, earning the refuge the title of "Redhead Capital, USA". The refuge is also a vital stopover for migrating neotropical songbirds. Painted buntings (*Passerina ciris*), Bullock's oriole (*Icterus bullockii*), and various warbler and hummingbird species all depend on the refuge during their migrations. Often, when many of the songbirds are migrating north, an occasional cold front moves in and causes the birds to "fallout." In need of shelter from strong winds and cold weather, the birds remain at the refuge until they can regain their strength and continue their long journey.

Resident mammal species typically found at the refuge include white-tailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), javelina (*Pecari tajacu*), feral hogs (*Sus scrofa*), gray fox (*Urocyon cinereoargenteus*), long-tailed weasel (*Mustela frenata*), and Mexican free-tailed bats (*Tadarida brasiliensis*).

Reptiles occurring on the refuge include the Texas tortoise (*Gopherus berlandieri*), six-lined racerunner lizard (*Cnemidophorus sexlineatus*), bullsnake (*Pituophis catenifer sayi*), and red-eared slider turtles (*Trachemys scripta elegans*). The refuge is also home to many species of invertebrates, including the blue metalmark (*Lasaia sula*), a species that reaches its northern limits in South Texas.

3.3.2 Boca Chica Tract of Lower Rio Grande Valley National Wildlife Refuge

Approximately, 344 wildlife species have been documented on or near Boca Chica Tract including 184 species of birds, 14 species of mollusks, 23 species of crab and shrimp, 61 species of fish, 40 species of reptiles and amphibians, and 22 species of mammals (Chaney and Pons 1987). Wind-tidal flats of the Boca Chica Tract are important migration stopover sites for peregrine falcons, *Falco peregrinus* (Maechtle 1987). The Boca Chica Tract also supports the highest concentrations of breeding snowy plovers, *Charadrius alexandrinus*, and Wilson's plovers, *Charadrius wilsonia*, in the Lower Laguna Madre Region of Texas (Zdravkovic 2005).

3.3.3 Willamar Tract of Lower Rio Grande Valley National Wildlife Refuge

The coastal prairie pothole provides food and a dense cover for deer and other mammals. The thick brush that also occurs on the tract provides many excellent nesting sites for birds. There are many types of birds, several wetland species and other wading birds. The natural wetland areas also provide habitat for many reptiles and amphibians. In July 1992, a Mexican Milksnake (*Lampropeltis triangulum*) was recorded, the first ever recorded in Willacy county. Sheep Frogs, (*Hypopachus variolosus*) have also been recorded in the wetlands in the northeast corner.

3.4 Threatened & Endangered Species and other Special Status Species

Refuges protect, manage for, and provide important habitat for federally-listed, candidate, and proposed species. Federally-listed species or other special status species that may occur within the project area are the northern aplomado falcon, whooping crane, Gulf Coast jaguarondi, and ocelot.

Northern aplomado falcons are year-round residents of the Lower Rio Grande Valley of Texas (Valley) and are known to nest on and near the refuge (Service 2013). Large scale reintroductions of northern aplomado falcons began on the refuge in 1993 as part of the recovery effort. The refuge's salt prairie, savanna grasslands, and marshes provide some of the best aplomado falcon habitat. Generally, this species is found in flat, open habitats containing prominent woody vegetation such as yuccas and mesquite trees.

Cameron County is known to occasionally have a single whooping crane appear within the SUP area. A single whooping crane appeared a few miles west of LANWR on November 2015, reported by Rio Grande birders and was later confirmed by a bird expert. This is the second whooping crane that has appeared in the Rio Grande Valley in the last several years.

Wintering surveys have documented extensive whooping crane use of similar corn feeders on private lands throughout wintering whooping crane range. Additionally, whole kernel corn has been effectively used to bait and trap whooping cranes at the Aransas National Wildlife Refuge for research purposes, so the whooping cranes are accustomed to eating corn. Therefore, there is some potential for whooping cranes to feed on corn feeders, but the chance of a whooping crane appearing in Cameron or Willacy County is low.

The Gulf Coast jaguarundi is thought to be extirpated from South Texas. No reliable sightings have been made in recent years. Although jaguarundi habitat is similar to that for ocelot, jaguarundi are thought to be tolerant of a wider range of habitats. For example, sightings and information from Mexico indicate that jaguarundis may frequent open areas such as grasslands and pastures more commonly than ocelots (Source: TPWD). This species prefers dense riparian habitat along the Rio Grande and the "resaca" systems in the Valley. Although jaguarundis are more active during the day than ocelots, the last known sighting of one occurred at the Sabal Palm Grove Wildlife Sanctuary in southern Cameron County in 1989 (C. Perez pers. Obs.).

The ocelot is a small striped cat that historically ranged from southern Texas to Arkansas and Louisiana in the United States, but is now restricted to a few populations in South Texas and southern Arizona. Only about 80 or fewer of these small cats are estimated to remain in the United States, which includes a population of about 15 at the refuge. In the Valley, typical ocelot habitat consists of dense brushlands composed of mixed brush species such as spiny hackberry, brasil, lotebush (*Zizyphus obtusifolia*), amargosa (*Castela erecta*), whitebrush (*Aloysia gratissima*), catclaw acacia (*Acacia greggii*), blackbrush (*Acacia rigidula*), guayacan (*Guaiacum angustifolium*), and cenizo (*Leucophyllum frutescens*) (Source: TPWD). Interspersed trees such as mesquite (*Prosopis sp.*), live oak (*Quercus virginiana*), Texas ebony (*Ebenopsis ebano*), and hackberry (*Celtis sp.*) may also occur in ocelot habitat. Optimal ocelot habitat is described as having at least 95% canopy cover of shrubs, whereas marginal habitat has 75-95% canopy cover. Ocelots are typically most active at night and rarely leave the cover of dense brush. Tewes

(1986) found that core areas of ocelot home ranges contained more thornscrub habitat than peripheral areas of their home ranges on the refuge. However, ocelots can and do use narrow strips of shrubs or forests for travel and dispersal (Ludlow and Sunquist, 1987, Caso, 1994, Tewes et al., 1995). Such corridors provide critical landscape connectivity so they are important aspects of ocelot conservation (Tewes et al., 1995, Tewes and Blanton, 1998).

Currently, only about 1% of the South Texas area supports optimal habitat (Source: TPWD). Most of this habitat occurs in scattered patches probably too small to support viable populations of ocelots. Although habitat loss is the single greatest long term and ongoing threat to ocelots, a conservative estimate attributes 50% of known ocelot mortalities to vehicle collisions. Ocelots often must travel significant distances and cross dangerous roads in search of food, shelter, and mates.

3.5 Human Environment

3.5.1 Cultural Resources

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.), and its implementing regulations found at 36 CFR 800 require all federal agencies to consider the effects of federal actions on cultural properties eligible for or listed in the National Register of Historic Places.

