United States
Department of
Agriculture

Marketing and
Regulatory
Programs

Animal and
Plant Health
Inspection
Service

Cattle Fever Tick Eradication Program – Tick Control Barrier

Maverick, Starr, Webb, and Zapata Counties, Texas

Draft Environmental Impact Statement—June 2013

Cattle Fever Tick Eradication Program – Tick Control Barrier

Maverick, Starr, Webb, and Zapata Counties, Texas

Draft Environmental Impact Statement—June 2013

Agency Contact:
Matthew T. Messenger
Staff Entomologist
Cattle Fever Tick Eradication Program Manager
Veterinary Services
Animal and Plant Health Inspection Service
U.S. Department of Agriculture
4700 River Road, Unit 43
Riverdale, MD 20737

Non-Discrimination Policy

The U.S. Department of Agriculture (USDA) prohibits discrimination against its customers, employees, and applicants for employment on the bases of race, color, national origin, age, disability, sex, gender identity, religion, reprisal, and where applicable, political beliefs, marital status, familial or parental status, sexual orientation, or all or part of an individual's income is derived from any public assistance program, or protected genetic information in employment or in any program or activity conducted or funded by the Department. (Not all prohibited bases will apply to all programs and/or employment activities.)

To File an Employment Complaint

If you wish to file an employment complaint, you must contact your agency's EEO Counselor (PDF) within 45 days of the date of the alleged discriminatory act, event, or in the case of a personnel action. Additional information can be found online at http://www.ascr.usda.gov/complaint_filing_file.html.

To File a Program Complaint

If you wish to file a Civil Rights program complaint of discrimination, complete the USDA Program Discrimination Complaint Form (PDF), found online at http://www.ascr.usda.gov/complaint_filing_cust.html, or at any USDA office, or call (866) 632-9992 to request the form. You may also write a letter containing all of the information requested in the form. Send your completed complaint form or letter to us by mail at U.S. Department of Agriculture, Director, Office of Adjudication, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, by fax (202) 690-7442 or email at program.intake@usda.gov.

Persons with Disabilities

Individuals who are deaf, hard of hearing or have speech disabilities and you wish to file either an EEO or program complaint please contact USDA through the Federal Relay Service at (800) 877-8339 or (800) 845-6136 (in Spanish).

Persons with disabilities who wish to file a program complaint, please see information above on how to contact us by mail directly or by email. If you require alternative means of communication for program information (e.g., Braille, large print, audiotape, etc.) please contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

Mention of companies or commercial products in this report does not imply recommendation or endorsement by the U.S. Department of Agriculture over others not mentioned. USDA neither guarantees nor warrants the standard of any product mentioned. Product names are mentioned solely to report factually on available data and to provide specific information.

This publication reports research involving pesticides. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife—if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.

Table of Contents

Appendices

Figures

Tables

Legal Authorities

Federal Acts

- Animal Health Protection Act of 2002, as amended (AHPA) (Public Law (P.L.) 107-171; 7 United States Code (U.S.C.) §§ 8301-8317).
- Archeological Resources Protection Act of 1979, as amended (ARPA) (P.L. 86-95, 16 U.S.C. §§ 470aa-mm).
- Bald and Golden Eagle Protection Act of 1940, as amended (BGEPA) (P.L. 86-70, 16 U.S.C. §§ 668-668d.)
- Clean Air Act of 1963, as amended (CAA) (P.L. 88-206, 42 U.S.C. §§ 7401-7661).
- Clean Water Act of 1972, as amended (CWA) (P.L. 92-500, 33 U.S.C. §§ 1251-1387).
- Endangered Species Act of 1973, as amended (ESA) (P.L. 93-205; 16 U.S.C. §§ 1531-1544).
- Farmland Protection Policy Act of 1981, as amended (FPPA) (P.L. 97-98, 7 U.S.C. §§ 4201-4209).
- Federal Insecticide, Fungicide, and Rodenticide Act of 1947, as amended (FIFRA) (P.L. 80-104, 7 U.S.C. §§ 136-136y).
- Migratory Bird Treaty Act of 1918, as amended (MBTA) (16 U.S.C. 703-712).
- National Environmental Policy Act of 1969, as amended (NEPA) (P.L. 91-190, 42 U.S.C. §§ 4321-4347.
- National Historic Preservation Act of 1966, as amended (NHPA) (P.L. 89-665; 16 U.S.C. §§ 470 et seq.).
- National Wild and Scenic Rivers Act of 1968, as amended (NWSRA) (P.L. 90-542, 16 U.S.C. §§ 1271-1287).
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (P.L. 101-601, 25 U.S.C. §§ 3001-3013).
- Plant Protection Act of 2000 (PPA) (P.L. 106-224, 7 U.S.C. §§ 7701-7786).

Executive Orders

- Executive Order (EO) 11988, *Floodplain Management*, issued on May 24, 1977.
- EO 11990, *Protection of Wetlands*, issued on May 24, 1977.
- EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations*, issued on Feb. 11, 1994.
- EO 13007, *Indian Sacred Sites*, issued on May 24, 1996.
- EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, issued on Apr. 21, 1997.
- EO 13112, *Invasive Species*, issued on Feb. 3, 1999.
- EO 13166, *Improving Access to Services for Persons with Limited English Proficiency*, issued on Aug. 11, 2000.

- EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, issued on Jan. 10, 2001.

Code of Federal Regulations

- Determinations of Eligibility for Inclusion in the National Register of Historic Places (36 Code of Federal Regulations (CFR) § 63).
- Endangered and Threatened Plants (50 CFR § 17.12).
- Interagency Cooperation – Endangered Species Act of 1973, as amended (50 CFR § 402)
- Introduction, Definitions (50 CFR § 22.3).
- Migratory Bird Permits (50 CFR § 21).
- National Environmental Policy Act Implementing Procedures (7 CFR § 372 (1995)).
- National Primary and Secondary Ambient Air Quality Standards (40 CFR § 50).
- Occupational Safety and Health Administration Regulations (29 CFR §§ 1910 et seq.).
- Office of the Secretary of Agriculture Administrative Regulations (7 CFR §§ 1b, 2.22(a)(8), 2.80(a)(30)).
- Protection of the Environment (40 CFR §§ 122-503).
- National Pollutant Discharge Elimination System (40 CFR §§ 122-503).
- Protection of Historic Properties, as amended (36 CFR §§ 800 et seq.).
- Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material, as amended (40 CFR § 230).
- Water Quality Standards Regulation, as amended (40 CFR § 131).
- 404 Program Definitions; Exempt Activities Not Requiring 404 Permits, as amended (40 CFR § 232).
- 404 State Program Regulations, as amended (40 CFR § 233).
- Regulations for Implementing the Procedural Provisions of the NEPA (40 CFR §§ 1500-1508 (1978)).
- Texas (Splenetic) Fever in Cattle, as amended (9 CFR § 72).

Federal Register

- Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Plant *Astrophytum asterias* (Star cactus) (58 Federal Register (FR) 53804-53807 (1993) (50 CFR § 17)).
- Proposed Cattle Fever Tick Control Barrier in South Texas; Environmental Impact Statement (76 FR 8709 (2011)).

Texas Legislation

- Texas Clean Air Act of 1989, as amended (Texas Health and Safety Code (THSC) Chapter 382).
- Environmental Quality – Air Permitting (30 Texas Administrative Code (TAC) §§ 101-122 (1996, as amended)).
- Fever Ticks (4 TAC §§ 41.1-41.22 (2002, as amended)).
- Noxious and Invasive Plants (4 TAC §19.300 (2005, as amended)).
- Texas Pollutant Discharge Elimination System (30 TAC §§ 305.533, 305.541).
- Texas Invasive Species Coordinating Committee, Definitions (Texas Government Code § 776.001).
- Estrays and Livestock (6 Texas Agriculture Code §§ 142-143).
- General Disease and Pest Control, Definitions (Texas Agriculture Code § 161.001(a)).
- Tick Eradication (6 Texas Agriculture Code § 167).

List of Abbreviations and Acronyms:

AHPA	Animal Health Protection Act
APHIS	Animal and Plant Health Inspection Service
ARPA	Archaeological Resources Protection Act
BGEPA	Bald and Golden Eagle Protection Act
CAA	Clean Air Act
CAFO	Concentrated Animal Feeding Operation
CBP	Customs and Border Patrol
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFSPH	Center for Food Security and Public Health
CFTEP	Cattle Fever Tick Eradication Program
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FPPA	Farmland Protection Policy Act
FR	Federal Register
FWHA	U.S. Federal Highway Administration
FWS	U.S. Fish and Wildlife Service
IBWC	International Boundary and Water Commission, United States Section
MBTA	Migratory Bird Treaty Act
MDNR	Michigan Department of Natural Resources
NABCI	North American Bird Conservation Initiative
NAGPRA	Native American Graves Protection and Repatriation Act
NAS	National Audubon Society
NEPA	National Environmental Protection Act
NHPA	National Historic Preservation Act
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NRCS	Natural Resources Conservation Service
NWSRA	National Wild and Scenic Rivers Act
O_3	Ozone
Pb	Lead

$PM_{2.5}$	Particulate Matter <2.5 Micrometers
PM_{10}	Particulate Matter <10 Micrometers
PPA	Plant Protection Act
SAGARPA	Secretaría de Agricultura, Ganadería, Desarollo Rural, Pesca Y Alimentación (SAGARPA, or Ministry of Agriculture, Livestock, Rural Development, Fishing, and Food)
SO_2	Sulfur Dioxide
TAC	Texas Administrative Code
TAHC	Texas Animal Health Commission
TAMU	Texas A&M University
TB	Tuberculosis
TCEQ	Texas Commission on Environmental Quality
TCPS	Texas Center for Policy Studies
TEA	Texas Education Agency
THSC	Texas Health and Safety Code
TIPPC	Texas Invasive Plant and Pest Council
TISCC	Texas Invasive Species Coordinating Committee
TPWD	Texas Parks and Wildlife Department
TSHA	Texas State Historical Association
TSSWCB	Texas State Soil and Water Conservation Board
TXDOT	Texas Department of Transportation
TXRC	Texas Railroad Commission
U.S.C.	United States Code
USDA	United States Department of Agriculture
VOC	Volatile Organic Compound

Executive Summary

In this Draft Environmental Impact Statement, APHIS analyzes the environmental effects associated with a proposal to enhance the eradication effort against cattle fever ticks in South Texas. The proposed action is installation of approximately 70 miles of non-contiguous game fencing under agreements for cost-sharing with landowners. Recurrent cattle fever tick outbreaks are increasing in locations either within the Permanent Tick Quarantine Zone or outside of the zone in the cattle fever tick-free area of South Texas. The proposed fence would help prevent re-infestation of areas where the pest has been or is being eliminated.

Cattle fever ticks are agricultural pests of concern for U.S. livestock because they can cause devastating economic loss. If there was an extended tick outbreak, the overall economic impact, including control costs, is estimated to exceed $1.2 billion. These ticks reduce animal productivity by feeding on blood and inducing anemia. Ticks also spread protozoan parasites that cause disease. Symptoms of the tick-borne disease babesiosis include anemia, weight loss, and neurological disturbances. Since bovine babesiosis was eradicated from the United States in 1943, there has been no need to vaccinate cattle against the disease. All U.S. herds are considered “naïve hosts” because they have not been exposed or vaccinated to ticks and the diseases they carry. Consequently, U.S. cattle are more susceptible to extreme illness if infected.

There is strong evidence that stray or smuggled livestock and wildlife, such as white-tailed deer, play a role in the spread of cattle fever ticks. When these free-ranging animals enter pastures, the effectiveness of other ongoing tick eradication measures (such as vacating pastures and systematic tick treatments for cattle) becomes compromised. These tick hosts increase the potential for cattle fever ticks and disease to spread. Game fences ultimately contribute another tool toward cattle fever tick eradication and prevention efforts.

Summary of Alternatives

No Action Alternative

Under the No Action Alternative, APHIS would continue current program operations for cattle that help prevent the spread of ticks and potential exposure to disease. These activities include inspection of livestock, patrols for stray or smuggled livestock, vacating premises, and pesticide treatment on tick-host livestock (primarily cattle and horses) on quarantined premises.

Proposed Action Alternative

The Proposed Action Alternative would provide a cost-share toward installation of game fences, in areas with landowner consent, along the Permanent Tick Quarantine Line in four counties in Texas (Maverick, Starr, Webb, and Zapata Counties). The properties proposed for game fences are privately owned lands in rural locations and are primarily used for cattle ranching. APHIS proposes to provide a one-time APHIS cost-share with property owners; costs are expected to be $22,000 per mile of game fencing. APHIS would contract with landowners, and terms would ensure compliance with various aspects of the law. In areas where 8-foot game fencing already exists near and is parallel to the Permanent Tick Quarantine Line, this proposed fencing would connect with the existing fencing. The majority of the proposed fence locations border U.S. Highway 83.

Environmental Impacts

No Action Alternative

Impacts associated with the No Action Alternative arise as a consequence of ecological processes progressing over time. The primary impact is that introductions of ticks into new areas could lead to devastating and widespread outbreaks of disease in the U.S. cattle population. Outbreaks are projected to be met with increased use of pesticides, which are associated with increasing tick resistance. Because these pesticides are the same compounds as those currently used in northeastern Mexican States, eradication efforts are less likely to be successful over time. This leads to concerns about pesticide-resistant tick populations becoming established in the United States. With climate change occurring, favorable vegetation is expected to shift north across the country. These changes could further increase the potential for unrestricted tick spread in white-tailed deer populations, including stray native and exotic deer.

Beneficial impacts associated with this alternative include keeping intact the long-term connectivity of ocelot and jaguarundi populations between Mexico and Texas. Competition among native threatened or endangered plants and invasive species is not likely to occur as a consequence of the movement of construction equipment and soil disturbance.

Proposed Action Alternative

The potential effects on the quality of the human environment during construction of fence segments would involve transient and minimal impacts to soil, climate, air, water, vegetation, and local residents along the corridor of installation. These impacts would arise from site clearing, soil erosion, and stormwater runoff as the fence is installed. The continued presence of game fence segments (post construction) is not expected to alter land use, permanently impact water use or drainage (including floodplains and wetlands), or have visual impacts. Limited inadvertent dispersal of invasive species could occur during construction.

The proposed fencing has the potential to impact federally listed threatened and endangered species in South Texas; therefore, APHIS is engaged in formal consultation with the U.S. Fish and Wildlife Service. Fence construction under this alternative would not occur until this consultation is complete.

Livestock would benefit from game fencing by reducing the likelihood of disease transmission from wildlife. The game fence segments may impact wildlife by hindering access to forage and water resources during seasonal migration. Wildlife also has the potential to collide with or become ensnared in the fencing.

Increased cattle fever tick eradication efforts are essential to prevent tick reestablishment and disease outbreaks. Outbreaks would lead to increased use of pesticides, the development of pesticide-resistant strains, increased control costs, and quarantines throughout the county. The use of game fences as an additional tool against cattle fever tick re-infestation would reduce the economic burden that extends to the U.S. government and taxpayers by reducing the potential for pest entry. The proposed fence is expected to create a minimally intrusive pest control measure that augments existing programs.

I. Purpose and Need

A. Federal Agency Mission and Relation to the Proposed Action Examined in This Document

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Veterinary Services protects and improves the health, quality, and marketability of U.S. animals, animal products, and veterinary biologics by (1) preventing, controlling, and/or eliminating animal diseases and (2) monitoring and promoting animal health and productivity. Veterinary Services derives its mission from the AHPA (7 U.S.C. §§ 8301-8317).

APHIS received emergency funding in 2009 for an enhanced eradication effort against the cattle fever tick in Texas. The ticks threaten animal health by spreading a severe and often fatal disease of cattle. As part of the continued enhanced eradication effort for this disease-spreading pest, APHIS requested funding to install game fencing in rural areas of cattle production where recurrent cattle fever tick outbreaks continue to occur in locations either within the Permanent Tick Quarantine Zone or outside of the zone in the cattle fever tick-free area of South Texas. The fence would help prevent re-infestation of areas where the pest has been or is being eliminated.

The Permanent Tick Quarantine Zone is an approximately 580-mile-long stretch of land from Del Rio to Brownsville, Texas, ranging in width from almost 125 yards (0.07 miles) to approximately 8 miles. The Permanent Tick Quarantine Line defines the boundary between the Permanent Tick Quarantine Zone and the tick-free area and is defined in regulations enforced by the Texas Animal Health Commission (TAHC) whose mission includes cattle fever tick eradication for protecting livestock health in Texas. This line runs along the existing roads and highways near the U.S./Mexico border through eight South Texas counties (Val Verde, Kinney, Maverick, Webb, Zapata, Starr, Hidalgo, and Cameron).