Laguna Atascosa National Wildlife Refuge

Known archaeological, cultural, and historical resources at LANWR are described in the Comprehensive Conservation Plan (USFWS 2010). LANWR contains several Coahuiltecan archaeological sites, such as the Unland Site, which was discovered in 1976 during the construction of a refuge service road. This site contained stone and shell artifacts and human skeletal remains. Another site discovered on Horse Island contained the skeletal remains of a female buried some 1,200 years ago.

Lower Rio Grande Valley National Wildlife Refuge

Known archaeological, cultural, and historical resources at LRGVNWR are described in the Comprehensive Conservation Plan (USFWS 1997). The Texas Historical Commission initiated the Los Caminos del Rio Heritage Project in 1989. The purpose of its establishment was to promote the linkage of cultural and natural resources of the corridor region. The ultimate desired outcome of this endeavor is the preservation of a unique heritage shared by the United States and northern Mexico along the Lower Rio Grande. All of the LRGVNWR is included in the heritage corridor, and two of the significant historic sites within the heritage corridor are on LRGVNWR. As part of the heritage corridor partnership effort the Palmito Ranch Battlefield on LRGVNWR tracts near Brownsville were nominated to be on the National Register of Historic Places, and the Old River Pumphouse on LRGVNWR near Hidalgo was nominated for a National Historic Landmark designation.

3.5.2 Socioeconomic Resources

Cameron County is the southernmost Texas County with a current population of 415,557 (Source: U.S. Census Bureau 2011). The County is characterized by agricultural and urban development, scattered small farming communities, and the seasonal influx of summer visitors and winter residents (i.e., Winter Texans). According to the U.S. Census Bureau, the 2010

population of Willacy County was 22,134. The nearest cities of Raymondville (11, 284 residents) and Harlingen (64,849 residents), Texas are within 9 and 31 miles, respectively. Oil and gas, agribusiness, tourism, and fishing are the dominant industries. The nearest metropolitan area to the project area is the Harlingen-Brownsville metro area, located about 20-26 miles away. The City of Brownsville has a current population of 172,437 and the City of Harlingen has a population of 64,202 (Source: 2010 Census).

The economic area for this project is Cameron, Hidalgo, and Willacy counties (Carver and Caudill 2013). The area population increased by 30% from 2001-2011 as compared to a 9% increase for the United States as a whole (Carver and Caudill 2013). The median household income is calculated at $22,249/year (Carver and Caudill 2013, after U.S. Dept. of Commerce – Nov 2012 data). According to Sethi and Arriola (2002), the Valley is one of the top 30 fastest growing regions in the nation. Area per capita income increased by 15% over the 2001-2011 period (Carver and Caudill 2013).

Agriculture has always been the staple of the Valley economy. Aside from agriculture, the service industry represents 36% of the total Valley economy, followed by local government (20%) and trade (17%) (Sethi and Arriola 2002). However, one of the largest and fastest growing industries is tourism, particularly nature-based or ecotourism (Mathis and Matisoff 2004). Ecotourism here generated over $340 million and resulted in the creation of 4,407 full-time and part time jobs annually (Woosnam et al. 2011). During the winter months, retired people (an estimated 125,000-150,000) leave their northern homes to spend the winter in the more favorable climate of the Valley. Winter Texans provide an important economic boost in the Valley since they provide a substantial seasonal source of revenue for the local economies.
As seen from the high annual visitation, both refuges support ecotourism and provide important wildlife-dependent recreational activities for local residents as well as for Winter Texans. The refuges also play a role in the local economy as refuge employees typically live in the community, own property, and support local businesses through routine purchases of goods and services. According to Carver and Caudill (2013), the local economic benefit of Laguna Atascosa NWR totaled $23.4 million providing 205 jobs as of 2011. Or, for every dollar of refuge budget expenditures, $37.17 is added to economy of the area.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes and discusses the potential environmental effects or consequences that can reasonably be expected by the implementation of the alternatives described in Chapter 2.0 of this EA. An analysis of the effects of management actions has been conducted on the physical environment (air quality, water quality, and soils); biological environment (vegetation, wildlife, and threatened and endangered species); and socioeconomic environment (cultural resources, socioeconomic features including public use/recreation, and visual and aesthetic resource). The direct, indirect, and cumulative impacts of each alternative are considered. USDA-APHIS analyzed the use of ivermectin-treated corn distributed through corn feeders in the USDA-APHIS Ivermectin Corn EA so that analysis is incorporated by reference.

4.1 Definition of Terms

Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions, which may have both beneficial and adverse effects, even if on balance the agency believes that the effect will be beneficial.

Effects

Direct effects are the impacts that would be caused by the alternative at the same time and place as the action.

Indirect effects are those that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Cumulative effects are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor but collectively significant actions taking place over a period of time.

Impact Type

Beneficial impacts are those resulting from management actions that maintain or enhance the quality and/or quality of identified refuge resources or human environment.

Adverse impacts are those resulting from management actions that degrade the quality and/or quantity of identified refuge resources or human environment.

Duration of Impacts

Short-term impacts affect identified refuge resources or human environment; they occur during implementation of the management action but last no longer.

Medium-term impacts affect identified refuge resources or human environment that occurs during implementation of the action; they are expected to persist for some time into the future while the action is occurring.

Long-term impacts affect identified refuge resources or recreation opportunities; they occur during implementation of the management action and are expected to persist throughout the life of the action and possibly longer.

Intensity of Impact

Negligible impacts result from management actions that cannot be reasonably expected to affect identified refuge resources or human environment at the identified scale.

Minor impacts result from a specified management action that can be reasonably expected to have a detectable though limited effect on identified refuge resources or the human environment at the identified scale.

Moderate impacts result from a specified management action that can be reasonably expected to have apparent and detectable effects on identified refuge resources or the human environment at the identified scale.

Major impacts result from a specified management action that can be reasonably expected to have readily apparent and substantial effects on identified refuge resources or the human environment at the identified scale.

Context or Scale of Impact

Localized scale are beneficial or adverse impacts on a given resource occurring only at a specific project site or its immediate surroundings that are relatively small in size (e.g., up to about an acre in size).

Widespread scale are beneficial or adverse impacts on a given resource that extend beyond the specific project site or localized scale, such as to an entire water body, watershed, the entire refuge, region, state, continent or world.

4.2 Resource Impacts associated with Ivermectin and Doramectin

Under the proposed action, white-tailed deer will be treated with ivermectin-treated corn and cattle will be treated with doramectin injections. Both ivermectin and doramectin are macrocyclic lactones (part of the avermectin group) commonly used to control parasites (Merola and Eubig 2012). Macrocyclic lactones have a systemic mode of action, in the case of both injectable doramectin and oral ingestion of ivermectin, the treatment gets into the bloodstream of the host (white-tailed deer and cattle), from where they are transported throughout the animal to kill the parasite.