B. National Environmental Policy Act and the Proposed Action Examined in This Document

Why did APHIS prepare an environmental impact statement (EIS)?

As a Federal Government agency subject to compliance with NEPA (42 U.S.C. 4321-4347), APHIS prepared this EIS in accordance with the applicable implementing and administrative regulations (40 CFR §§ 1500-1508; 7 CFR §§1b, 2.22(a)(8), 2.80(a)(30), 372). APHIS will consider potential significant environmental effects on the quality of the human environment[1] caused by providing a cost share toward installation of game fencing by landowners in four of the counties (Maverick, Starr, Webb, and Zapata Counties) along the Permanent Tick Quarantine Line. The intent of game fencing is to help prevent the spread of cattle fever ticks to U.S. cattle populations from free-ranging tick hosts, such as stray or smuggled livestock from Mexico and wildlife ungulates (hoofed animals), including white-tailed deer. The fencing would ultimately contribute another tool towards eradication and control efforts.

Although APHIS began preparing an environmental assessment (EA) for the fencing,[2] the CEQ NEPA implementing regulations provide that one of the factors that renders an action "significant" is the presence of a federally listed threatened or endangered species or its critical habitat, according to the ESA (16 U.S.C. §§ 1531-1544). While the EA was underway, APHIS confirmed that the scope of the proposed action would extend to potential effects on threatened and endangered species and/or critical habitat in some locations and potentially to other factors as described in the CEQ NEPA regulations (40 CFR § 1508.27). Therefore, APHIS determined a need to examine the significance (context) and the severity of the impact (extent) on federally listed threatened and endangered species and on other factors from building the fence. APHIS prepared and is making available for public comment this Draft EIS on the proposed fence to examine the full scope of effects, both short- and long-term, and the intensity of the impact on the human environment from the following factors:

- impacts that may be both beneficial and adverse,
- the degree to which the proposed action affects human health or safety,

[1] The "human environment" is interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment (40 CFR § 1508.14).

[2] APHIS' NEPA Implementing Procedures classify actions seeking to remedy specific animal health risks as actions normally requiring preparation of environmental assessments (7 CFR § 372.5(b)(1)).

- unique characteristics of the geographic area such as proximity to historic or cultural resources, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas,
- the degree to which the effects on the quality of the human environment are likely to be highly controversial,
- the degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks,
- whether the action is related to other actions with individually insignificant but cumulatively significant impacts,
- the degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources, and
- the degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the ESA.

How was the public involved in the scoping process for this Draft EIS?

Scoping is an open and early process for determining the scope of the issues to be addressed and for identifying the significant issues related to a proposed action in the EIS. Public scoping is required under CEQ NEPA regulations. Scoping for this EIS began on February 15, 2011, when APHIS gave notice of its intent (76 FR 8709) to prepare an EIS for the proposed tick control barrier in South Texas. The notice stated that the following issues would be discussed in the EIS:

- Effects on wildlife, including consideration of migratory bird species and changes in native wildlife habitat and populations.
- Effects on federally listed threatened and endangered species.
- Effects on the soil, vegetation, and water from the installation of game fencing.
- Effects on local residents, including impacts on daily activities.
- Effects on human health and safety in the proposed tick barrier locations during and after the installation of game fencing.
- Effects on cultural and historic resources.

The notice solicited public involvement in the form of either oral or written comments on the proposed fence installation. A total of 96 people attended four public scoping meetings held by APHIS in South Texas in 2011: March 7 in Rio Grande City; March 8 in Zapata; March 9 in Laredo; and March 10 in Eagle Pass. A Spanish translator was available at each meeting. APHIS received numerous comments in addition to questions from meeting attendees. We also invited public comments through the Federal eRulemaking portal at www.regulations.gov, and Postal mail or commercial delivery to APHIS in Riverdale, Maryland. We received 10 comments via the regulations.gov web site. Main issues raised by commenters included the location of the tick barrier; coordination of tick control efforts with other agencies; impacts of the fence on wildlife, ranchers, hunters, and residents of colonias; and efficacy of the tick barrier. APHIS has posted a summary of the scoping comments on the web page for this EIS at http://www.aphis.usda.gov/animal_health/animal_diseases/tick/.

In addition to the scoping notice, APHIS provided outreach opportunities for stakeholders to receive information about the proposed tick barrier, scoping process, and public meetings. These include:

- Web page for the CFTEP Tick Control Barrier EIS. http://www.aphis.usda.gov/animal_health/animal_diseases/tick/.
- Letters to Federal, State, and local public agencies, such as: USDA; U.S. Fish and Wildlife Service; U.S. Department of Homeland Security; U.S. Army Corps of Engineers; Texas Parks and Wildlife; Office of the Texas Secretary of State, including the Colonia Initiatives Program; Texas Farm Services Agency; Texas Animal Health Commission; County Commissioners' Courts; Texas Department of Transportation; Texas Rural Development; Texas Commission on Environmental Quality; and Texas Farm Bureau.
- Local newspaper press releases.
- Door-to-door distribution of flyers about public meetings in English and Spanish by APHIS personnel prior to meetings. These flyers were also posted in public places near colonias.

How and why is APHIS making the Draft EIS available for public comment?

In accordance with requirements under APHIS' NEPA Implementing Procedures, APHIS is making this document available to the public for comment through the Federal Register and also is mailing copies of the EIS to members of the public and public agencies who indicated an interest in receiving a copy of the document at public meetings and through the APHIS website at http://www.aphis.usda.gov/animal_health/animal_diseases/tick/. Providing public notice of an environmental document to interested or affected persons and agencies is consistent with requirements under CEQ and APHIS NEPA regulations (40 CFR § 1506.6(b) and 7 CFR §§ 1b, 372, respectively).

C. Background Information Related to the Proposed Action

What is the proposed action and why is the action being proposed?

APHIS proposes to provide funding toward the installation of game fencing, upon landowner consent and agreement to cost-sharing, in rural areas near the Permanent Tick Quarantine Line in Maverick, Starr, Webb, and Zapata Counties, Texas, where cattle fever tick (*Rhipicephalus* (*Boophilus) annulatus*) and southern cattle tick (*Rhipicephalus* (*Boophilus) microplus*) infestations have recurred in recent years. These infestations cause lengthy quarantine restrictions on cattle herds and increased herd management efforts and expenses to cattle producers in the tick-free zone in South Texas. We provide more details about the proposed action in chapter 2.

Why are the ticks a concern?

The cattle fever tick *(R. annulatus)* and the southern cattle tick *(R. microplus)* (both referred to as "cattle fever ticks") are agricultural pests of concern for U.S. livestock. The cattle fever ticks infest cattle, and—occasionally—horses, mules, sheep, goats, or deer. The ticks must have blood from an animal host to complete their life cycles. As they feed, these ticks spread (are vectors of) protozoan parasites of the genus *Babesia* (blood parasites), the causative agent of babesiosis (also called Texas fever, tick fever, redwater, or bovine piroplasmosis). Bovine babesiosis is caused by at least two of seven *Babesia* species that infect cattle -- *B. bigemina* and *B. bovis*. The ticks acquire *Babesia* infection during their feeding on infected cattle. The infection settles in the ovaries of the ticks and thus larvae from infected female ticks carry the infection.

The parasites continue to develop within the larvae, and their transmission to the cow or other host usually occurs when the nymph and adult stages of the infected ticks feed on the host (Barros and Fighera, 2008). *Babesia bigemina* and *B. bovis* have been discovered in free-ranging white-tailed deer in northeastern Mexico — these deer serve as a reservoir of infection that can spread to cattle via cattle fever ticks in South Texas (Cantu-C et al., 2009).

The ticks and their associated diseases, especially bovine babesiosis, or cattle fever, pose serious problems to warm-blooded animals. Babesiosis is generally characterized by extensive loss of red blood cells due to breakdown of the cellular membrane. This leads to anemia, jaundice, and death. Infected cattle may exhibit neurological disturbances characterized by incoordination, seizures, muscle tremors, hyperexcitability, aggressiveness, blindness, head pressing, and coma. In addition, the two cattle fever tick species are capable of causing blood loss, significant damage to hides, and an overall decrease in the health condition of livestock. Less severe cases may be characterized by weight loss and secondary bacterial infections. Due to these wide ranging symptoms, babesiosis can cause devastating economic losses to owners of affected herds (CFSPH, 2008). More details about bovine babesiosis, including species affected, geographic distribution, transmission, and clinical signs can be found through Iowa State University's Center for Food Security and Public Health at http://www.cfsph.iastate.edu/DiseaseInfo/disease.php?name=bovine-babesiosis&lang=en.

The cattle fever tick life cycle consists of four stages: egg, larva, nymph, and adult (figure 1-1). Cattle fever ticks are a one-host tick, meaning that they feed on only one host during their life stages (larva, nymph, and adult); however, a blood-engorged female tick releases 1,000 to 2,000 eggs into the surrounding environment after detaching from the host and before dying on the ground. This starts the life cycle again, and new hosts are sought by the larva after the eggs hatch. Many adult ticks are olive green; others are mottled yellow or olive brown in appearance.

Figure 1-1. Cattle fever tick life stages (from left to right; larva, nymph, adult engorged female). Photo credit: USDA, APHIS.

Cattle fever ticks spend the early part of their lives on the ground. Newly hatched seed ticks, or larvae, are barely visible to the unaided eye. These waxy brown, six-legged ticks crawl up grass or shrubs and wait to attach to a passing host. The ticks require blood from a host to complete their life cycles. If ticks do not find a host, they eventually die of starvation and desiccation (extreme dryness). In summer, seed ticks may starve after 3 to 4 months; in colder periods, they may survive for 6 months before starvation. Cattle fever ticks are host-specific and are able to complete their life cycles on cattle (their preferred host), horses, donkeys, white-tailed deer, and other animals including axis deer, red deer, elk, nilgai antelope, and aoudad (Anderson et al., 2010).

After a host is found, seed ticks usually first attach themselves to soft skin inside the animal's thigh, flanks, and forelegs or along the belly and brisket. There, they suck blood, or engorge. Then these ticks molt twice: seed ticks develop into eight-legged nymphs; after engorging about a week, nymphs molt to become adults. Tick feeding causes blood loss, and they have the potential to transmit *Babesia* parasites to cattle, which subsequently could cause bovine babesiosis.

In the absence of cattle fever ticks in tick-free areas, the disease bovine babesiosis does not occur and the consequence is that cattle do not have a natural immunity to the disease. However, cattle that carry *Babesia* species and that also bear cattle fever ticks are capable of introducing babesiosis into a tick-free area, provided that the timing coincides with favorable weather conditions from the second generation of ticks (infected by transovarian transmission) to transmit the disease to cattle. Likewise, other animals that carry *Babesia* species and that also bear cattle fever ticks, such as white-tailed deer and nilgai antelope (Cardenas-Canales et al., 2011), are capable of introducing babesiosis into a tick-free area.

We are concerned about the role of deer, since deer can serve as effective cattle fever tick hosts and therefore distribute engorged female ticks within their core areas and home ranges (Pound et al., 2010; Anderson et al., 2010). In one study, home ranges of white-tailed deer, males and females, in the western plains of South Texas were measured to be approximately 264 and 189 hectares (652 and 467 acres; note: 1 square mile = 640 acres), respectively (Fulbright and Ortega-S, 2006). Southern cattle ticks have been found on hunter-killed white-tailed deer on properties vacated of cattle for as long as 10 years (Pound et al., 2010).

Since bovine babesiosis was eradicated from the United States in 1943, there has been no need to vaccinate cattle against the disease. However, naïve host cattle that have not been exposed or vaccinated are more susceptible to extreme illness if infected.

What is the history of U.S. efforts taken against these ticks?

The cattle fever ticks were introduced to the New World through livestock brought from other countries by colonists and explorers in the early 1500s (Anderson et al., 2010). These tick species once occurred in large areas of the United States (see figure 1-2) and still occur in a permanent quarantine or “buffer” zone (referred to in this document as the Permanent Tick Quarantine Zone) of South Texas, in Mexico, and throughout tropical and subtropical regions of the Western Hemisphere.

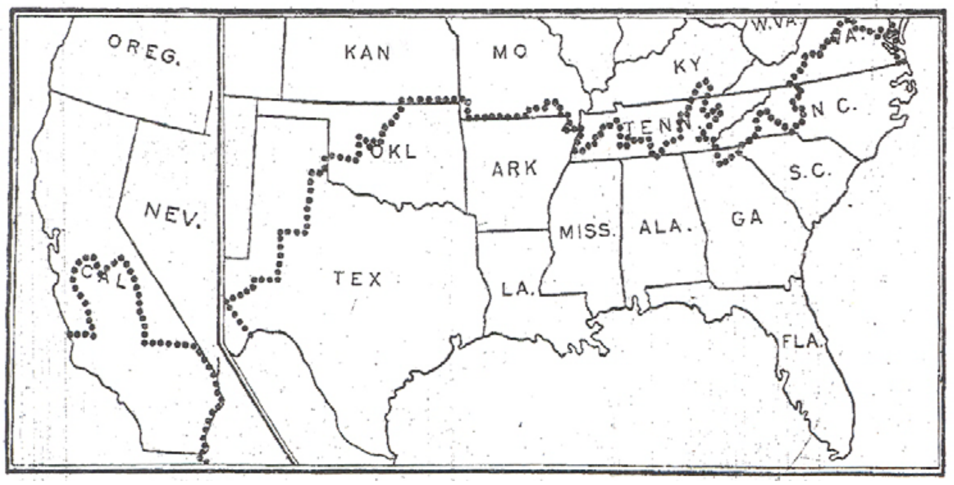

Figure 1-2. Early 1900s range of cattle fever ticks and southern cattle ticks in the United States. Credit: Ellenberger and Chapin, 1940.

In the late 1800s, the association between cattle fever ticks and “Texas fever” was identified based on research by three scientists (Pound et al., 2010). In the early 1900s, when large areas of the United States[3] were affected with the cattle fever tick and the southern cattle tick, the U.S. Congress initiated a tick eradication program. Established in 1906, the Cattle Fever Tick Eradication Program (CFTEP) was the first cooperative State-Federal eradication effort, beginning the sharing of costs and cooperation between the Federal Government and 14 southern and southeastern States and California (see figure 1-2), local governments within each of those States, and individual livestock producers (Houck, 1921, *in* Pound et al., 2010).

From the beginning of the eradication effort, program participants developed, tested, and discarded or refined tick eradication techniques, eventually narrowing options to two that became commonly used:
(1) pasture vacation, i.e., the removal of all host livestock from infested pastures or premises for a continued period of time that would ensure that cattle fever tick larvae would not survive in the absence of hosts and
(2) systematically treating all cattle, horses, and mules topically with an acaricide (pesticide) every 2 weeks until the livestock and premises were free of cattle fever ticks (Mohler, 1942, *in* Pound et al., 2010). Cattle and equine (horses, mules, and donkeys) were the focus of the early national tick eradication effort.

---

[3] The tick-infested area included all or parts of 14 southern and southeastern States, i.e., Texas, Oklahoma, Louisiana, Arkansas, Mississippi, Alabama, Tennessee, Kentucky, Missouri, Florida, Georgia, South Carolina, North Carolina, Virginia, and a portion of southern California, totaling 1,813,000 square kilometers (about 700,000 square miles) (Bram et al., 2002).

In 1938, the focus of the eradication effort in Florida changed to include more than cattle when it was determined that white-tailed deer were a contributing factor in Florida's continuing eradication battle in the central and southern areas of the State. In 1939, Florida targeted and substantially reduced the deer population in the Everglades in a successful effort to stop cattle fever tick infestations on wildlife (as reported in "Tick Riders -- Texas-style Border Guards Protect Livestock Health", September 24, 1999; available at http://www.southernlivestock.com/articles/industry_news/tick_riderstexasstyle_border_guards_protect_livestock_health.3783.sls). The effort in Florida against the cattle fever ticks also included construction of an 80-mile, 6-strand, electrified, barbed-wire fence by wildlife managers. The purpose for the fence barrier was to restrain tick-infested deer to areas south of the fence, thereby preventing spread of the southern cattle tick to cattle north of the fence (McAtee, 1939). Cattle also continued to be part of Florida's tick eradication efforts. In 1943, the quarantine was lifted for Florida; however, there were several subsequent tick infestations through 1961.

In Texas, white-tailed deer had not been a part of the early tick eradication program focus. White-tailed deer populations were described to be at an all-time low in Texas around 1890 (McDonald et al., 2004). Pound et al., 2010, discussed that white-tailed deer populations were low or nearly extinct in most of the early tick eradication program efforts in 14 of 15 cattle fever tick-affected States (except for Louisiana and noting the unavailable estimates of white-tailed deer population for Florida through 1935). Over-hunting and the lack of hunting laws and enforcement were responsible for the decrease in deer populations in the late 1800s and early 1900s. It is important to note that hunting laws, such as the designation of a deer hunting season, were not established and enforced throughout Texas until the late 1950s and early 1960s (Smyrl, 2013).

Screwworm, an obligate parasite of the screwworm fly, affects both livestock and wildlife species, including white-tailed deer. Heavy infestation of screwworms contributed to limited white-tailed deer population growth in the early to mid-1900s (Strickland et al., 1981). Endemic screwworm populations were eradicated from Texas and New Mexico in 1964; however, new infestations continued to appear in Texas along the Mexican border. An agreement with Mexico in 1972 led to a combined effort to eradicate screwworms from Mexico and prevent further incursions into the United States. Screwworms were officially eradicated from the United States in 1982, and the majority of northern Mexico was considered screwworm-free by 1981 (Novy, 1991). As a result, white-tailed deer populations increased due to the absence of the screwworm during the 1970s. Therefore, native white-tailed deer were not as important through the mid-century as they are today in maintaining and spreading cattle fever ticks throughout South Texas because their populations remained low through the mid- to late-1900s.

In 1938, the buffer zone, or Permanent Tick Quarantine Zone, was established at the U.S./Mexico border in South Texas where the cattle fever ticks continued to be a problem (see figure 1-3 for current regulated quarantine zone). In 1943, the two species of cattle fever ticks, *R. annulatus* and *R. microplus*, were eradicated from the United States, with the exception of the Permanent Tick Quarantine Zone, which serves as a buffer area for conducting surveillance in Texas along the border with Mexico.

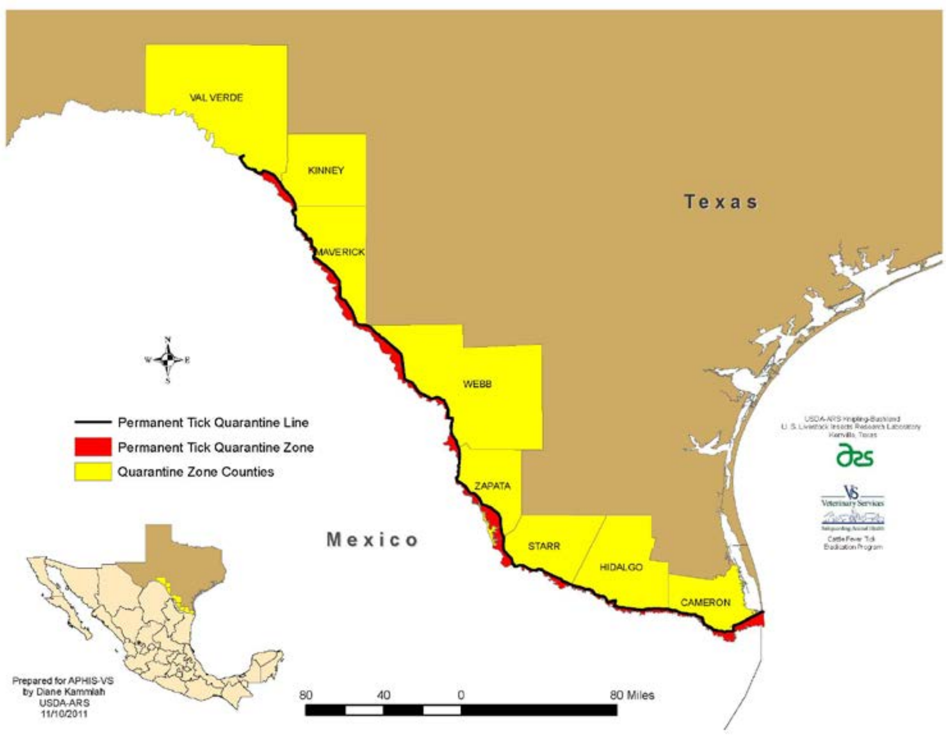

Figure 1-3. Map of the current Permanent Tick Quarantine Zone and Permanent Tick Quarantine Line (boundary between the quarantine zone and tick-free area) within eight Texas counties.

After 1943, efforts against the cattle fever ticks were concentrated in Texas' Permanent Tick Quarantine Zone, and annual cattle fever tick infestations in the quarantine zone were often traced to movement (stray and illegal) of cattle and equine from Mexico. Recurring cattle fever tick outbreaks in both the Permanent Tick Quarantine Zone and in the tick-free zone were resolved with pasture vacation and systematic treatment of cattle with a topical acaricide—two of the tools still used today. Although the ticks were eradicated from most of Texas by 1943, vigilant efforts against the ticks continued because of the existence of cattle fever ticks in Mexico in the border states of Tamaulipas, Nuevo Leon, and Coahuila across the Rio Grande and their potential movement via stray or smuggled cattle and wildlife, especially deer.

By 1961, when the last U.S. pocket of the southern cattle tick was eliminated from Florida, direct and indirect economic losses caused by cattle fever ticks were high—estimated to be $130.5 million, which would be approximately $3 billion today (APHIS, 2010). If the ticks had not been eradicated from the United States, today's cattle industry's losses from disease and ticks could amount to approximately $1 billion annually (APHIS, 2010).

In 1965, the Bureau of Animal Industry (APHIS' predecessor agency) approved the use of low-height, double fences for release of premises from cattle fever tick quarantine within the Permanent Tick Quarantine Zone (figure 1-4). Double-fence placement was primarily located along the ridge next to the Rio Grande. The fence was not placed on the river banks because sections could be washed away or damaged due to unpredictable flooding of the Rio Grande. The double fencing was required to be at least 15 feet apart and to each have a minimum of 6 barbed wires, with a minimum height of 52 inches (slightly higher than 4 feet) and no less than 12 inches from the ground. The area between the double fences was required to be kept free of vegetation (to serve as a buffer for cattle fever ticks), and cattle guards were required at entrances of the quarantined areas used for operations other than ranching. This requirement focused on keeping stray livestock from accessing the premises surrounded by the double fences. This effort later proved to be an unsuccessful attempt to allow changes to the Permanent Tick Quarantine Line (and Zone), partly because of the cost and labor involved in maintaining the fences (owing to the fence design and large areas covered) and vegetation removal, but mainly because the double fencing did not prevent ungulate (having hooves) wildlife cattle fever tick hosts from moving ticks beyond low-fenced areas.

Figure 1-4. Double fences remain years later after the CFTEP 1965 double fence effort (see barbed-wire fence on left and right in photo) to move the quarantine zone closer to the Rio Grande. Photo credit: USDA, APHIS.

Approximately 80 miles of double fencing were erected within the northern area of the Permanent Tick Quarantine Zone (Val Verde, Kinney, Maverick, and Webb Counties) bordering Mexico during the 1960s and 1970s; however, due to the increased number of tick outbreaks on the other side of the fencing, the Permanent Tick Quarantine Line was moved back to its original locations in the late 1980s and 1990s. Further complicating the control of cattle fever ticks, the Inter-American Development Bank funding for cattle fever tick eradication in Mexico was discontinued in June 1981, thereby reducing the progress of eliminating cattle fever ticks from along the U.S./Mexico border.

The Permanent Tick Quarantine Zone extends through parts of eight counties of Texas parallel with the Rio Grande (the geographical and political division between Mexico and the United States). The eight counties whose southern boundaries contain a portion of the Permanent Tick Quarantine Zone are as follows (from north to south): Val Verde, Kinney, Maverick, Webb, Zapata, Starr, Hidalgo, and Cameron (see figure 1-3). The distance of the Zone is 583 miles along the Rio Grande from Del Rio, Texas, to the Gulf of Mexico, and the width of the Zone varies from nearly 125 yards (0.07 miles--an area in Maverick County) to 8.01 miles wide (an area in Cameron County) from the border with

Mexico. The narrow Zone serves as a buffer between Mexico and the rest of the cattle fever tick-free United States, referred to in this document as the "tick-free area." The ticks are well-established in Mexico and continue to be a source of infestation in eradicated areas in Texas along the Rio Grande. To this day, cattle producers in the Permanent Tick Quarantine Zone continue to operate under a special quarantine where vigilant surveillance efforts against the cattle fever ticks by State and Federal inspectors continue for the protection of U.S. cattle health.

What has changed?

White-tailed Deer

In 1968, cattle fever ticks were discovered on white-tailed deer in ranches in Dimmit County and southern cattle ticks were discovered on deer in other areas in later years, raising concern about the role of white-tailed deer and cattle fever tick outbreaks in the tick-free area. Since then, more evidence has been gathered on the role of white-tailed deer as suitable cattle fever tick hosts and their importance in tick eradication efforts, which has led APHIS to believe that fencing is a worthwhile endeavor to control cattle fever ticks.

Studies have shown that white-tailed deer are suitable hosts for cattle fever ticks (Graham et al., 1972, *in* Pound et al., 2010). In the 1970s, chronic cattle fever tick infestations on ranch properties in Webb County north of Laredo, Texas, were not resolved by pasture vacation. In 1979, after sampling white-tailed deer in an area of Webb County, a study demonstrated that white-tailed deer sustained the existence of and spread cattle fever ticks within pastures vacated of cattle. This study reinforced the conclusion from an earlier study that white-tailed deer can support cattle fever ticks within vacated pastures and from another study that white-tailed deer distribute the ticks from infested to non-infested pastures.

Success of Fencing

The chronic tick infestations and confirmation of white-tailed deer as a source of cattle fever tick sustenance and spread in vacated pastures prompted a cattle rancher in Webb County to erect game fencing along 17.2 miles of property parallel with the Permanent Tick Quarantine Line.

He installed cattle guards at the northern and southern ends of the high fence line on access dirt roads. This high fencing effort was successful in preventing cattle fever tick reinfestations outside the Permanent Tick Quarantine Zone in the tick-free area since its completion in 1984 (see figure 1-5). High fencing was later constructed surrounding the entire property from the Permanent Tick Quarantine Line to the Rio Grande ridge during the mid-1990s. Enclosing this premises with high fencing has been successful in drastically reducing tick reinfestations in this area of the Permanent Tick Quarantine Zone in Webb County since 1997 (see figure 1-5). More importantly, no tick infestations have been discovered in the adjacent free area since 1981.

The following explanations provide additional context to the shaded areas in figure 1-5:

- In 1996, there were two pastures in the Permanent Tick Quarantine Zone that were undergoing the mandatory 9-month quarantine period during fence construction.
- In 2009, two pastures were placed under quarantine due to cattle fever ticks that most likely were introduced by wildlife from Mexico that traversed an opening between premises with high fencing.

<u>Hunter Involvement</u>

Since the late 1990s, cattle fever ticks continue to be found on hunter-killed white-tailed deer taken on properties that have been cattle-vacated for several years (Pound et al., 2010). This suggests that deer can maintain a population of cattle fever ticks, even in the absence of cattle. The following factors are related to an increased risk of white-tailed deer sustaining and spreading cattle fever ticks (Pound et al., 2010): (1) density and geographic distribution of deer populations, (2) quality of deer habitat and browse abundance, and (3) quality of deer habitat and microhabitat for cattle fever tick survival.

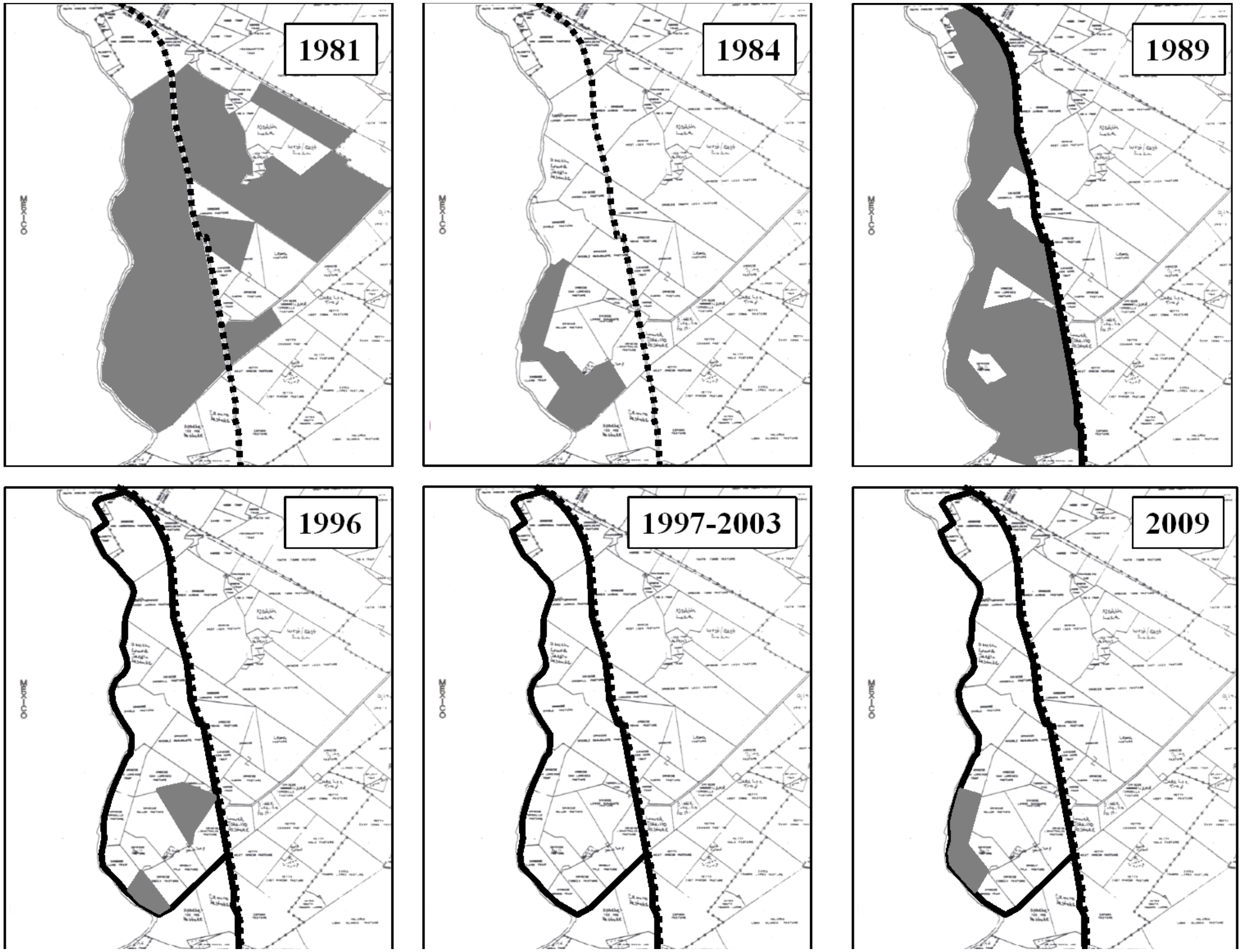

Figure 1-5. High fencing project in Maverick County showing infested and exposed pastures to cattle fever ticks (gray shaded areas) before construction of the high fence along the Permanent Tick Quarantine Line (dotted black line) in 1981, after construction of the high fence (solid black line) along the Permanent Tick Quarantine Line in 1984, and after construction of the high fencing surrounding the entire property located in the Permanent Tick Quarantine Zone (1996-2009).

Cattle Fever Tick Infestations

Figure 1-6 shows the number of cattle fever tick infestations in the Permanent Tick Quarantine Zone and the tick-free area from 1959 to 2011. Between 1978 and 2003, the number of new tick infestations stayed below 40 discoveries per year in both the areas. In 2004, a marked increase in the number of cattle fever tick infestations occurred (more than 70 discoveries) in the Permanent Tick Quarantine Zone owing to changes in the TAHC regulations that permit premises to be designated as infested and quarantined when a cattle fever tick is found on hunter-killed or live white-tailed deer. Prior to 2004, premises were quarantined only when cattle fever ticks were found on cattle Pound et al., 2010). The finding of one cattle fever tick is defined as an outbreak or infestation, based on the principle that it takes some level of tick population in existence to make the population large enough to find the first one (Anderson et al., 2010). Domestic deer are considered livestock by Texas (4 TAC § 41.1(14)(2002). Also, nonindigenous deer are considered as exotic livestock (Texas Agriculture Code § 161.001(a)(4)). Therefore, CFTEP personnel may require treatment of deer in vacated premises (Pound et al., 2010).