Both ivermectin and doramectin have low volatility and are unlikely to partition into the atmosphere (Halley et al. 1993; USDA 2017). Ivermectin and doramectin undergo rapid degradation in light and soil, bind tightly to soil and sediment making them unlikely to leach into groundwater or runoff to surface water in a dissolved state, will not accumulate, and will not undergo translocation in the environment, minimizing impacts to non-target organisms (Halley et al. 1993; USDA 2017). Ivermectin breaks down to less bioactive compounds via photo and aerobic degradation; degradation in soil varies with the soil type and properties, absorption capacity, and temperature (USDA 2017). Doramectin would not be expected to partition into the atmosphere because of its high molecular weight, high melting point and low vapor pressure (Pfizer EA 1996).

Ivermectin half-lives in soil are 7 to 14 days at high temperatures in summer, but can be much longer (up to 240 days) at low temperatures (22 degrees or less) in the winter (Halley et al. 1989). Photolysis in water is less than 0.5 day in summer, and 39 hours in winter. When directly exposed to sunlight, its photolytic half-life was approximately 3 hours on a thin, dry film (USDA 2017). In addition, studies in cotton and food crops (sorghum, lettuce, carrots, and turnips) show that plants uptake little ivermectin from direct applications to plants or from soil. Vegetation uptake of doramectin is not anticipated (EPI Suites, Greg Masson).

There is the possibility of exposure to some non-target terrestrial wildlife that may consume corn spilled onto the ground during feeding by white-tailed deer or when being transported from storage sites. Transported medicated corn will be in sealed containers/bags and very minimal corn should be lost during transportation. The feeders dispense corn from feed ports up from ground level with a lip intended to minimize spillage and access by animals other than deer. Additionally, the use of exclusion barriers to include welded wire panels precluding swine, javelina, and livestock and silt fencing to preclude Texas tortoise combined with weekly monitoring of the feeders greatly reduces the likelihood of consumption by non-target species. The exclusion fencing surrounding each deer feeder has a height of 34 inches, which is optimum to prevent feral swine from accessing the corn feeders (Rattan et al., 2010). Game cameras will be rotated between 50% of the feeders during the study period to evaluate utilization by deer and the occurrence of non-target exposure. USDA-APHIS had placed cameras at eight different ivermectin-treated corn feeders in Willacy County, Texas in the spring of 2017. These cameras captured images of wildlife at the selected feeders from April 2017 until the last week of July 2017. Within the feeder fence, most photos contained images of white-tailed deer. Non-target wildlife species that were captured at feeders, such as raccoons, grackles, wild turkeys, red winged blackbirds, rose-breasted grosbeaks, cardinals, mourning doves, and green jays, are not adversely impacted by ivermectin. Images of feral swine were not seen within the perimeter feeder fencing. The perimeter feeder fencing appears to be sufficient to reduce any adverse impacts associated with the consumption of ivermectin-treated corn.

Ivermectin and doramectin are excreted virtually unchanged in the feces of treated animals (Lumaret et al. 2012, Suarez et al 2003). Studies show that up to 90 percent of the ivermectin dose administered parenterally or orally could be excreted in the feces (USDA APHIS 2017, Laffont et al 2001). One study conducted in Canada found that the dung of cattle treated with ivermectin did not support the insect communities typical of feces from untreated cattle; this continued for as many as 12 weeks post drug administration (Floate 1998). Likewise, that same study documented the persistence of ivermectin-containing feces on the landscape 4.25 times longer than untreated feces. Persistence of ivermectin in soil or feces varies dramatically by season (summer 7-14 days; winter 91-217 days) and may depend on temperature or UV exposure (reviewed in Lumaret et al. 2012).

Doramectin has been shown to be toxic to dung fauna; however, excretion of doramectin through deer feces into the environment is not expected to have an adverse effect on invertebrates in the environment due to the tight binding of doramectin to organic material and resultant reduced bioavailability of the medication (Kolar and Erzen 2006). Additionally, the active ingredient in this formulation is inactivated by sunlight in approximately 24 hours. Any invertebrates or detritivores are expected to be exposed to very limited quantities of doramectin through the action area. Doramectin does not bioaccumulate in the environment. Therefore, even if bioavailable in dung fauna, doramectin will not amplify up the food chain if consumed (Kolar and Erzen 2006). As a result, other animals feeding on these invertebrates are not expected to be affected by doramectin. Based on the information above, localized impacts to this group of invertebrates depend on site-specific conditions influencing ivermectin and doramectin degradation and availability, but potentially have moderate adverse impacts that are medium-term in duration by altering insect communities and nutrient cycling for the duration of the treatment and for some days to weeks following its cessation.

The most sensitive organisms to avermectins (ivermectin and doramectin) are some freshwater organisms, such as *Daphnia magna*, green unicellular algae and bacteria, and fish (e.g., rainbow trout, zebrafish) (Halley et al. 1993, Kolar 2006). Both ivermectin and doramectin are highly toxic to many aquatic invertebrates (reviewed in Lumaret et al. 2012; Schweitzer et al. 2009). The labeling of the Ivermax product contains the following warning for topical application in cattle: "Free ivermectin may adversely affect fish and certain aquatic organisms. Do not permit cattle to enter lakes, streams, or ponds for at least six hours after treatment." The Safety Data Sheet for ivermectin also contains the warning "do not allow any volumes of product to reach ground water, water source or sewage system." The Safety Data Sheet for doramectin contains a similar warning "Releases to the environment should be avoided. As with other members of the avermectin family, doramectin is highly toxic to fish and certain aquatic organisms."

The potential for exposure to aquatic organisms from ivermectin-treated corn is expected to be negligible (USDA, 2017). Ivermectin is mixed with whole kernel corn and dispensed from a closed gravity feeder system to deer (Figure 3). Drift of ivermectin to aquatic areas is not anticipated based on the use pattern. Runoff would also not be anticipated because the corn is contained within a feeder that is accessed by deer. There is the possibility of some spillage from deer feeding at the feeders although the amount of corn would be minor because that corn would likely be consumed by deer or other non-target organisms. Previous studies to evaluate ivermectin effectiveness in controlling ticks in white-tail deer populations have shown that little to no treated corn is available on the ground (Pound et al., 1996; Rand et al., 2000). Any corn left on the ground would not be expected to runoff into aquatic areas due to the size of the kernels with a very low probability of movement in a rain event. Ivermectin has low water solubility and partitions strongly to soil and organic matter and would not be expected to be in solution in detectable levels if there was a rain event that could result in transport of treated corn into aquatic habitats. The program will not place feeders within 50 meters of aquatic habitats on the refuge, further reducing the probability of any aquatic exposure. Deer droppings containing ivermectin may be transported as runoff or deposited directly into aquatic habitats, but this is not expected to be a major pathway of exposure for most aquatic organisms. Ivermectin in deer droppings would be bound to organic matter and not available to most aquatic organisms (USDA, 2017). Sediment dwelling invertebrates could be exposed due to the preferential binding of ivermectin to organic matter. However, the low probability of significant quantities of deer droppings being deposited into aquatic habitats, and the degradation of ivermectin would suggest that exposure to benthic aquatic invertebrate populations would be very low. Though ivermectin and doramectin are considered highly toxic to most aquatic species, feeder barriers, fencing, buffer zones, and environmental fate of ivermectin and doramectin, will minimize exposure to aquatic environments, although such measures will not eliminate the risk as treated deer could still excrete the drug into those environments.

Ivermectin binds strongly to soil particles making it unlikely to leach into groundwater or runoff to surface water in a dissolved state (USDA, 2017). Ivermectin breaks down to less bioactive compounds via photo and aerobic degradation; degradation in soil varies with the soil type and properties, sorption capacity, and temperature (USDA APHIS, 2016b). Ivermectin half-lives in soil are 7 to 14 days at high temperatures in summer, but can be much longer (91 to 217 days) at low temperatures in the winter. Photolysis in water is less than 0.5 day in summer, and 39 hours in winter. When directly exposed to sunlight, its photolytic half-life was approximately 3 hours

on a thin, dry film (USDA APHIS, 2016b). In addition, studies in cotton and food crops (sorghum, lettuce, carrots, and turnips) show that plants uptake little ivermectin from direct applications to plants or from soil (USDA APHIS, 2016b).

Ivermectin tolerance for ocelots is likely similar to that of domestic cats. Ivermectin toxicosis in domestic cats is not expected until exposure significantly exceeds 750 µg/kg in an adult cat or 110 µg/kg in a kitten (USDA, 2017). This would be equivalent to the consumption of approximately 2 kg of medicated corn by a 15 kg cat. Ocelots are not likely to consume medicated corn directly but could be exposed indirectly through consumption of exposed prey.

There is relatively little information available regarding toxic ivermectin thresholds in wild birds. The drug is recommended for clinical use at 200 µg/kg in most avian species, but some applications recommend up to 1 mg/kg (Carpenter 2005; Plumb 2008). A dosage of 200 µg/kg is recommended for most snakes and lizards, but ivermectin is not considered safe for use in chelonians, crocodilians, indigo snakes, and skinks (Carpenter 2005; Plumb 2008). In conclusion, ivermectin is a relatively safe veterinary drug for vertebrates. Insectivorous birds would not likely ingest ivermectin-treated corn. Small insects that would serve as prey for these birds are also not expected to ingest ivermectin-treated corn. The risk assessment provided in the USDA-APHIS Ivermectin Corn EA concluded that direct risk to non-target birds is expected to be low based on the method of application for ivermectin-treated corn and low toxicity of ivermectin to birds (USDA, 2017). Additionally, the use of the closed gravity feeder will reduce risk to most terrestrial non-target birds and other animal species. However, if sick or dead animals of any species are observed and presumably related to these treatments (ivermectin-treated corn and cattle treated with doramectin), an investigation will be conducted and that information provided to the refuge to make a determination if these activities need to be reevaluated or discontinued.

4.3 Impacts to Air Quality

Placement of feeders and conducting an experimental grazing program will increase the number of vehicles on refuges by 1-2 vehicles per day. Though greenhouse gas release occurs during the routine use of vehicles from implementing the proposed action, the emissions and resulting changes in atmospheric CO_2 concentration would be virtually undetectable at a global scale. Although efforts to reduce emissions are important, implementing the proposed action would not affect the climate of LANWR and LRGVNWR to any detectable extent. Driving on unpaved gravel roads stirs up dust, which has the potential to negatively impact air quality. Air pollution from fugitive dust due to the additional vehicle traffic on the refuge would be negligible to minor and localized to refuge-wide. These effects would be intermittent and any one effect would be short-term (minutes to hours), though the effects would occur as long as the experimental grazing and placement of feeders occurs on FWS lands.

4.4 Impacts to Soil and Vegetation

Habitats on LANWR and LRGVNWR within the quarantine area are primarily managed for dense thornscrub woodlands suitable for ocelot or migratory birds and wetland habitats. LANWR has almost 55,000 acres of wetland habitats, ranging from freshwater to mostly brackish or salty. LANWR contains about 19,800 acres of coastal prairie and savannah habitat; prairies are dominated by Gulf cordgrass (*Spartina spartinae*). Brushland occupies about 11,400

acres of LANWR, which is generally well drained and not normally flooded. These areas are dominated by woody vegetation with 50 percent or more canopy cover. The brushlands on the lomas are essential to the survival of the endangered ocelot, as well as providing protective roosting habitat for aplomado falcons.

Implementing an experimental grazing program may have short-term minor adverse impacts on refuge habitats. Overgrazing can cause direct impacts on upland and riparian areas, such as loss of vegetation and soil compaction that lead to indirect impacts on the hydrology of an area and the ecosystems, both terrestrial and aquatic, that rely on it (EPA1994). The impacts of livestock grazing will depend on timing, intensity, and frequency. Conducting the grazing treatment at stocking rates prescribed by USDA-NRCS and excluding sensitive habitat areas to including thornscrub, will generally minimize adverse impacts to vegetation. Loss of vegetation will occur in some areas of LANWR and LRGVNWR. This could result in both beneficial and adverse impacts. Removal of invasive grasses would benefit native habitat and wildlife species supporting the purposes for which the refuges were established by reducing competition with native grassland and brush species and reducing fire fuel amounts (Davidson 1996, Bush and Van Auken 1990). Native vegetation removal through grazing would need to be closely monitored and experimental grazing program would be need to adjusted as necessary to ensure minimal adverse impacts to native grassland and shrubland species. During heavy rainfall or wet conditions, there may be minor impacts to soil and vegetation trampling where cattle congregate. Additionally, during dry conditions, cattle will concentrate around watering areas causing impacts to the vegetation and soil in that immediate area. When cattle travel as a herd, they may create unwanted trails by trampling vegetation in its path.

Fencing needs will be identified on each area proposed for grazing based on USDA-NRCS recommendations for grazeable areas and stocking rates. Fencing will likely be used to keep cattle out of sensitive areas to include thornscrub habitat, wetlands, threatened and endangered species needs including core ocelot monitoring sites, cooperative farm fields, thornscrub restoration sites, core ocelot monitoring sites, high public use and administrative areas. Fencing will cause some fragmentation of habitat. Fencing will be wildlife-friendly on all interior areas. A more durable type of fencing may be considered on the perimeter/exterior refuge boundaries to reduce vehicle traffic, habitat trampling, and wildlife disturbance from frequent fence maintenance.