Information in table 1-1 correlates with the graph in figure 1-6 depicting cattle fever tick infestations for fiscal years 2001-2011 (a fiscal year is based on a time period of October 1 through September 30).

Table 1-1. Cattle Fever Tick Infestations in the Permanent Tick Quarantine Zone and Tick-free Area of South Texas (2001-2011)

Fiscal Year	*Permanent Tick Quarantine Zone*	*Tick-free Area*	*Annual Total*
2001	14	5	19
2002	11	5	16
2003	15	4	19
2004	74	20	94
2005	78	39	117
2006	50	15	65
2007	59	25	84
2008	85	47	132
2009	61	85	146
2010	68	22	90
2011	71	37	108

As indicated in figure 1-6 and table 1-1, in more recent years, cattle fever tick infestations, based upon the revised TAHC definition, began to rise sharply starting in 2004 in both the Permanent Tick Quarantine Zone and

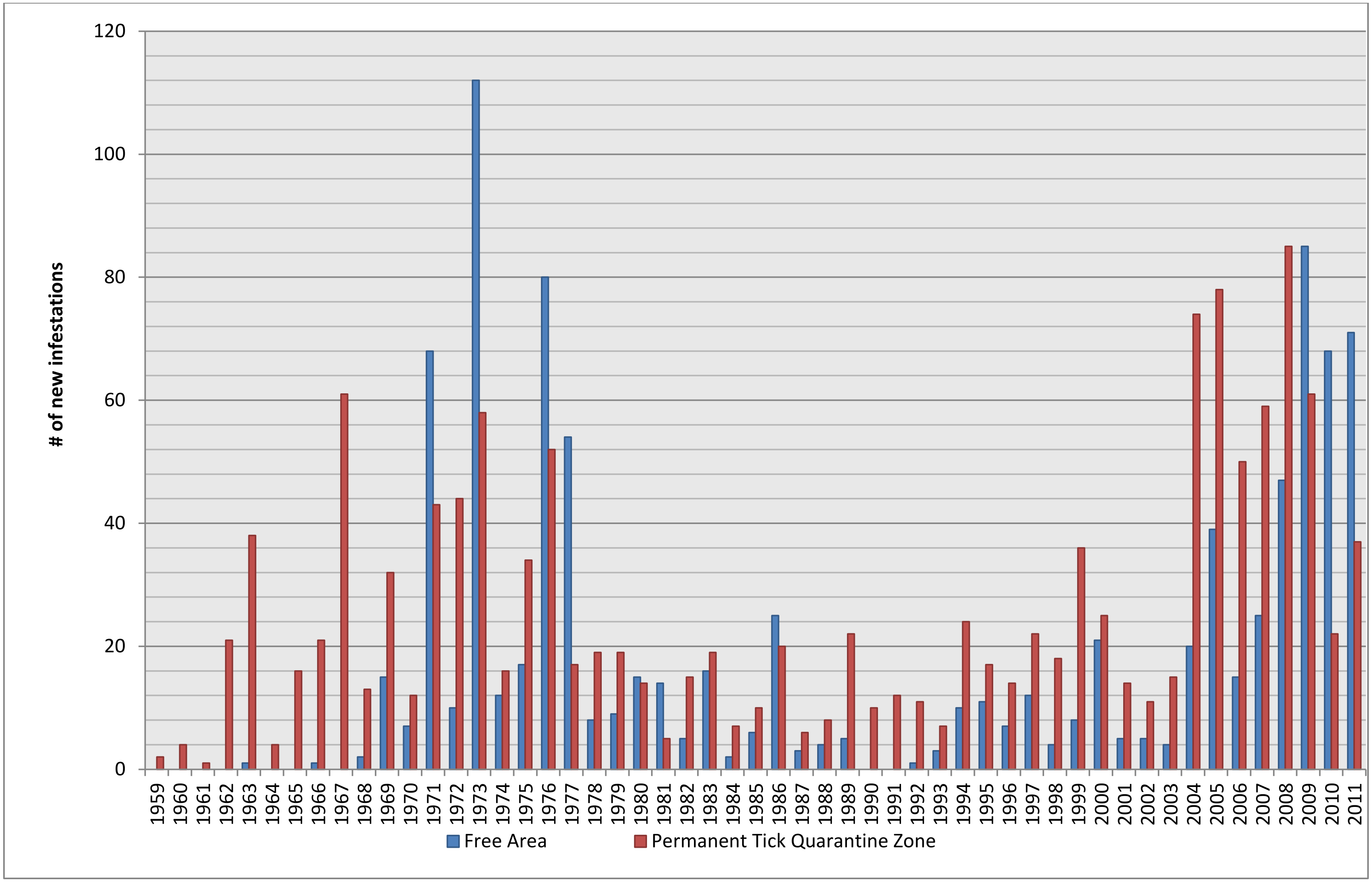

Figure 1-6. Cattle fever tick infestations in Texas by fiscal year, October 1, 1959 – September 30, 2011. Credit: USDA, APHIS.

the tick-free area and continue to remain high. The locations of infestations from 2004 through 2011 are shown in figures 1-7 through 1-14. The increase in infestations resulted in large portions of the tick-free area being designated as Temporary Preventative Quarantine Areas during fiscal years 2007 through 2011 (see figures 1-10 through 1-14).

APHIS attributed tick infestations for fiscal years 2004 through 2009 to cattle, white-tailed deer, and exotic wildlife, including red deer from Mexico (for additional information see wildlife discussion below; Pound et al., 2010). APHIS also attributed more infestations to white-tailed deer during the October-February period than compared to cattle at the same time, further noting that the October-February period coincides with the annual deer hunting season and reasoning that deer are inspected by hunters and Texas Parks and Wildlife Department personnel more often during this time of year (Pound et al., 2010).

The 2010 report also summarizes the results of the examination of live-captured deer in cattle-vacated pastures in the counties of Maverick, Starr, Webb, and Zapata during 2005 through 2009, indicating that high percentages of the deer are infested with cattle fever ticks during other times of the year as well.

In 2009, a Temporary Preventative Blanket Quarantine of more than 1 million acres in South Texas was established by the TAHC (see figure 1-12) because of cattle fever tick outbreaks. This represented the largest area under CFTEP quarantine in more than 40 years (Anderson et al., 2010).

What are the factors related to the control of cattle fever ticks?

Although there is no specific answer with certainty, numerous factors add to the challenges associated with recurring cattle fever tick infestations.

Wildlife

Native and exotic deer species that serve as hosts for cattle fever ticks are abundant in South Texas (Pound et al., 2010). Wild or feral animals such as white-tailed deer, red deer, nilgai antelope, and stray livestock (cattle and horses included) migrate from Mexico cross the Rio Grande in areas

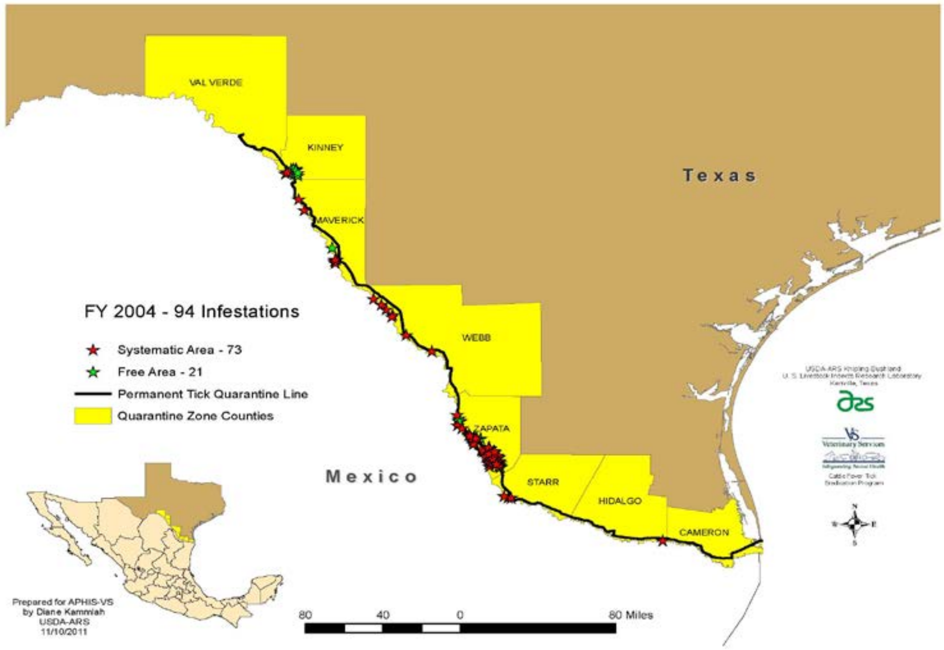

Figure 1-7. Locations of cattle fever tick infestations during fiscal year 2004 (October 1, 2003, through September 30, 2004).

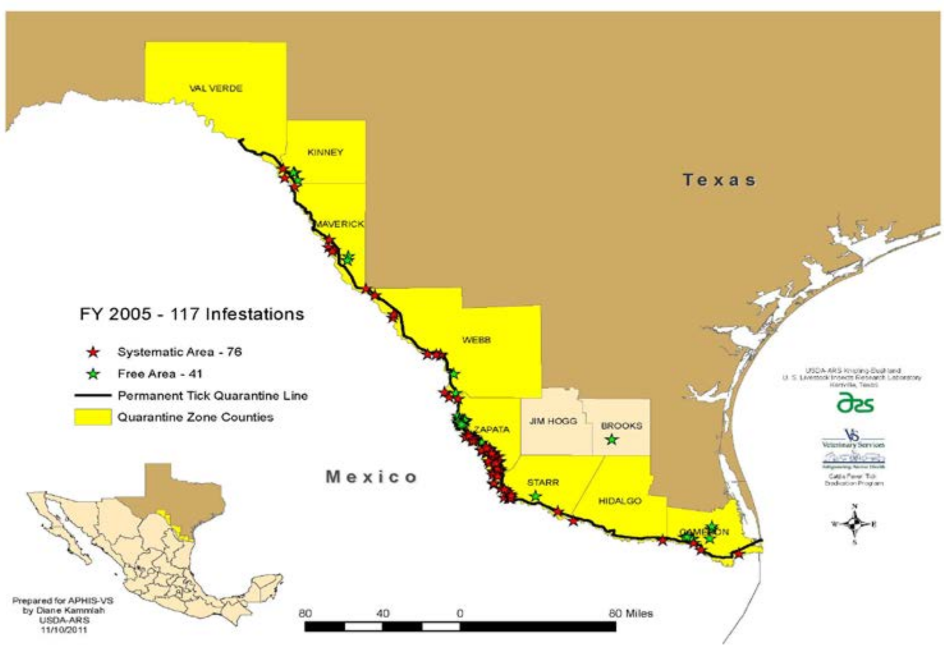

Figure 1-8. Locations of cattle fever tick infestations during fiscal year 2005 (October 1, 2004, through September 30, 2005).

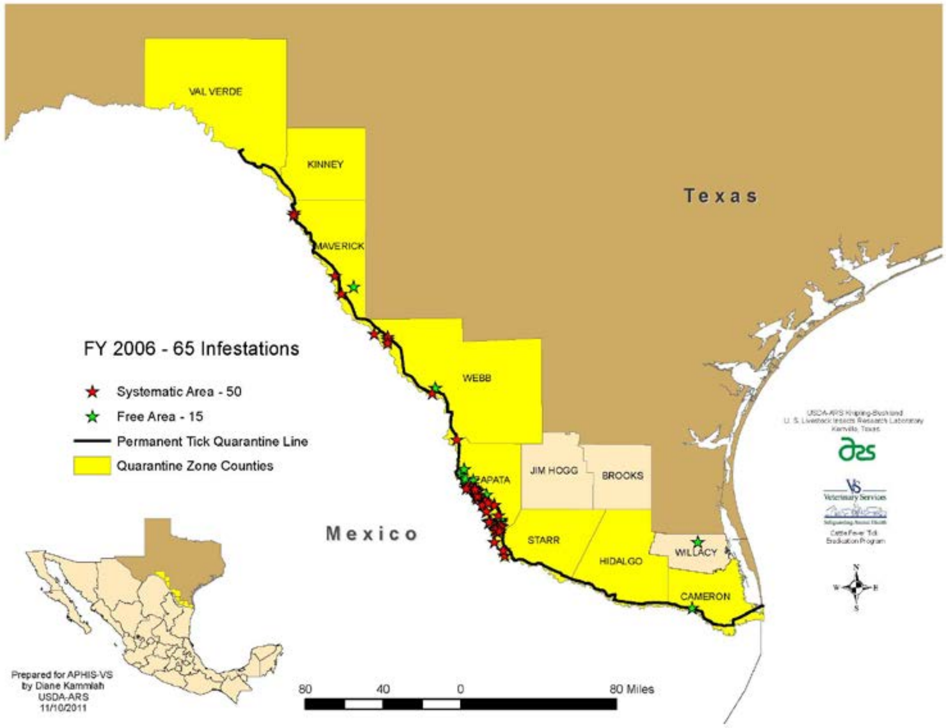

Figure 1-9. Locations of cattle fever tick infestations during fiscal year 2006 (October 1, 2005, through September 30, 2006).

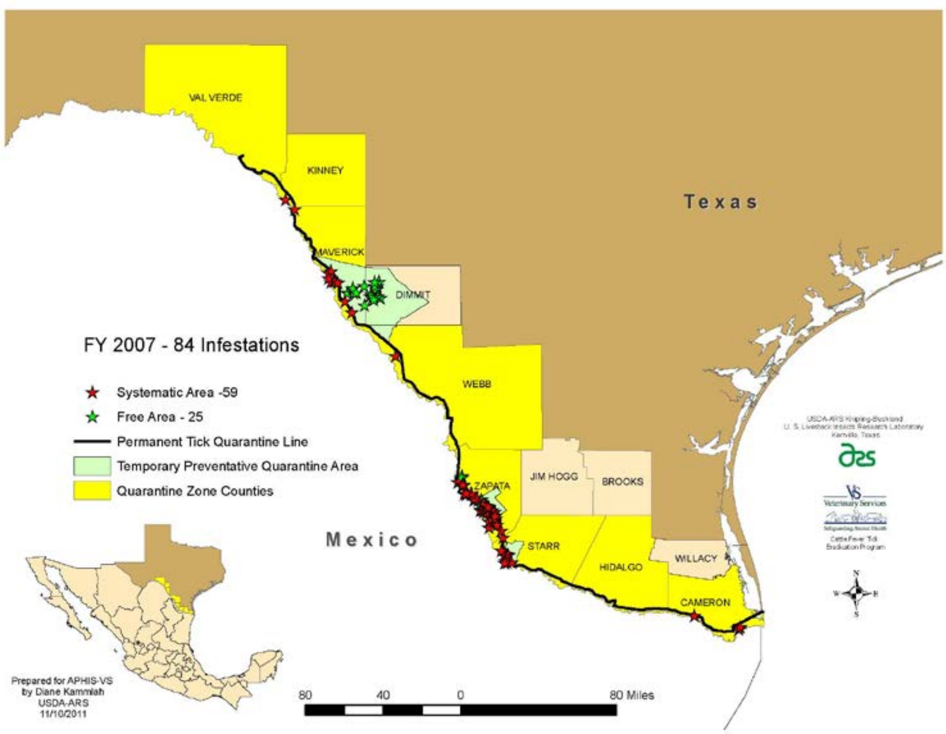

Figure 1-10. Locations of cattle fever tick infestations during fiscal year 2007 (October 1, 2006, through September 30, 2007).