Some vegetation loss and trampling will occur through the direct systematic treatment of cattle, which requires gathering cattle every 21-28 days to inspect for CFTs and retreat with doramectin injectable. This operation generally requires approximately 12-15 staff resources for one or two days. To the extent practicable, temporary corrals will be set up off-refuge on an adjacent premises. Temporary corrals on refuges will be on the edge of the road, previously disturbed sites, or in areas where old corrals still exist from cattle operations on these lands prior to establishment as a refuge. These locations will be identified on a case by case basis to limit habitat trampling and disturbance. The experimental grazing program will be continually monitored by FWS based on environmental conditions and adjustments to stocking rates, movement or complete removal of cattle, and/or additional fencing will be implemented to ensure impacts to refuge habitats are minimized.

There may be some adverse impacts on soil and habitat from placement and service of ivermectin-treated corn feeders. Vegetation disturbance and soil compaction will occur in the immediate vicinity surrounding the feeder and barrier. These impacts are likely to be negligible to minor since feeder placement will be prioritized near existing roads. If it becomes necessary to place a feeder off an existing road, all travel through refuge habitats will be conducted using a UTV or ATV, minimizing vegetation disturbance and soil compaction.

4.5 Impacts to Threatened and Endangered Species

Potential effects of the proposed action to listed species and critical habitat include toxicity of ivermectin and doramectin to non-target species, runoff of ivermectin and doramectin into aquatic areas, trampling of listed plants from cattle operations, species disturbance by feeder set up and weekly servicing, and species disturbance from cattle operations (gathering, providing water sources, installation of fences). The FWS has determined that implementing the proposed action may adversely impact the Gulf Coast jaguarondi, ocelot, northern aplomado falcon, and whooping crane due to potential disturbance and minimal habitat loss. In implementing the proposed action, adverse impacts will be avoided by surveying potential feeder sites for presence of listed plants and nesting birds, placing feeders near existing roads and in areas already dominated by nonnative vegetation, avoiding creation or widening of trails to access feeders, implementing a 50-meter buffer for feeder placement from aquatic areas, avoiding removal of native vegetation and brush, and using a barrier around feeders that prevent access to treated corn by non-target species. All experimental grazing units will be identified and areas that may impact any listed species will be avoided or fenced off and no thornscrub habitat will be removed or cut-through. Additionally, once fencing needs have been identified, FWS staff will survey the proposed fence line to ensure there are not any denning ocelots or nesting birds in the area.

Feeders will be placed in locations that can be accessed by vehicles using existing trails and roads. In general, these trails will not be widened and no new trails will be created to place or access feeders, and vehicle speed will not exceed 25 miles per hour unless otherwise posted on NWR lands. Data indicates that ocelot vehicle collision is a significant source of mortality. Approximately 44 percent (12 of 27) of known ocelot mortalities from 1982 to 1996 were vehicle related (Hewitt et al. 1998) and 45 percent of the total ocelot mortality documented in South Texas between 1983 and 2002 were vehicle related (Haines et al., 2005b). As of April 2016 there were an additional seven ocelot road mortalities. Implementation of reduced speeds, awareness training, and educating USDA-APHIS/TAHC staff will help reduce potential collisions.

The FWS issued a Biological Opinion in January 2017 indicating that the proposed use of ivermectin-treated corn in feeding stations (USDA-APHIS Ivermectin Corn EA) will not likely jeopardize the continued existence of the ocelot, Gulf coast jaguarundi, northern aplomodo falcon, or whooping crane. As outlined in the January 2017 BO, USDA-APHIS/TAHC, as the permittees, would provide the following to FWS for feeders placed on LANWR or LRGVNWR: 1) information regarding take of an ocelot, jaguarundi, northern aplomado falcon, or whooping crane to FWS; and 2) annual reports. In addition, USDA-APHIS/TAHC will: 1) provide Endangered Species Act training to all CFTEP personnel; 2) develop and follow standard operating procedures for use of game cameras to monitor wildlife visiting the ivermectin corn feeders; and 3) conduct bi-annual ivermectin sensitivity testing of ticks.

A map of existing northern aplomado falcon nesting structures will be provided to USDA-APHIS/TAHC. USDA-APHIS/TAHC would avoid these aplomado nest structures by a minimum distance of 1,000 feet at all times of the year. Additionally, if nests are located, refuge staff will provide permittees with their locations and are to be avoided by a minimum distance of 1,000 feet as well. If access is needed within the 1,000 foot buffer of a falcon nest, USDA-APHIS/TAHC would have to consult with the refuge manager.

In general, conservation measures identified in the BO issued for the USDA-APHIS Ivermectin Corn EA (USFWS 2017) will be implemented and additional conservation measures for the experimental grazing program have been identified and are outlined below.

Conservation measures for Gulf Coast jaguarundi and ocelot:
To avoid effects of disturbance and habitat loss:

1. Thornscrub will not be cleared for placement of feeders or for fencing, water sources, or corrals associated with the experimental grazing program. Feeders will be placed in open areas away from brush habitat.
2. Feeders will be placed in locations that can be accessed by vehicles using existing trails and roads. In general, these trails will not be widened and no new trails will be created to place or access feeders. If necessary, trails may be widened or created to place and service feeders that are located in already open and disturbed areas with non-native plant species, such as buffelgrass (*Cenchrus ciliaris, Pennisetum ciliare)*, or on bare ground to allow UTVs or ATVs to access the feeder.
3. Wildlife-friendly fencing will be required for all interior areas; more durable exterior/perimeter fencing may be considered to reduce the need for frequent maintenance causing additional disturbance. Cattle will be fenced off and excluded from any natural freshwater sources to include arroyos, resacas, wetlands, or rivers. STRC staff will survey the proposed fence line to ensure there are not any denning ocelots. All placement of fencing will be in consultation with FWS personnel.
4. Feeders will be placed a minimum of 50 meters from aquatic areas.
5. Game cameras will be rotated between 50 percent of feeder locations from February to April when species are most active to better determine what species may be accessing the feeders. Additionally, game camera placement will prioritize feeders near wetland and thornscrub habitat. The STRC has developed standard operating procedures to be implemented for a five-year period or duration of the SUP, and will coordinate with USDA-APHIS/TAHC to make sure the protocol meets the desired objectives. An annual report will be provided with the data and summary of ivermectin-treated corn utilization by species.
6. Range cubes provided by USDA-APHIS/TAHC (maximum of 4 pounds cubes/head/week) will be used as a tool in the gathering of the cattle. If this method is not successful, then horses may be used to gather cattle.
7. Vehicle speed will not exceed 25 miles per hour unless otherwise posted on refuge lands.

Conservation measures for aplomado falcons:
To avoid disturbance impacts to nesting falcons:

1. Surveys for nesting falcons will be conducted by a FWS-approved ornithologist on feeder locations and proposed fence lines within LANWR and LRGVNWR using approved survey protocol.
2. Any newly discovered falcon nests should be reported within one day to FWS staff.
3. Feeders or fence will not be placed within a ½- mile of an active falcon nest.
4. Feeders will be accessed once a week during the day, limiting disturbance to falcons.
5. Feeders will be placed in locations that can be accessed by vehicles using existing trails and roads. In general, these trails will not be widened and no new trails will be created to place or access feeders. If necessary and in consultation with refuge staff, trails may be widened or created to place and service feeders that are located in already open and disturbed areas with non-native plant species, such as buffelgrass, or on bare ground to allow UTVs or ATVs to access the feeder.
6. Range cubes provided by USDA-APHIS/TAHC (maximum of 4 pounds cubes/head/week) will be used as a tool in the gathering of the cattle. If this method is not successful, then horses may be used to gather cattle. Helicopters may be used with FWS approval if all other methods prove unsuccessful.

Conservation measures for whooping cranes:
To avoid feeding impacts and disturbance of whooping cranes:

1. Feeders will be accessed once a week during the day, limiting disturbance to migrating whooping cranes.
2. Should a whooping crane be sighted within 1,000 feet of ivermectin-treated corn feeders, all work (placing or servicing feeders) will stop until the whooping crane leaves the area.
3. Feeders will be placed in locations that can be accessed by vehicles using existing trails and roads. In general, these trails will not be widened and no new trails will be created to place or access feeders. If necessary and in consultation with refuge staff, trails may be widened or created to place and service feeders that are located in already open and disturbed areas with non-native plant species, such as buffelgrass, or on bare ground to allow UTVs or ATVs to access the feeder.
4. A 50-meter feeder placement buffer from aquatic areas will deter ivermectin and doramectin from adversely affecting the aquatic prey of the whooping crane.
5. Cattle will be fenced off and excluded from any natural freshwater sources to include arroyos, resacas, wetlands, or rivers.
6. Remote camera surveillance for the duration of the SUPs will be used if close to wetlands, potholes, or other sources of water near whooping crane habitat.

4.6 Wildlife Disturbance

Implementing an experimental grazing program and placing feeders on both LANWR and LRGVNWR will have minor adverse impacts on various wildlife species due to increased disturbance. Placement of feeders will not remove brush or native vegetation that migratory birds would use as nesting substrate; feeders will be placed in areas dominated by bare ground, buffelgrass, or other non-native vegetation. Feeders will also be placed a minimum of 50 meters from aquatic areas (seasonal and permanent wetlands) to avoid disturbance of nesting shorebirds from placement and servicing of feeders. Additionally, from March 15 to August 15, surveys for

nesting migratory birds will be conducted prior to installing/maintaining fencing, gathering, or other operations associated with the cattle grazing program and any areas with nesting migratory birds will be avoided to include a ½-mile buffer from any nesting locations. Therefore, disturbance to migratory birds is anticipated to be minor and short-term in duration.

Wildlife disturbance may occur through interruption of normal behavior via flushing when placing and servicing feeders and conducting cattle operations. The disturbance is likely to be temporary and once personnel are gone from the area normal behavior should resume. In general, typical wildlife responses to human disturbance may be fleeing, increased vigilance, and changes in habitat selection (Frid and Dill 2002). Noise can cause stress in animals and the responses to noise are varied. Geist (1979 as cited by Larkin 1996) believed that there was an energetic cost to animals being disturbed by noise. Others have used heart rate as physiological index of energy expenditure, monitored with telemetry, in wild animals exposed to noise. Others have used heart rate changes to indicate alarm or excitement of animals exposed to noise (Larkin 1996).

For the proposed action, the most severe noise will be from vehicles being used to travel to service feeding stations and managing the grazing program through or alongside wildlife habitat (1-2 vehicles per day). Responses of wildlife to noise have included a range of responses from no reaction to alerting, disruption of feeding, and flight (Larkin 1996). Generally, refuge vehicle use is limited to winter bird tours, wildlife monitoring, and general administrative use of these roads. Impacts from the additional 1-2 vehicles per day at 25mph as proposed are anticipated to be minor and short-term.

Priority for fencing will be along existing roads to reduce disturbance to wildlife and habitat. Wildlife-friendly fencing will be used for all interior areas; more durable exterior/perimeter fencing may be considered to reduce the need for frequent maintenance. Nilgai can damage fencing and more durable exterior/perimeter fencing will reduce the necessary maintenance and associated disturbance from installing/fixing fences. The intention is to minimize disruption of native plant species destruction as much as possible while also keeping the fence placement in a straight line.

4.7 Impacts on the Human Environment

Human health risks associated with the use of ivermectin-treated corn in feeding stations are determined based on the toxicity of ivermectin and the potential for exposure. Ivermectin is a highly lipophilic drug, and as such, it is easily absorbed into the edible tissues of food animals (Baynes et al. 2000). As noted in the USDA-APHIS Ivermectin Corn EA, ivermectin has low toxicity in mammals because gamma-aminobutyric acid is found only in the central nervous system of mammals and is protected by the blood-brain barrier. Therefore, ivermectin is sometimes used as a human drug for the treatment of strongyloidiasis and onchocerciasis in the United States (FDA 2016), and the treatment of scabies, lice, and ascariasis in other countries (NIDDK 2016). A study conducted in 2002 indicated that ivermectin is generally well tolerated by healthy adults at levels up to 10 times the highest FDA-approved dose of 200µg/kg and at more frequent regimens (Guzzo et al. 2002). Ivermectin can be toxic to humans if accidental overdose or significant exposure to veterinary formulations occurs. Humans with exposure to ivermectin-treated corn include USDA-APHIS/TAHC staff filling feeders, refuge staff working in the area, and potentially the general public based on placement of feeders. The corn will be

treated with ivermectin off-refuge and in well-ventilated areas with proper worker hygiene and properly functioning personal protective equipment. Drift from the application of ivermectin will not occur because ivermectin has low volatility and corn is loaded directly into the gravity flow feeders.

For the general public, potential direct exposure to ivermectin-treated corn is unlikely based on feeder placement and barriers in place that restrict access to feeders. A sign in both English and Spanish will be posted at all feeder locations. Feeders are checked weekly so that damaged feeders can be repaired or removed, reducing the potential for exposure to the public from corn that may spill onto the ground if the feeder is damaged. Therefore, the potential exposure for the general public to ivermectin via inhalation, dermal exposure, or through ingestion of treated corn is not expected. There is potential for a person to ignore the signage and breach the exclusion fencing to access treated corn due to the fence's height of 34 inches, however, in general, risk to the general public from direct contact exposure to ivermectin-treated corn in feeders in restricted access feeding stations is expected to be low.