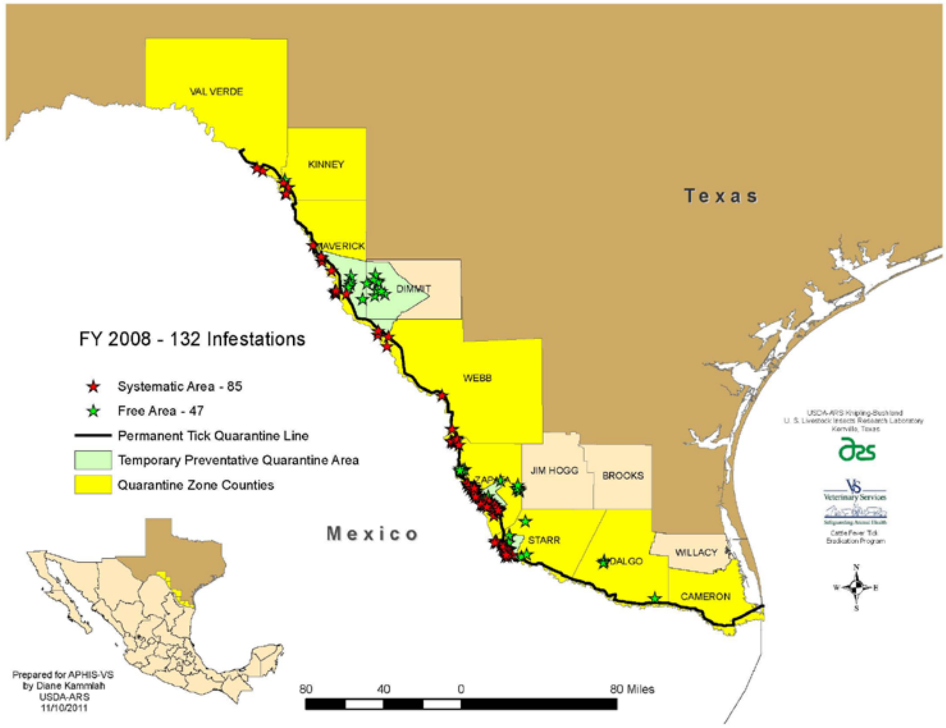

Figure 1-11. Locations of cattle fever tick infestations during fiscal year 2008 (October 1, 2007, through September 30, 2008).

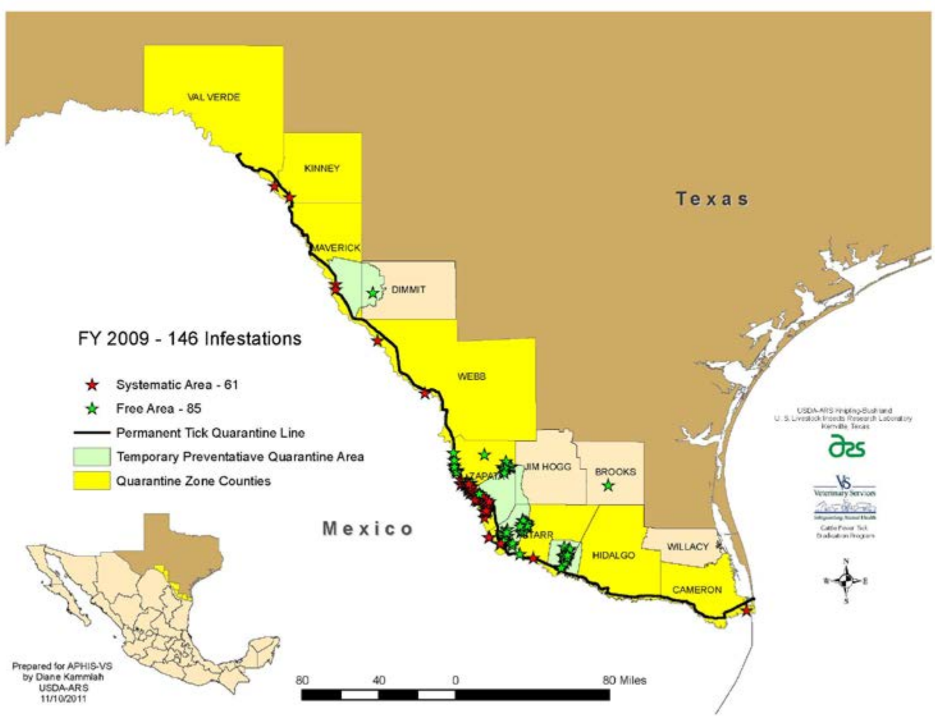

Figure 1-12. Locations of cattle fever tick infestations during fiscal year 2009 (October 1, 2008, through September 30, 2009).

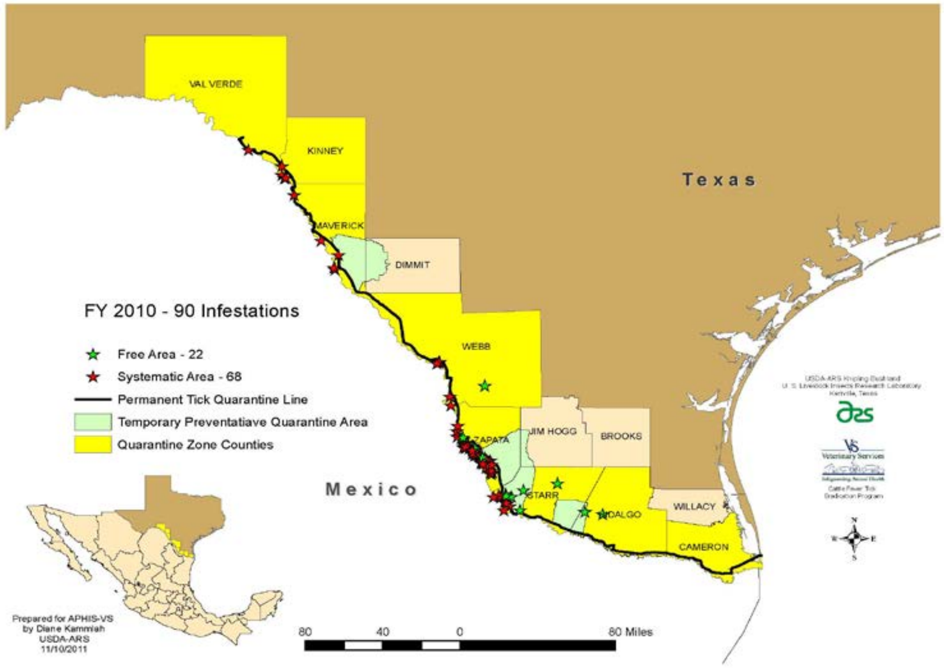

Figure 1-13. Locations of cattle fever tick infestations during fiscal year 2010 (October 1, 2009, through September 30, 2010).

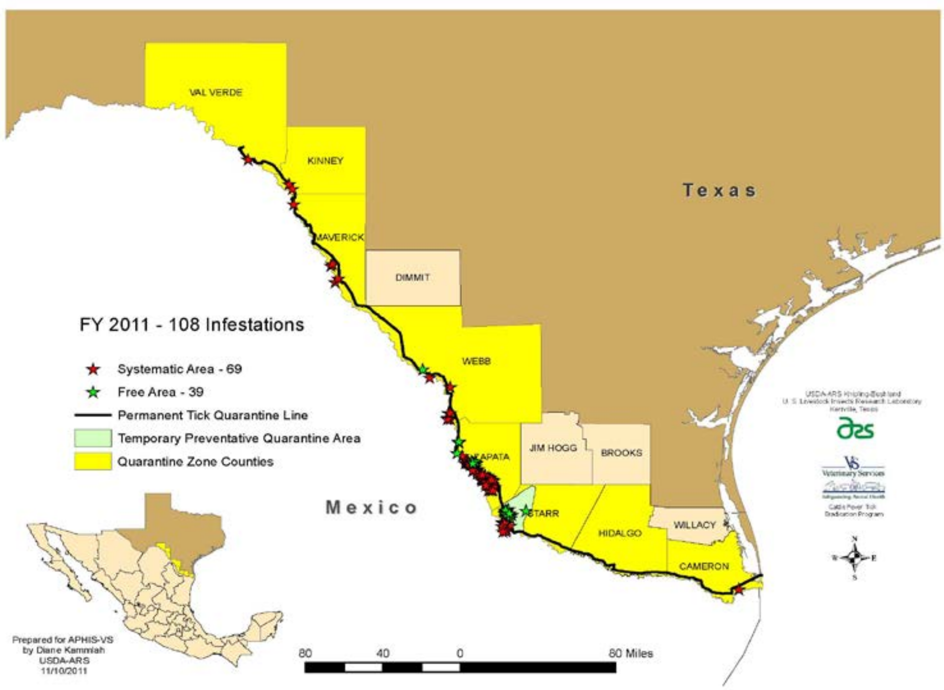

Figure 1-14. Locations of cattle fever tick infestations during fiscal year 2011 (October 1, 2010, through September 30, 2011).

where the river is shallow, which provides easy and unimpeded access into the Permanent Tick Quarantine Zone. Periods of low rainfall contribute to ease of access across the Rio Grande. The animals that cross the Rio Grande from Mexico and enter the Permanent Tick Quarantine Zone are capable of carrying with them the cattle fever ticks that can harbor *B. bovis* and *B. divergens*—part of the package for transmitting babesiosis to naïve (non-immune) cattle and other animal populations.

In recent years, surveillance on live white-tailed deer with the use of helicopter netting capture-release methods provided information about the severity of the tick infestation problem occurring in the white-tailed deer population (Duhaime, 2009). Sampling was done within a short timeframe (less than 6 hours) of one day. Within the Permanent Tick Quarantine Zone, animals from a population of white-tailed deer were captured and released on a ranch in Starr County in 2005 and again in 2007. The deer in this area were 76 percent infested (19 out of 25 head) with cattle fever ticks at the time of the first capture, and 82 percent infested (18 out of 22 head) at the time of the second capture (Duhaime, 2009; Pound et al., 2010). On two occasions in the tick-free area of Zapata County in 2008, 1 (3.3 percent) and 3 (12.5 percent) of sampled deer in a pasture on a ranch were infested with cattle fever ticks. Cattle were not stocked on any of the pastures where deer were sampled for cattle fever ticks. These findings show that deer in the quarantine zone and in tick-free areas carry cattle fever ticks and have the potential to transmit them to cattle.

Climate and Weather

Temperature and humidity have a strong influence on microclimate and the subsequent survival of cattle fever tick eggs and larvae (Corson et al., 2004; Edney, 1982; Teel, 1984). At relative humidity levels of 75 percent or more, death of tick larvae is minimal, and the limiting factor for larval survival is temperature. When relative humidity is 63 percent or less, the survival of larvae is decreased regardless of temperature (Davey et al., 1991). Therefore, low humidity and long periods of drought can dry out cattle fever ticks and greatly decrease vegetation used by ticks on which to quest and reach a host. During drought, animals such as white-tailed deer that are in search of suitable vegetation for forage or a water source could contribute to the spread of cattle fever ticks, especially when congregating around food or water sources (Michael, 1968, *in* Webb et al., 2007).

Suitable tick habitat also can contribute to cattle fever tick reinfestations. Bram et al. (2002) report that the progressive conversion of the grassland savanna of much of South Texas and adjacent areas of Mexico to brush provides a habitat more favorable to the survival of nonparasitic life stages of cattle fever ticks. A simulation model evaluated this further and assessed how microclimate, habitat heterogeneity (vegetation dissimilarities), and within-pasture cattle movement may influence cattle fever ticks in South Texas. The sensitivity analysis of the model showed that temperatures and relative humidities created by habitat type (grass versus shrubs) and engorged female tick mass influenced tick population dynamics most strongly, as well as host habitat selection, initial number of larvae per cow, and the number of cells into which the simulated pasture was divided (Corson et al., 2004).

Cattle Fever Ticks and Acaricide Resistance

Certain strains of cattle fever ticks have demonstrated increased resistance to the topical use of the chemical formulations used to kill them. Acaricide resistance can occur when an acaricide, such as coumaphos, is not properly used. This occurs, for example, if too low of a dose to achieve lethal toxicity is used or the continued frequency of treatments contributes to selection for resistant ticks in a geographical region (Miller et al., 2005). We have known about resistance to coumaphos in southern cattle ticks (*R. microplus*) in Mexico since the 1980s (Miller et al., 2005).

Eight strains of southern cattle ticks from the northern areas of Mexico's States of Tamaulipas, Nuevo Leon, and Coahuila and two strains of cattle fever ticks from infestations in the Permanent Tick Quarantine Zone in South Texas have varied levels of resistance to the organophosphate class of acaricides specifically (amitraz, coumaphos, and diazinon)—used in Mexico for controlling cattle fever ticks (Li et al., 2003; Li et al., 2004). While organophosphate acaricides, specifically coumaphos and diazinon, played an important role in Mexico's control of the southern cattle tick during 1975 to 1985, tick resistance to these acaricides is the consequence of their extensive use in Mexico's efforts for tick control (Li et al., 2003). Tick resistance to the same acaricides used in South Texas as in northeastern Mexican states presents another challenge to the success of the CFTEP. Miller et al. (2005) report that an investigation of southern cattle ticks (*R. microplus*) collected in August 2004 from cattle in the

Permanent Tick Quarantine Zone of Starr County, Texas, found that some ticks from the collection were resistant to coumaphos. This leads to concerns about resistant tick populations becoming established in the United States.

Funding

The National Tick Eradication Program in Mexico began with a MEX$35,000,000 (pesos) loan from the Inter-American Development Bank in 1975. This amount represented 19.3 percent of the total cost for the Program, which was estimated at MEX$178,000,000 over a 5-year period. Federal, State, and local governments provided funding, including special taxes on the sale of cattle throughout Mexico. Credit from the initial Inter-American Development Bank investment ended during June 1981. The Development Bank approved a second line of credit for an additional MEX$90,000,000; however, the Mexican government decided not to accept the new loan based on changing economic and financial situations in Mexico. As a result, progress gained in eradicating cattle fever tick populations from northern areas in Mexico was halted, and cattle fever tick populations began to reestablish in these previously eradicated locations.

Mexico is faced with cattle fever tick challenges in wildlife and livestock. The Secretaría de Agricultura, Ganadería, Desarollo Rural, Pesca Y Alimentación (SAGARPA, or Ministry of Agriculture, Livestock, Rural Development, Fishing, and Food), the agency responsible for livestock health in Mexico, has been operating under a reduced budget for some of its animal health programs, including cattle fever tick control in the northern areas of Mexico near the U.S. border. Mexican border state governments have also experienced reduced budgets for cattle fever tick control in recent years.

Cost of Cattle Fever Tick Spread

If not contained, re-emerging cattle fever ticks in South Texas could spread into U.S. tick-free zones of the cattle fever tick historical range in 15 States, which would be devastating to U.S. cattle production in those areas and to U.S. cattle health and food supply. According to an economic impact report prepared in 2010 by the Agricultural and Food Policy Center at Texas A&M University, the cost for the first year of a tick eradication effort for a small outbreak, starting with three infestations in the tick-free zone of Texas, is estimated to be $123 million, with subsequent annual costs of about $97 million per year (Anderson et al., 2010). These estimates are conservative and are based on assumptions and unknown factors, and they do not include costs for ongoing eradication activities in the Permanent Tick Quarantine Zone. A year-one minimum cost for an extended cattle fever tick outbreak in the historic range of the ticks would be $1.2 billion, plus the cost of developing infrastructure for inspection and surveillance for ticks in those areas (Anderson et al., 2010).

II. Purpose and Need for the Proposed Action

The purpose for providing funding toward the installation of game fencing is to assist cattle producers and the CFTEP Mounted Patrol Inspectors in limiting the movement and dissemination of cattle fever ticks by host wildlife, to the degree possible, in areas where recurring cattle fever tick infestations have been detected in recent years.

Recurring cattle fever tick infestations result in increased quarantine efforts in areas beyond the Permanent Tick Quarantine Line in South Texas. When quarantine efforts are increased as a result of cattle fever tick infestations, cattle producers are burdened with cattle movement restrictions and higher production costs associated with eradicating these ticks. Increased quarantine efforts add increased workload (see figures 1-15 and 1-16) and costs for the CFTEP Mounted Patrol Inspectors and TAHC employees responsible for protecting animal health. CFTEP efforts related to tick infestations beyond the Permanent Tick Quarantine Line from fiscal year 2007 through 2011 in one location of the tick-free area (the Carrizo Springs area of Dimmitt County) cost APHIS nearly $10 million.

Based on a low estimate of approximately $22,000 per mile of game fencing, we estimate that a one-time APHIS cost-share of 50 percent for installation of game fencing with landowners in all the areas of need (discussed in chapter 2 under the Proposed Action section) would cost less than 1/10th of the amount of CFTEP efforts during fiscal years 2007-2011 combined for Dimmit and Maverick Counties. Based on the costs associated with CFTEP efforts during recent years, the installation of game fencing is a cost-effective tool to reduce the spread and recurrence of cattle fever ticks in problematic areas, allowing the CFTEP Mounted Patrol Inspectors to focus efforts within the Permanent Tick Quarantine Zone—the area of first defense.

No tool alone is 100 percent effective against cattle fever ticks. The cooperative Federal, State, local, and private initiative will continue vigilant surveillance and inspection for tick-infested cattle and wildlife, acaricide dip or spray treatment of livestock (primarily cattle and horses), and pasture vacation to help protect cattle from potential exposure to the pathogen that can be transmitted by the cattle fever ticks. Game fencing would provide an additional tool to help prevent the unimpeded movement of cattle fever tick spread by white-tailed deer and other ungulates from Mexico, thereby reducing or preventing tick outbreaks in the tick-free zone.

The use of game fences is not a new concept. Fences are used in many situations throughout the world as a method for preventing disease transmission from wildlife to other wildlife, livestock, and humans; crop loss or damage; automobile and aviation collisions; habitat destruction and environmental damage; and more (Taylor and Martin, 1987; VerCauteren et al., 2006). Game fencing installed along approximately 17 miles of property parallel with the Permanent Tick Quarantine Line for the purpose of preventing cattle fever tick reinfestations and potential transmission of babesiosis from white-tailed deer to cattle has proven to be successful for more than 27 years. Electrified, 6-strand, barbed-wire fencing was successfully used in Florida in the 1930s to help eliminate the spread of cattle fever ticks by white-tailed deer (McAtee, 1939; VerCauteren et al., 2006).

The proposed fencing is needed to prevent the potential spread of cattle fever ticks northward and to reduce exposure risk of cattle and other susceptible animals to babesiosis in the U.S. tick-free zone. The cattle fever ticks can survive in the southern half of the United States, where they were once established and subsequently eradicated during the 1900s (Pound et al., 2010). U.S. cattle populations are naïve to babesiosis, a debilitating and fatal disease. Additionally, game fencing also would reduce the need for additional uses of acaricide to treat cattle and horses when Temporary Preventative Blanket Quarantines (large areas containing infested, adjacent, exposed, vacated, and checked premises) result from the spread of cattle fever ticks.

Without the fence, unimpeded wildlife movement north of the Permanent Tick Quarantine Line would require increased operational effort and funding and also presents a threat to the Nation’s livestock health and food supply. Funding for fencing, therefore, would help sustain U.S. cattle production, sustain cattle export trade, and prevent economic hardship to U.S. cattle producers.

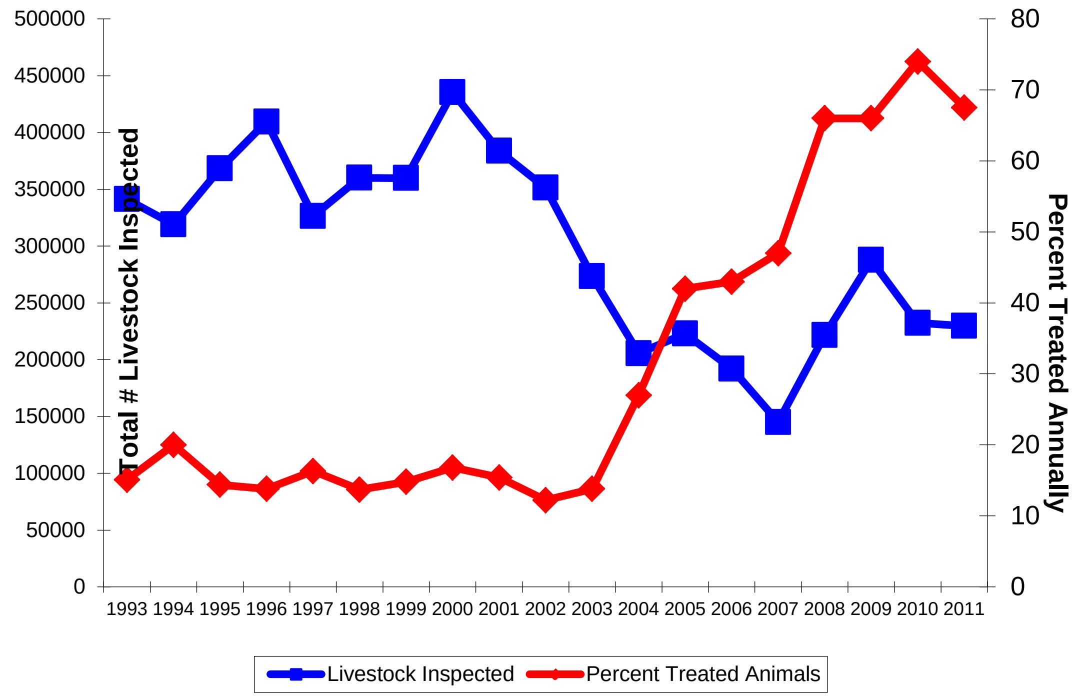

Figure 1-15. CFTEP annual number of cattle inspected in both Permanent Tick Quarantine Zone and Tick-free Area, 1993-2011. Credit: USDA, APHIS.

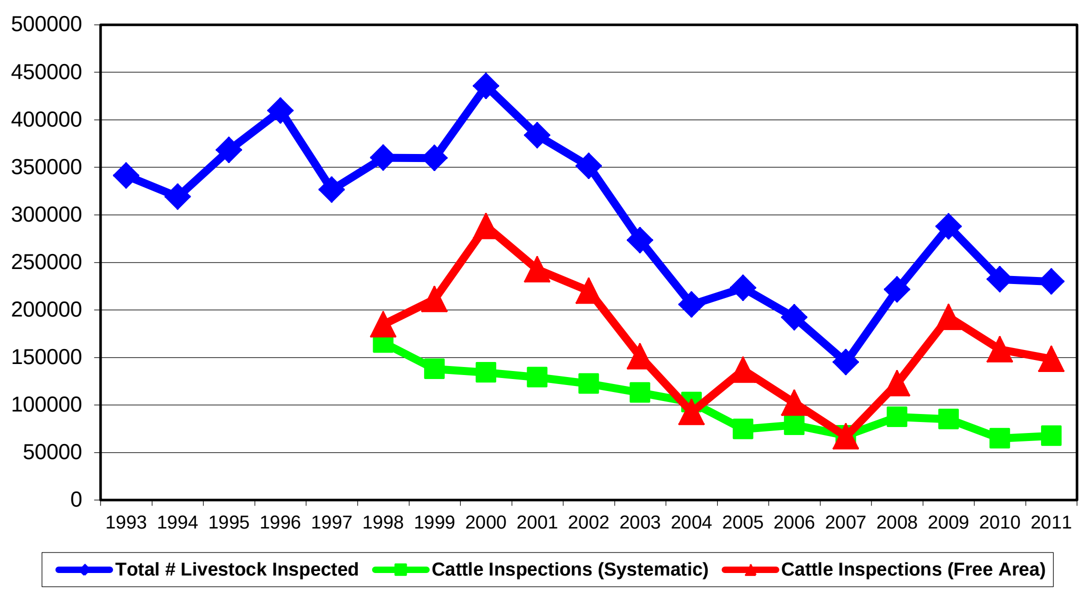

Figure 1-16. CFTEP annual number of cattle inspected in Permanent Tick Quarantine Zone (Systematic) and Tick-free Areas, 1993-2011. Credit: USDA, APHIS.

II. Alternatives

The CEQ's NEPA regulations (40 CFR §§ 1500-1508) require Federal agencies to consider in their environmental documents other reasonable courses of actions (alternatives) to any proposed action. In addition to the proposed action, a "no action" alternative is always an alternative to consider, representing the baseline or the current situation in the absence of the proposed action.

This EIS considers two possible alternatives for further analysis: (1) No Action—APHIS will provide no funding assistance toward installation of game fencing, and (2) the Proposed Action—APHIS will provide funding assistance toward installation of game fencing in identified areas of need along the Permanent Tick Quarantine Line. These alternatives are discussed in this chapter and are the basis for further analyzing potential environmental effects addressed in chapter 4 of this EIS.

Prior to initiating this EIS, APHIS considered other options to the game fencing. APHIS also solicited for and received additional alternatives during the public scoping period for the EIS. During the public scoping period, it was suggested that APHIS include an additional location for game fencing where recurring tick infestations were problematic in recent years. After further consideration, APHIS modified the proposed action to include the additional location, which is consistent with the purpose of and need for the proposed action. APHIS dismissed other alternatives from further consideration if they did not specifically meet the purpose of and need for the proposed action. The dismissed alternatives are discussed later in this chapter.

A. No Action: Continue to conduct current program operations without installing game fencing

1. Livestock Program Activities in the Permanent Tick Quarantine Zone

Under the No Action Alternative, APHIS would not provide any funding toward the installation of game fencing in rural locations where recurring cattle fever tick infestations are problematic in Maverick, Starr, Webb, and Zapata Counties, Texas to prevent the spread of cattle fever ticks from tick-infested areas of Mexico by host wildlife ungulates.

APHIS would continue to carry out current program operations that help prevent the spread of ticks and potential exposure of cattle to babesiosis without the aid of game fencing, cost-shared by APHIS, in areas of need. Program activities carried out to help prevent the introduction and spread of cattle fever ticks in the Permanent Tick Quarantine Zone would continue, including inspection of livestock at selected South Texas markets handling livestock originating from the Permanent Tick Quarantine Zone, patrols for stray or smuggled livestock in the Permanent Tick Quarantine Zone along the Rio Grande, and inspection and pesticide treatment of tick-host livestock (mostly cattle and horses) on quarantined premises.

APHIS cattle fever tick regulations (9 CFR § 72) provide requirements for inspection, interstate movement, and permitted dips and procedures for cattle in quarantined areas or where tick eradication is conducted in cooperation with State authorities. APHIS regulations (§ 72.5) incorporate by reference the quarantined areas (4 TAC §§ 41.14-41.22) as described by TAHC.

The Permanent Tick Quarantine Zone, also known as the permanent buffer zone or systematic area, is located in South Texas between the Rio Grande and the officially designated Permanent Tick Quarantine Line (§§ 41.14-41.22). The Permanent Tick Quarantine Zone (§ 41.4) is treated as a permanently designated surveillance area for tick-infested stray and smuggled livestock from Mexico. The Permanent Tick Quarantine Zone encompasses 545,348.4 acres within eight counties, stretching 583.7 miles from the Gulf of Mexico to the Amistad Reservoir north of Del Rio. The Permanent Tick Quarantine Line runs along existing roads, such as U.S. Highway 83, U.S. Highway 277, and portions of the El Indio Highway 1021 (also called Mines Road). The distance between the border of Mexico (Rio Grande) and the Permanent Tick Quarantine Zone varies from 0.07 miles in an area of Maverick County to 8.01 miles in an area of Cameron County.

Approximately 60 inspectors, known as CFTEP Mounted Patrol Inspectors, carry out surveillance in the Permanent Tick Quarantine Zone. Monitoring for stray and smuggled livestock occurs along a trail parallel with the Rio Grande and throughout all contiguous country along the Permanent Tick Quarantine Line. When inspectors find stray livestock from Mexico, they restrain their movement, hand-scratch inspect (manually feel the skin of the animal from head to hoof for ticks), treat them on-site with a hand-held sprayer, and then take them to an APHIS-owned holding pen. From this stage, they are processed and claimed by their owners in Mexico or sold at auction for movement only to slaughter if not claimed.

Within the Permanent Tick Quarantine Zone, inspectors also visually examine premises containing livestock every 7 to 14 days and inspect and conduct acaricide treatment of any stock that owners want to move from the Permanent Tick Quarantine Zone.

When a tick is found on a livestock owner's premises, either in the Permanent Tick Quarantine Zone or beyond the Zone in the tick-free area, two options are available to the owner: (1) leave the livestock in the pasture and treat the livestock with an approved acaricide (coumaphos) every 7 to 14 days for a 6- or 9-month period depending upon the time of year the cattle fever ticks are found—this is called systematic treatment—or (2) vacate the pasture for the same period of time 6 Texas Agriculture Code § 167). For tick eradication purposes, the intent of vacating the pasture is to prevent tick larvae from accessing hosts for a long enough period of time to eliminate sustainable tick populations. The larval-to-adult feeding phase on a host requires 18 to 20 days to complete, after which the adult females detach and lay eggs. The emergence of new larvae can span 1 to 9 months, depending upon temperature, precipitation, available vegetation cover, oviposition (the process of laying eggs), and incubation (TAMU, 2011).

Before vacating the pasture, livestock must be scratch-inspected and receive two clean treatments at a 7- to14-day interval before being allowed to move from the infested premises (4 TAC § 41.6). Movement of the livestock is allowed by the TAHC's issuance of a permit (§ 41.5).

Other procedures conducted in coordination with these two options—whether in the Permanent Tick Quarantine Zone or a Temporary Preventative Quarantine Area—during the entire length of the quarantine include:

- Examination of infested pastures by a qualified animal health technician or tick inspector at least once every 14 days.

- Fence checks to ensure that livestock from other pastures are not intermingling in infested pastures.
- Marking cattle with paint at time of treatment and checking the entire herd for marking to ensure all cattle are treated with acaricide during their systematic treatment timeframe.
- Examination of vacated pastures to ensure that no livestock (generally cattle, but also could include horses, sheep, or goats) were left behind and that no new livestock has entered the vacated pasture due to a break in a fence.
- Treating ranch horses on quarantined premises for cattle fever ticks every 7 to 14 days with coumaphos administered by a hand-held sprayer. The horses used by CFTEP Mounted Patrol Inspectors also are sprayed with coumaphos (Texas Agriculture Code § 167).

When cattle fever ticks are confirmed on livestock that is on a premise for more than 14 days without systematic treatment, the premises is considered to be an "infested premise" (4 TAC § 41.1(13)). The TAHC places all premises bordering infested premises, whether separated by a fence or having the same owner as the adjacent premises into the Temporary Preventative Quarantine Area. The Temporary Preventative Quarantine Area is designated by TAHC for systematic inspection and treatment of livestock and premises, and control of movement of livestock, in order to detect and eradicate infestation and exposure from infested or exposed premises outside the tick eradication quarantine area. The extent of the area is determined by evaluating the barriers to the potential spread of ticks (§§ 41.14-41.22).

Requirements for the adjacent premises (§ 41.1(1)) are as follows:

- The quarantine period for adjacent premises lasts for the same period of time as the infested premises (adjacent premises are released from quarantine when the infested premises is released).
- CFTEP Mounted Patrol Inspectors on horseback conduct visual inspections on all range cattle every 14 days.
- A CFTEP representative examines fences every 14 days.
- Livestock are permitted to move from the premises after one dip treatment followed by a hand-scratch inspection. The TAHC issues the permit allowing movement of the livestock (6 Texas Agriculture Code § 167).

2. Treatment of White-tailed Deer and Exotic Ungulates on Infested Premises

Occasionally, APHIS and TAHC inspectors find cattle fever ticks attached to the hides of deer killed by hunters. Hunters that kill deer on infested and adjacent premises must be inspected, treated, and permitted prior to removal from the property. Hunters that kill deer on other properties within the temporary quarantine areas must either leave the hide behind, freeze the hide for one day, or have the hide inspected prior to removal from the property (TAHC, 2010).

There are few options available to eradicate cattle fever ticks from deer. Medicated corn treatment is one such option that is sometimes used in South Texas and involves the strategic placement of deer feeders containing corn treated with the acaricide, ivermectin. Medicated corn is not used during the hunting season, and per use restrictions, its use is discontinued at least 60 days prior to the beginning of the hunting season.

APHIS is investigating the use of a passive treatment method involving the use of roller device technology developed by USDA’s Agricultural Research Service. The rollers are attached to deer feeders and are “charged” with an oily formulation of permethrin, and deer rub on these rollers while feeding on corn. Once the treatment contacts their necks, the deer distribute the treatment to other parts of their bodies during regular grooming. The permethrin treatment is capable of killing and repelling cattle fever ticks; however, the passive treatment method is still being evaluated to determine its usefulness in eradicating cattle fever ticks from infested premises.

Climatic trends in South Texas are expected to increase deer migration and foraging as they look for available food and water sources. According to the U.S. Global Climate Change Research Program (Karl et al., 2009), average temperatures in the Southern Great Plains (Texas) increased across the region, and are projected to continue this increase. Cold days are becoming less frequent and hot days are more frequent. Precipitation is projected to decrease, causing the southern Great Plains to become drier. In 2011, Texas experienced the most intense one-year drought since statewide weather records were initially maintained in 1895 (Nielsen-Gammon, 2011). These climatic trends are expected to shift the ranges of native plants as they become less competitive in areas where they are not well adapted. Weather events affecting soil erosion also are associated with shifts in host plant density, and may alter the ease and frequency of deer migration. Therefore, as the area becomes hotter and drier, and water as well as food preferred by deer becomes scarce, we anticipate that white-tailed deer will migrate — and potentially spread ticks — over greater areas.