The proposed treatment period is annually from February through July to prevent inadvertent human exposure (through human consumption of treated white-tailed deer). All corn will be removed from feeders 60 days prior to hunting season. The withdrawal time of 60 days allows ivermectin residues to decrease to below the tolerance levels in white-tailed deer (USDA 2017). Additionally, hunters will be notified that ivermectin-treated corn feeders are being used on refuges. Adverse impacts to hunters or members of the public consuming ivermectin in harvested deer meat is expected to be negligible. Potential exposure of the general public from dietary consumption of meat from feral swine that have ingested ivermectin-treated corn is unlikely because of the installation of exclusion fencing, the design of feed ports, and the time of year associated with hunting swine for food. Feeders will be enclosed with welded wire panels to exclude non-target animals, such as hogs, and serviced weekly. However, while uncommon, breach of fencing by feral swine could occur (Cooper and Ginnett, 2000). When a breach occurs, USDA-APHIS/TAHC staff will repair the fencing and report the finding to FWS staff. The feed ports on the feeders are not easily accessible to feral swine because they are above ground level with a small opening and ventral lip to minimize spillage. The available corn to feral swine if they breach the fencing is minimal—it is estimated that there is less than 5% of the total treated corn in the feeder that ends up on the ground (D. Baca, pers. comm., email dated Oct. 19, 2016). Overall, the use of ivermectin-treated corn feeders is not likely to have adverse impacts on human health.

Although the feeders proposed for use on LANWR are constructed to limit consumption by non-target species, they may not be able to exclude all other species under all circumstances. Feral hogs in particular are very common on LANWR and are extremely destructive. Damage to feeders by feral hogs could result in their consumption of ivermectin-treated corn. Although feral hogs can only be hunted on LANWR during designated hunting seasons, due to its invasive status, this species may be harvested on private property year-round without limitation. The recommended withdrawal time following oral administration of ivermectin (0.1 mg/kg body weight) in swine is 5 days (Baynes et al. 2000). Swine moving between refuge and private properties may pose a risk to public health if exposed to ivermectin-treated corn. A similar concern for the removal of nilgai is discussed below.

No human activity would be allowed in any unit during a public hunt and/or during scout days related to hunting activities. If there is an emergency need related to cattle operations, USDA-APHIS/TAHC must get approval from the refuge manager before entering any unit open to public hunting to ensure proper coordination with hunters. Additionally, as discussed previously, placement/service of feeders is not permitted during public hunting season. The quality of hunt provided by the FWS to the paying public may decrease in units where cattle are present. Currently, public hunts on both LANWR and LRGVNWR do not have any cattle. Under the proposed action potential impacts may include (but are not limited to): safety concerns over hunters traversing by foot or on bicycle in close proximity to cattle, particularly those unfamiliar with cattle behavior; potential damage to hunter-owned equipment and personal property that may get damaged by cattle (i.e. hunting ground blinds, tripod stands, game carts, and vehicles parked in hunt units); and mistakenly injuring or killing cattle by shooting or hitting with a vehicle. Hunters will be provided with additional safety information during hunter orientation for units that have cattle prior to their hunt. The USDA-APHIS/TAHC and FWS will work together to minimize impacts to hunting which is a priority public use as defined by the National Wildlife Refuge System Improvement Act of 1997.

As outlined in the proposed action, when determining locations for implementing experimental grazing, the refuges would avoid areas of high public use to minimize any impacts to visitors engaging in other priority public uses (fishing, wildlife observation and photography, interpretation, and environmental education) on the refuges.

4.7.1 Impacts on Cultural Resources

The GPS coordinates for proposed feeder locations and proposed fence lines will be provided to regional archeologist for clearance prior to implementing. Any known cultural sites will be avoided.

4.8 Assessment of Cumulative Impacts

A cumulative impact is defined as an impact on the environment that results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future action regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Cumulative impacts are the overall, net effects on a resource that arise from multiple actions. Impacts can "accumulate" spatially, when different actions affect different areas of the same resource. They can also accumulate over the course of time, from actions in the past, the present, and the future. Occasionally, different actions counterbalance one another, partially cancelling out each other's effects on a resource. But more typically, multiple effects add up, with each additional action contributing an incremental impact on the resource.

As outlined in the USDA-APHIS Ivermectin Corn EA, similar uncertainties are associated with this EA primarily from lack of information about the effects of ivermectin, its formulations, metabolites, and potential mixtures to non-target organisms that can occur in the environment. These uncertainties are not unique to this assessment but are consistent with uncertainties in

human health and ecological risk assessments with any environmental stressor. In addition, there is uncertainty in the number and location of feeding stations, which are based on number and density of deer in the program area. Another area of uncertainty is the potential for cumulative impacts to human health and the environment from the proposed use of ivermectin in the CFTEP. Areas where cumulative impacts could occur are: 1) repeated worker and environmental exposures to ivermectin from program activities; 2) co-exposure to other chemicals with a similar mode of action; and 3) exposures to other chemicals in mixtures and how that may affect the toxicity of ivermectin.

Ivermectin is a widely used anti-parasitic drug in humans, livestock, and pets (Crump and Omura, 2011). There would be increased environmental loading from the use of ivermectin-treated corn for white-tailed deer where there are also ivermectin uses for cattle and other domestic animals. Currently, there are about 2,000 feeders in the 13-county area that was identified in the USDA-APHIS Ivermectin Corn EA. The impacts to white-tailed deer are expected to be incrementally negligible when put in context with other stressors because the dose of ivermectin is considered therapeutic and not intended to result in adverse effects. Domestic animals that are receiving ivermectin for other purposes are also not expected to have cumulative impacts resulting from the proposed use of ivermectin-treated corn because domestic animals will not be able to access the feeders. Cumulative impacts to aquatic organisms will be minor because of buffer zones that will result in a low probability of exposure to aquatic habitats from the proposed use of ivermectin-treated corn.

Additional CFT control efforts include the removal of nilgai. Nilgai are one of the primary factors for the spread of CFTs in Willacy and Cameron counties. Nilgai do not eat corn; therefore, are not treated for CFT. Currently, the only mechanism for addressing the spread of CFTs by nilgai is population reduction. The STRC is responsible for the majority of the nilgai harvests (through public hunting and USDA-APHIS culling) in the temporary quarantine area even though significant numbers occur throughout the temporary quarantine area. Some landowners around LANWR are opposed to reducing nilgai numbers due to the potential economic loss of the landowner. USDA-APHIS, TAHC, and FWS will continue to explore all available options for eradicating CFTs in Texas.