3. Treatment of Imported Cattle from Mexico

When cattle are imported from areas of Mexico where there are cattle fever ticks, APHIS inspects them (visual and hand-scratch inspection of individual animals) at their U.S. port of entry before entering the United States and dipped in vats containing coumaphos to prevent the potential introduction and spread of the ticks. If ticks are found, then the entire lot of Mexican cattle is quarantined, treated, inspected, and then treated again approximately 7 to 14 days later. If ticks are not found after the second dipping/inspection, then they are allowed to enter the United States (4 TAC § 41.12; 6 Texas Agriculture Code § 167).

B. Proposed Action: Provide funding assistance to install game fencing in areas of need

Under this alternative, APHIS would contribute partial funding (in accordance with terms of funding provided to APHIS)[4] toward installation of game fencing on privately owned property in rural locations, upon landowner agreement, where recurring cattle fever tick infestations are problematic in Maverick, Starr, Webb, and Zapata Counties, Texas. APHIS would provide flexibility in determining the most logical placement of game fencing on a landowner's property, depending upon the particular situation. APHIS would not contribute funding toward game fencing that would be located in wetlands or that would obstruct arroyos or streams; an APHIS agreement providing funds to a landowner would include concurrence with these stipulations.

Game fencing would serve as an additional tool in needed areas to help CFTEP personnel prevent cattle fever tick reinfestations beyond the Permanent Tick Quarantine Zone. The CFTEP surveillance and eradication activities described above in section A would continue.

1. General Location of Game Fencing

APHIS will partially fund game fencing a minimum of 8-feet high on private land in rural areas near the Permanent Tick Quarantine Line where recurring tick infestations have occurred in recent years. It would be

[4] APHIS will determine the amount of funding and the cost-share at a later date and through a premises-by-premises evaluation. Some premises may qualify for additional funding from other sources such as the Texas Department of Agriculture, Texas Farm Bureau, and USDA's Natural Resources Conservation Service (NRCS).

installed in areas of need to prevent access of cattle fever tick host wildlife from spreading ticks to the tick-free area. The properties where the game fencing is proposed are privately owned lands in rural locations and are primarily used for cattle ranching. Game fencing would not obstruct public or private access roads or driveways or be installed through township areas or across water resources, including streams and arroyos. To maximize the cost/benefit ratio, in areas of need where some 8-foot game fencing exists near and parallel with the Permanent Tick Quarantine Line, the additional proposed game fencing would connect with the existing fencing. In some areas where a standard 4-foot fence exists and game fencing is proposed, the lower fence could be modified by extending the height of the fence, if feasible.

The estimated measurement of locations where there is a need for game fencing is 5.25 miles for Maverick County, 12.46 miles for Starr County, 7.8 miles for Webb County, and 45.82 miles for Zapata County, for a total of approximately 71 miles overall (Appendix H). The total amount of game fencing installed would depend upon landowners' consent for game fencing on their properties and cost-share agreements with APHIS. The targeted areas in the northern rural areas (Maverick and Webb Counties) of the Permanent Tick Quarantine Zone are comprised of large land parcels; in the southern rural areas (Zapata and Starr Counties), the targeted areas are smaller land parcels comprising many individually owned properties. After the landowner agrees to install game fencing and to share the cost, APHIS and the landowner would enter into a contract that would include stipulations to assist APHIS' compliance with environmental laws and other requirements. This would include an agreement to incorporate mitigation measures established by APHIS to minimize adverse impacts to the environment.

In Maverick County, we propose placing game fencing parallel to the Permanent Tick Quarantine Line on the south side of Mines Road. In Webb County, we propose placing game fencing parallel to the Permanent Tick Quarantine Line on the south side of U.S. Highway 83. And in Zapata and Starr Counties, we propose placing game fencing on the south side of U.S. Highway 83. In these cases, U.S. Highway 83 would provide a buffer for ticks dropped on the south side of the Permanent Tick Quarantine Line. However, in some situations, a landowner with cattle on the north side of U.S. Highway 83 may benefit more from the installation of game fencing on the north side of U.S. Highway 83 along [parallel to] the TAHC quarantine line than on the south side of the highway. This is especially true if existing game fencing surrounds the property except for the highway frontage that is low-fenced. In these cases, we would work with the landowner on the ideal placement of the fencing.

In some situations, a landowner may own property on both the north side and south side of U.S. Highway 83, and it may be beneficial to install game fencing on the south side of the highway closer to the Rio Grande. A landowner also may have existing game fencing along the Permanent Tick Quarantine Line but could benefit from fencing in another property location to close a gap in existing fencing and prevent access to cattle fever tick hosts.

Although the majority of game fencing is proposed for contiguous placement parallel with the Permanent Tick Quarantine Line, placement would be determined based upon consideration of factors that meet the purpose and need for the game fencing. Additionally, placement of fencing may be modified, depending upon the need to mitigate potential environmental effects and depending upon factors such as existing game or high fencing on or adjacent to the property, land management uses of the property, and management needs for preventing additional cattle fever tick infestations.

Other considerations for the Proposed Action include climate and greenhouse gas emissions. Climatic trends are expected to shift the ranges of native plants northward and could increase animal migration and foraging for scarce water resources. Greenhouse gas emissions that should be considered and are associated with this alternative arise from the production of fencing materials, fencing installation (including travel to/from construction sites), and subsequent travel associated with fence maintenance. Total emissions are anticipated to be less than 25,000 metric tons annually.

2. Specific Placement of Game Fencing

Fencing locations where APHIS has determined a need for game fencing to prevent cattle fever tick infestations in the tick-free zone are described below.

a. Maverick County

- Northernmost short stretch of game fence along Mines Road (north of El Indio). Start 28°38'42.19" N, 100°25'2.16" W; Stop

28°37'41.76" N, 100°23'57.25" W. The fence would be located on the south (river side) of Mines Road. The length of the game fencing segment is approximately 1.57 miles. Refer to Appendix H (Map A) for a close-up view of this proposed game fencing segment.

- Just north of town center El Indio. Start 28°31'26.39" N, 100°18'44.92" W; Stop 28°30'28.08" N, 100°18"13.09" W. The fence would be located on the north side of Mines Road. The length of the game fencing segment is approximately 1.0 mile. Refer to Appendix H (Map B) for a close-up view of this proposed game fencing segment.
- Start 28°12'14.92" N, 100°9'57.7" W; Stop 28°12'1.59" N, 100°7'36.6" W. The fence would be located on the north side of Mines Road. The length of the game fencing segment is approximately 2.4 miles. Refer to Appendix H (Map C) for a close-up view of this proposed game fencing segment.

b. Webb County

- North end of fence on FM 1472 (Mines Road) 27°53'19.04" N, 99°50'20.16" W, south end 27°46'43.39" N, 99°47'42.77" W. The fence would be located on the south side of U.S. Highway 83. The length of the game fencing segment is approximately 7.8 miles. Refer to Appendix H (Map D) for a close-up view of this proposed game fencing segment.

c. Zapata and Starr Counties

South of Webb County, approximately 56.44 miles of game fence is proposed to be installed in place of existing highway right-of-way fence on the south side of U.S. Interstate 83. The fence would start just south of the Webb County/Zapata County line at mile marker 752 in rural locations only and skipping roads and water resources and extending to Roma, Texas, ending north of Roma High School in Starr County, to mile marker 766. One, two-mile portion of the proposed fencing between the towns of San Ygnacio and Zapata would be installed on the north side of U.S. Interstate 83 between the southwest corner of the high-fenced Las Avispas pasture (approximately 9.57 miles southeast of San Ygnacio) and the northwest corner of the high-fenced Alexander pasture (approximately

3.17 miles northwest of Zapata). Refer to Appendix H (Map E to K) for a zoomed-in map view of these proposed game fencing segments.

3. Details of Game Fence Installation

The game fence would be a minimum height of 8 feet and made using high-carbon galvanized steel ends, braces, angles, line posts (T-posts), and clips and 2 3/8-inch line pipe (figure 2-1). The fixed-knot fencing would be made with a minimum of 12.5-gauge net wiring (17/96), class 3 (galvanized) material. To prevent rusting, line and brace posts would include a rust-inhibited coating, primer, and green paint. A single H-brace would be installed approximately every ¼-mile as stretch braces and would be set approximately 2 1/2 feet deep in concrete. Excavated soil would be scattered around each post. Earthen diversion berms may be required in some locations to prevent erosion beneath the fence. T-posts would be spaced at a maximum of 20-feet apart.

Figure 2-1. Example of wire-knot game fencing. Photo credit: USDA, APHIS.

The wire-knot design of the game fence also could include ladders for human access as well as gates for vehicle access (including farm equipment). These accesses would be up to the discretion of the property owner. The fencing design also may include other special needs in some locations to prevent animals from being injured or to allow small wildlife species to pass through. Under ideal conditions and with a straight run, approximately 1 mile of fence could be installed in one week.

If necessary, staging sites (locations for fencing material delivery and work equipment) would be provided on privately owned properties of landowners who agree to the installation of game fencing and in areas that would not be greatly impacted by the work activities for fence installation. To comply with environmental laws and other environmental review considerations, staging sites would occur in previously cleared areas, roads, or driveways and would not impact federally listed threatened or endangered species or migratory birds. The sites would be determined on a case-by-case basis, depending upon the location of the fencing and an agreement between APHIS and the concurring landowner.

At the discretion of a landowner, if an existing lower fence is present in the area where game fencing is agreed to be installed, the game fencing either could replace an existing low or four-wire fence, or it could be constructed by adding to the existing low fence if it could support a higher fence extension (figure 2-2).

Figure 2-2. Low fence with a high game fencing extension. Photo credit: USDA, APHIS.

A crawler tractor, a type of equipment that is generally used to prepare ground for fence installation, would be used where needed to prepare the surface of the ground by removing vegetation and leveling. An area at least 20-feet wide may need to be cleared of vegetation and leveled in preparation for installing the fence. Based upon an area of 20-feet wide, each mile of prepared area is equivalent to a total 3.03 acres. Some areas could require less preparation than other areas because they already have existing low fences that are maintained and free of growth, thereby requiring little removal of vegetation. Vegetation removal is maintained in many of these types of areas because the existing fences are along property access clearings used by property owners or managers, or the clearings are adjacent to maintained rights-of-way.

4. Maintenance of Game Fencing

According to the Commodity Credit Corporation's terms of funding set aside for the game fencing, landowners would be responsible for maintaining and repairing the fencing and for removing vegetation. CFTEP Mounted Patrol Inspectors conducting daily surveillance along the Permanent Tick Quarantine Line would notify landowners of needed repairs to the fencing. The landowner would also be responsible for periodically removing or mowing vegetation. This may occur once or twice per year.

C. Other Alternatives Considered but Dismissed

Prior to the EIS scoping process, APHIS considered other alternatives to the Proposed Action discussed above and determined that some of the alternatives did not warrant further consideration because they were contrary to the purpose and need for the Proposed Action. During the EIS scoping process, which included electronically submitted comments and comments made at public meetings, APHIS heard other suggested alternatives to the APHIS Proposed Action as it was described at that time. Suggested alternatives to the Proposed Action ranged from not installing game fencing (which is the No Action alternative) to where fencing should and should not be located.

At the time of the public scoping meetings, APHIS initially considered providing funding toward the installation of game fencing in rural areas of Maverick, Starr, and Zapata Counties along Mines Road and U.S. Highway 83, parallel to the TAHC eradication line in a contiguous manner. The initially proposed alternative and other alternatives mentioned during the meeting are discussed further in this section.

1. Provide funding for game fencing in contiguous placement along the TAHC Quarantine Line

Prior to the EIS public scoping meetings, APHIS was considering an alternative, similar to the Proposed Action described above, except that the game fencing would be contiguously located on privately owned land in rural areas on both the north and south sides (depending upon the location of existing game fencing) of Mines Road in Maverick County and on the south side of U.S. Highway 83 in Zapata and Starr Counties, parallel with the TAHC Permanent Tick Quarantine Line. Game fencing would not block driveways, roads, or other access ways and would not be located in sensitive areas, such as wetlands. APHIS would provide funding toward the installation of game fencing in rural areas where recurring cattle fever tick infestations have been problematic in the tick-free zone north of the Permanent Tick Quarantine Line in rural areas of Maverick, Starr, and Zapata Counties.

Considering that the concern for movement of cattle fever ticks is north of the Permanent Tick Quarantine Line, the highway would provide a buffer between land on the north side (tick-free zone) and south side (permanent quarantine zone) of U.S. Highway 83 in Zapata and Starr Counties. In Maverick County, Mines Road would provide a buffer between the land on the north and south sides of the road. This initial proposal at the time of the EIS public scoping meetings did not include a segment of Webb County that experienced recurring tick infestations during the 2006 to 2011 Temporary Preventative Quarantines.

During the public scoping meetings, attendees offered suggestions for placing game fencing in areas other than the contiguous locations proposed. Suggestions for different locations were based upon specific landowner needs involving contiguous placement on landowner property parallel with U.S. Highway 83. This included the addition of a segment in Webb County on the south side of U.S. Highway 83 where tick infestations occurred in recent years. In some situations, placement of the fencing other than parallel and close to U.S. Highway 83 would better meet the purpose of and need for the Proposed Action because of a landowner’s specific situation. The current Proposed Action discussed above originated from this alternative but was modified to consider case-by-case circumstances where game fencing may be more suitable in a slightly different location within the Permanent Tick Quarantine Zone and to extend the game fencing to an area of need in Webb County.

2. Provide game fencing along the entire 500 miles of the Permanent Tick Quarantine Line

Game fencing along the entire 500 miles of the Permanent Tick Quarantine Line would not be consistent with the purpose of and need for the Proposed Action. The intent for the use of game fencing proposed in the areas of need is to reduce the likelihood that cattle fever ticks will spread outside of the Permanent Tick Quarantine Zone, which would reduce the number of Temporary Preventative Quarantine Areas. This in turn could allow for increased surveillance by CFTEP Mounted Patrol Inspectors along unfenced areas of the Permanent Tick Quarantine Line. We requested and have funding for areas that had recurring tick infestations that resulted in temporary blanket quarantines from 2006 to 2011 (the areas noted in figures 1-9 to 1-14 in chapter 1). Funding is limited and was provided to cover a cost-share for approximately 100 miles of game fencing for cattle fever tick infestations.

3. Locate the proposed tick control barrier game fencing in the right-of-way in the proposed locations along U.S. Hwy 83 versus on privately owned land

The terms of funding for the game fencing were based upon cost-share with landowners who would agree to allow the game fencing on their privately owned land. If it were feasible to locate fencing in a right-of-way, APHIS would need additional permits and additional funding. Many public utilities, such as electricity, water, telecommunications, gas lines, and common-carrier petroleum and petroleum-related products, are located within the right-of-way of roadways. Locating game fencing in the right-of-way would require coordination with public utility companies and the Texas Department of Transportation (TXDOT). Other related matters (as required by the terms of approval of the funding for game fencing), such as responsibility for fence maintenance, make this alternative impractical. Texas DOT does not get involved in fencing or providing monies toward fencing or fence maintenance.

4. Use other tick control methods or technologies in addition to game fencing

Several tick control methods are in early stages of study and need further review before their use can be approved for tick eradication. These studies will take years to ensure that the technology is safe and efficacious for use. APHIS received suggestions during the EIS public scoping meetings to use other methods in its efforts against cattle fever ticks.

One method needing further study is a deer feeder device that baits deer with corn and treats a deer's head and neck with permethrin when the deer feeds on corn from the hopper of the device. Consideration also must be given to the influence of this method on deer population size and dynamics due to the placement of corn at the feeders. The deer feeder devices also could contribute to attracting deer to the gap areas in the fencing, which could be contrary to preventing further movement of the ticks on host deer into the tick-free zone. Some tick control methods also may not be suitable for use in certain environments because of proximity to human populations or environmentally sensitive areas. The use of tick control methods in gap areas would not necessarily prevent ticks from being moved by deer into the tick-free zone.

APHIS also is working with USDA's Agricultural Research Service to investigate a self-medicating nutritional feed block treated with molasses and ivermectin for cattle that would help kill ticks that attempt to feed on cattle. In addition, APHIS is working with companies to test an anti-tick vaccine for use on cattle, specifically for use against *R. annulatus*, the cattle fever tick. These studies involve the collaboration of other agencies, including the U.S. Department of Health and Human Services' Food and Drug Administration.

In noting the purpose and need for the Proposed Action in this document, these other technologies, when available as a proven tool for the CFTEP, could warrant a broader programmatic evaluation in order to incorporate them with existing proven and other new eradication methods. Therefore, use of these methods could complement existing activities as well as the proposed game fencing.