There is likely going to be increased disturbance to wildlife and habitat through implementation of the CFT eradication program. In addition to CFT control efforts taking place on the STRC lands, private landowners are conducting various efforts to battle the CFT infestation. Throughout the South Texas landscape, to varying degrees, there are nilgai and white-tailed deer harvests, ivermectin-treated corn feeder, and systematic treatment of cattle, which increases the amount of vehicle traffic and noise disturbance to native wildlife. The disturbance caused by these actions is likely to be temporary and once personnel have left the area normal wildlife behavior should resume; therefore, the proposed action is expected to be incrementally negligible when put in context of all the other activities occurring on the landscape.

4.8.1 Other Projects in the Area impacting T&E Species

Wind energy projects have drastically increased in the Rio Grande Valley and have impacted habitat used by ocelots, jaguarundi, and falcons by causing fragmentation of the landscape. Oil and gas development and the rapid economic expansion of the large metropolitan areas with the

continuing influx of immigrants, retirees, and increased tourism will likely continue to result in the loss of brushlands and coastal grasslands. As remaining small islands of suitable habitat and the corridors to connect them are developed and brush encroachment reduces plant diversity for prey species, ocelots', jaguarundis', and aplomado falcons' recovery alternatives are limited. Road expansions to accommodate the Rio Grande Valley development and road network, North American Free Trade Agreement, and border crossings will likely increase loss and fragmentation of habitat corridors and increase road mortality for ocelots. Encroachment from urban development that brings increased noise, light, fencing, and human disturbance; Customs and Border Protection operations that include roads, drag roads, off-road impacts, lights, and Border Fence and road maintenance will also likely result in the loss of habitat and avoidance of areas by the endangered ocelot, jaguarundi, and aplomado falcon across their listed ranges.

4.9 Environmental Justice

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations; February 11, 1994) was designed to focus the attention of federal agencies on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations. The order is intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, to provide minority and low income communities with access to public information, and to provide opportunities for participation in matters related to human health and the environment. Adverse direct or indirect effects on vulnerable populations are not likely to occur when there is proper handling of ivermectin-treated corn combined with effective communication with program area residents.

Federal agencies must ensure their programs and activities are accessible to persons with limited English proficiency as directed by EO 13166. To meet this need, USDA-APHIS and FWS conduct outreach to English-speaking and Spanish-speaking communities through a variety of public notices and informational brochures about program activities. APHIS and FWS will invite all stakeholders, including Colonia ombudspersons and residents of Colonias, to any public meetings. If this EA leads to a FONSI, then USDA-APHIS will provide a Spanish translation of the FONSI to all staff for their use when working with the public. In addition, if a FONSI is reached, USDA-APHIS will also notify the Director of the Colonia Initiatives Program in South Texas about the new CFTEP activities.

5.0 CONSULTATION, COORDINATION AND DOCUMENT PREPARATION

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Appendix A. TAHC Situation Report from October 2017

Texas Animal Health Commission

Monthly Fever Tick Situation Report

October 18, 2017

Statewide Quarantine Summary

184 Infested Quarantine Premises:

- 66 permanent quarantine zone premises
- 118 non-permanent quarantine zone premises
- Counties with infested premises quarantines include: Cameron, Hidalgo, Kinney, Kleberg, Live Oak, Maverick, Starr, Webb, Willacy and Zapata

92 Exposed Quarantine Premises:

- 40 permanent quarantine zone premises
- 52 non-permanent quarantine zone premises

2,444 Adjacent/Check Quarantine Premises:

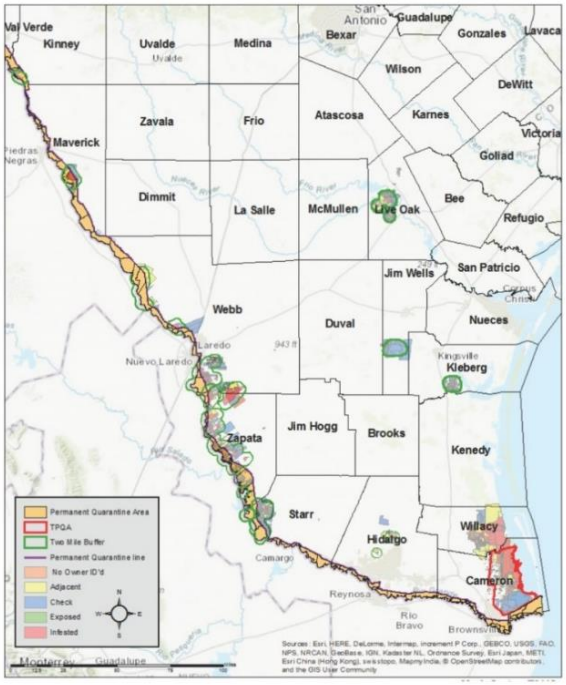
- 393 permanent quarantine zone premises
- 2,051 non-permanent quarantine zone premises

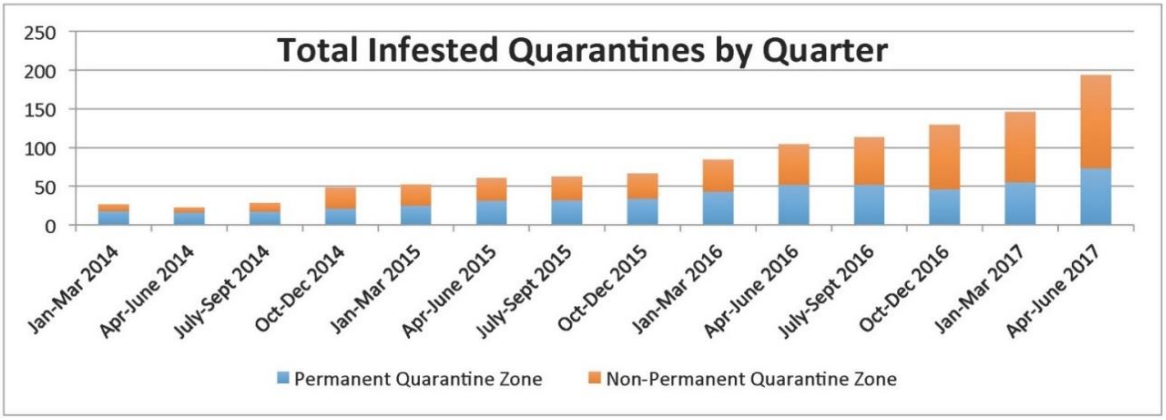
Total Quarantined Premises: 2,720
Changes since last report:
↓ 24 Infested ↑12 Exposed ↑288 Adjacent/Check

Non-Permanent Quarantine Zone Acreage:
approx. 706,367* acres total

Permanent Quarantine Zone (PQZ) Acreage:
approx. 187,142 acres total

Texas Fever Tick Quarantine Areas





For more information regarding the fever tick program and terminology used, please visit
http://www.tahc.texas.gov/news/brochures/TAHCBrochure_FeverTickFAQ.pdf

* Data Reconciliation.