5. Coordinate game fencing efforts with other agencies

Work activities related to the CFTEP involve or affect other stakeholders, including Federal and State agencies that carry out their missions in the same locations[5]. Although the missions of other agencies are different, the purpose and need for the APHIS Proposed Action to install game fencing could be complementary to these agencies' missions. APHIS has communicated with these agencies to ensure that they are aware of the Proposed Action. As limited funding was specifically designated to the proposed installation of game fencing, any efforts of other agencies that would contribute to meeting the purpose and need for game fencing and that would make it more practical, feasible, and economical could be considered in the realm of APHIS implementation of the Proposed Action.

[5] For example, USDA's NRCS, Texas' Soil and Water Conservation Districts, USDA's Agricultural Research Service, and CBP.

6. Coordinate tick control barrier game fencing effort with CBP efforts

U.S. Customs and Border Patrol's (CBP) mission is to protect the U.S. borders from illegal immigration. APHIS informed CBP about the Proposed Action. The proposed game fencing does not contribute to, coincide with, or support CPB actions. The locations of their actions that have to do with a physical barrier do not coincide with the areas of the proposed game fencing locations. In addition, game fencing for the purpose of deterring the movement of white-tailed or exotic deer to prevent cattle fever tick infestations in the tick-free zone is different from the CBP Tactical Infrastructure/Border Fence and would not meet their needs. To ensure that game fencing would not conflict with their efforts, APHIS will continue to apprise CBP of the Proposed Action.

7. Work with Federal and State agencies in Mexico

Although Mexico is focusing tick eradication efforts in the northern states along the Mexico/U.S. border, funding is limited. APHIS meets with Mexico's agriculture ministry, SAGARPA, bi-annually on animal disease concerns, including cattle fever ticks, and shares information about tick control options we are exploring in the United States. Challenges with tick eradication in northern Mexico include government cooperation with deer producers and acaricide resistance in the cattle fever tick populations.

Mexico's agriculture ministry recently revised the national tick program regulations by approving an official tick agreement plan; however, implementation throughout Mexico has not occurred yet. It likely will not have any effect on the cattle fever tick problem in South Texas because the focus will be on preventing the establishment of pesticide-resistant tick populations in Mexican-recognized tick-free zones.

8. Implement white-tailed deer and exotic deer population control with a vaccine

One purpose of the Proposed Action is to use game fencing as a tool to prevent cattle fever ticks from being moved by the white-tailed deer, a known favorable host of the ticks, beyond the Permanent Tick Quarantine Zone. Employing the use of an immunocontraceptive vaccine in white-tailed deer does not meet the purpose of and need for the Proposed Action. Although a vaccine could reduce the white-tailed deer population density, movement of the deer with cattle fever ticks from Mexico would continue.

Wildlife population control can occur via lethal and non-lethal methods. In the areas of the Proposed Action, white-tailed deer are an important and valued natural resource. White-tailed deer also are important for recreational purposes, such as hunting, and are extremely important to the rural economy and culture of the area. Seasonal hunting of white-tailed deer also assists in population control.

In deer, immunocontraceptive vaccines are intended to be used in combination with other wildlife management tools to control populations. Although some non-lethal population control could be accomplished solely by an immunocontraceptive vaccine that is effective for use in white-tailed deer, administration of a contraceptive vaccine would be labor-intensive, expensive, and unlikely to be successful on its own in resulting in any significant population control. Using an immunocontraceptive vaccine also would not prevent existing deer populations from becoming a successful host for cattle fever ticks or prevent other tick hosts from moving cattle fever ticks beyond the Permanent Tick Quarantine Zone.

While wildlife management officials are aware of the immunocontraceptive vaccine option for deer, there is some resistance to its widespread use. Hunting advocates have questioned whether the use of an immunocontraceptive vaccine would replace the need for culling or hunting as a management tool. Some States that receive significant revenues from issuing hunting permits have raised similar concerns. APHIS continues to believe that the use of an immunocontraceptive vaccine in the absence of other more traditional wildlife management tools would not be effective in producing any significant population controls. Immunocontraceptive vaccines are intended to be one additional tool in the toolbox of wildlife management options rather than a stand-alone replacement for other traditional options currently in use.

The use of immunocontraceptive vaccines in white-tailed deer is regulated by the U.S. Environmental Protection Agency (EPA). Registration of the vaccine required species-specific safety studies that were evaluated by EPA prior to approving the vaccine. These safety studies were conducted with the goal of approval for use in white-tailed deer only. If an immunocontraceptive vaccine for use in deer other than white-tailed deer were needed, additional studies would have to be conducted, submitted to EPA, and evaluated before it could be used. This process can be time-consuming, and it may not be achieved prior to the timeframe in which it would be needed for the CFTEP.

(This page is intentionally left blank.)

III. Affected Environment

This chapter describes the existing conditions at and near the proposed sites for the installation of game fencing in Maverick, Starr, Webb, and Zapata Counties in Texas. These data and information form the basis for assessing the potential impacts of the action and “no action” alternative evaluated in chapter 4. Relevant issues evaluated in this chapter include:

- Cattle Fever Tick Resistance and Distribution
- Land Characteristics and Agricultural Production
- Climate
- Air Quality
- Water Quality
- Vegetation
- Wildlife
- Human Health and Safety
- Cultural, Historic, and Visual Resources

A. Cattle Fever Tick Resistance and Distribution

The CFTEP was established in 1906 to eliminate the two cattle fever tick species, *R. microplus* and *R. annulatus*, responsible for transmitting the causal agents of bovine babesiosis, *B. bigemina* and *B. bovis,* to U.S. cattle herds. In addition, both species are capable of transmitting the causal agents of bovine anaplasmosis, *Anaplasma marginale*, and relapsing fever, *Borrelia theileri* (Andreotti et al., 2011; Trees, 1978). *Rhipicephalus microplus* is also capable of transmitting the causal agents of *B. equi* to horses (Ueti et al., 2005). Heavy infestations of both cattle fever tick species can cause mechanical damage to hides, as well as compromise the health of the animal due to blood loss and irritation.

The cattle fever ticks are designated as one-host ticks, which is defined as requiring a single host animal to complete their life cycles. Hosts include cattle, horses, mules, donkeys, goats, sheep, pigs, dogs, buffalo, oxen, several species of deer, nilgai, and antelope (Cooley 1946; Barré et al. 2001; Ghosh et al., 2007; Cançado et al., 2009; Pound et al., 2010).

It is important to note that in Mexico, *R. microplus* populations are resistant to at least five different classes of acaricides; however, no acaricide resistance has been detected so far with *R. annulatus*.

Populations of *R. microplus* established in Australia are resistant to many different types of acaricides as well, including DDT and arsenic. More importantly, it is impossible to remove acaricide resistance from a tick population once resistance is genetically inherited and established within that particular tick population. Therefore, the overarching goal of the CFTEP is to prevent and eliminate the chance of potentially *Babesia*-infected and acaricide-resistant ticks becoming established in South Texas and perhaps the southeastern portion of the United States.

Rhipicephalus microplus is more widely distributed throughout the world than *R. annulatus*. It is endemic to the Indian subcontinent and populations are established throughout tropical and subtropical regions of the world, including parts of northeastern Australia, southeastern Africa, and southern regions of South America. *Rhipicephalus microplus* populations are well-established throughout Mexico and Central America, and historically, populations became established in the southeastern portion of the United States from Florida to Texas, including Puerto Rico and the U.S. Virgin Islands in the Caribbean (Graham and Hourrigan, 1977).

The distribution of *R. annulatus* tends to overlap with *R. microplus* in subtropical regions of the world, such as Mexico and the southeastern United States; however, *R. annulatus* populations are established predominately in northern and central Africa, eastern Europe, and countries bordering the Mediterranean Sea. Historically, in the United States, *R. annulatus* populations were established as far north as Virginia, Tennessee, Kansas, and southern California. Today, both species are periodically encountered within the Permanent Tick Quarantine Zone in South Texas; however, *R. microplus* is typically recovered from the Gulf Coast up to the City of Laredo, and *R. annulatus* is typically recovered from the City of Laredo up to Amistad Dam. The distribution of both species overlaps in Webb County, where the City of Laredo is located (Lohmeyer et al., 2011).

B. Land Characteristics and Agricultural Production

“Land characteristics” as defined in this EIS include the physical features and soil resources within Maverick, Starr, Webb, and Zapata Counties. Wildlife, vegetation, water resources, air quality, human populations, and weather and climate patterns that may be associated with land in or near the proposed fence locations are discussed in detail in their own subsections of the EIS.

The four counties lie within an area designated by NRCS as the Rio Grande Plain. Rio Grande Plain soils formed from sediments deposited over a broad coastal plain (Tinker et al., 2008). The proposed fence sections are limited to the Western Rio Grande Plain land resource area. Soils are fine to coarse-textured, well-drained, and have limited soil moisture for use by vegetation during the growing season (McNab and Avers, 1994). Soils range from alkaline to slightly acidic clays and clay loams. The predominant soils in the fence areas are deep clay loams and sandy clay loam over clay. The different physical and chemical properties of soils in these counties support different types of flora and fauna. For example, deeper soils in Texas can support tall brush, such as mesquite and spiny hackberry, whereas short, dense brush grows in the shallow, caliche (sedimentary rock) soils (TPWD, 2013 a). Drought has historically been a disturbance in the Rio Grande Plain, and 90 percent of the area has been converted from natural vegetation to dry-land pasture for cattle grazing (McNab and Avers, 1994).

1. Maverick County

Maverick County is in the Western Rio Grande Plain major resource area (Tinker et al., 2008). Elevations range from 540 feet in the southern part of the county to 960 feet above sea level in the northern part. The central and southern parts of the county are characterized by ridges and drainages to the Rio Grande and the Nueces River. Terrain along the Rio Grande is characterized by rough hills with brush overlooking a mile-wide stretch of irrigated farmland (Stevens and Arriaga, 1977; TAMU, 2013). Soils are clay, sandy, and alluvial (composed of materials left by the water of rivers, floods, etc.) (TSHA, 2013). With the exception of adding height to the short fence already present along an irrigation canal in El Indio, we do not plan fencing in locations adjacent to water bodies.

The most important natural resources in the county are soil, water, wildlife, petroleum, coal and natural gas. Sand, gravel and caliche are also available and used extensively for roads and building construction. U.S. Highway 277 is the major transportation route; some farm-to-market and county roads also serve the area. Water for residential, wildlife, recreational, and agricultural needs is supplied by canals from the Rio Grande, rivers, creeks, and other manmade ponds or bodies of water. A few wells draw from the Carrizo Springs Aquifer on the eastern side of the county (TAMU, 2013).

Almost all crops are grown under irrigation and may include cotton, sorghum, alfalfa, hay, pecans, and wheat (Stevens and Arriaga, 1977; TSHA, 2013). In 1982, 88 percent of all land in the county was considered farmland and ranches, but only 2 percent of the farmland was under cultivation. The predominant land uses in areas adjacent to the proposed fence are rangeland and ranches. There are areas of irrigated crops and orchards, but the majority of agricultural receipts are from livestock and livestock products, which include cattle, milk, sheep, wool, angora goats, mohair, and hogs (Ochoa, 2013). The agricultural market in Maverick County is valued at $26.1 million (TSHA, 2013).

2. Starr County

Starr County is in the Sandsheet Prairie, Western, Central, and Lower Rio Grande Plain major land resource areas (Tinker et al., 2008). Starr County has elevations from 125 to 580 feet above sea level (TSHA, 2013). The proposed fencing is limited to flat or gently rolling rangelands in the Western Rio Grande land resource area. The most prominent feature is the line of low hills forming a boundary between the floodplain of the Rio Grande and the northern plain. The hill ridges are gravelly and highly dissected. West of Los Olmos Creek is a gently rolling plain containing rounded hills and broad valleys. The hills are drained by arroyos emptying into the Rio Grande (Thompson et al., 1972).

Starr County has clay, loam, and sandy soils. The terrace along the Rio Grande contains alluvial soils. The majority of soils in Starr County are well suited for rangeland; some are suitable for irrigated cultivation (Thompson et al., 1972).

Livestock production is the predominant means of livelihood in Starr County (Thompson et al., 1972). The majority of the land is used for agriculture, with cattle as the primary livestock, and sorghum, hay, onions, cantaloupes, lettuce, bell peppers, honeydew melons, and cabbage as primary crops. Natural resources include caliche, clay, gravel, oil, and gas. Gas and oil production is significant (Garza, undated). The agricultural market in Starr County is valued at $64.4 million (TSHA, 2013).

3. Webb County

Webb County is in the Northern, Central, and Western Rio Grande Plain major land resource areas (Tinker et al., 2008). Webb County soils are primarily sandy, gray soils with alluvial soils along the river. The proposed fencing is limited to flat or gently rolling rangelands in the Western Rio Grande land resource area. The county's land surface is generally flat to rolling with brush. Wind action has minimized some of the older sedimentary deposits. Elevation ranges from 310 to 940 feet above sea level, and the northern and eastern sections are drained by creeks that eventually enter the Nueces River; the southern and western parts of the county are drained by the Rio Grande (Leffler and Long, 2013; TSHA, 2013). There are estimated to be more than 2,500 ponds and lakes in Webb County (Sanders and Gabriel, 1985). We do not plan fencing in locations adjacent to water bodies.

Mineral resources include caliche, clay, uranium, oil, natural gas, and zeolite (commonly used as an adsorbent). Webb County was first in the State in production of natural gas (Leffler and Long, 2013).

Cattle ranching and the oil and gas industry are integral to the county's economy, and the majority of the county's land is devoted to agriculture, including ranching. Principal crops include vegetables, sorghum, cotton, and hay. Crops and pasture grasses are grown using irrigation water from the Rio Grande (Leffler and Long, 2013). The agricultural market in Webb County is valued at $24.7 million (TSHA, 2013).

4. Zapata County

Zapata County occupies two major land resource areas: Western and Central Rio Grande Plain (Tinker et al., 2008). The prevailing landscape consists of inland, dissected coastal plains. Most of the area is similar to rolling brushy prairie, with elevations from 300 to 860 feet above sea level (Garza and Long, undated; TSHA, 2013). The proposed fencing is limited to flat or gently rolling rangelands in the Western Rio Grande land resource area.

Zapata County generally has light-colored loam over reddish or mottled clay subsoils; limestone lies in places within 40 inches of the surface (Garza and Long, undated). Soils in Zapata County are well suited for rangeland, wildlife habitat, livestock production, and forage production (Molina and Guerra, 2011).

The most important natural resources in the county are soil, water, wildlife, petroleum, and natural gas. Other natural resources include clay, lignite coal, sand, gravel, and caliche – the last three are used extensively to construct roads and buildings (Garza and Long, undated).

Water for residential, wildlife, recreational, and agricultural needs is supplied by the Rio Grande, Falcon Reservoir, and other manmade wells or bodies of water. Most crops are grown under irrigation and may include cotton, corn, cantaloupes, watermelons, onions, tomatoes, peppers, cabbage, spinach, herbs and sorghum. Raising beef cattle is a major agricultural enterprise in the county, involving careful management of available rangeland, pastureland, and hayland. Rangeland or native grassland, unlike pasture or hayland, receives no regular cultural treatment, such as irrigation, fertilizer, weed control, or tillage (Garza and Long, undated). The agricultural market in Zapata County is valued at $13.1 million (TSHA, 2013).

C. Climate

The climate in Maverick, Webb, Starr, and Zapata Counties is considered subtropical. Temperatures in the summer are hot, with average high temperatures near 100 degrees Fahrenheit. Winter weather is mild, with average minimum temperatures near 45 degrees Fahrenheit. Precipitation averages 20 inches annually, with more precipitation in the summer than in the winter (figure 3-1). A southerly wind is the predominant wind condition in South Texas. In most areas of the State, the average wind speeds are between 7 and 15 miles per hour (Bomar, 2008).

D. Air Quality

The CAA (42 U.S.C. §§ 7401 et seq.) is the primary Federal legislation that addresses air quality. In a given region or area, air quality is measured by the concentration of pollutants in the atmosphere, and is influenced by surface topography and prevailing meteorological conditions. The EPA established National Ambient Air Quality Standards (numerical concentration-based standards) for six criteria pollutants that impact human health and the environment (40 CFR § 50). These pollutants are common and accumulate in the atmosphere as a result of normal levels of human activity. They include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulfur dioxide (SO_2), small particulate matter, and lead (Pb).

Pollutant emission types are categorized as either primary or secondary (§ 50). Primary standards represent maximum levels of background air pollution that are considered safe for humans, including sensitive groups such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including the protection of animals, vegetation, crops, and other public resources (EPA, 2012). Table 3-1 indicates the primary and secondary National Ambient Air Quality Standards.

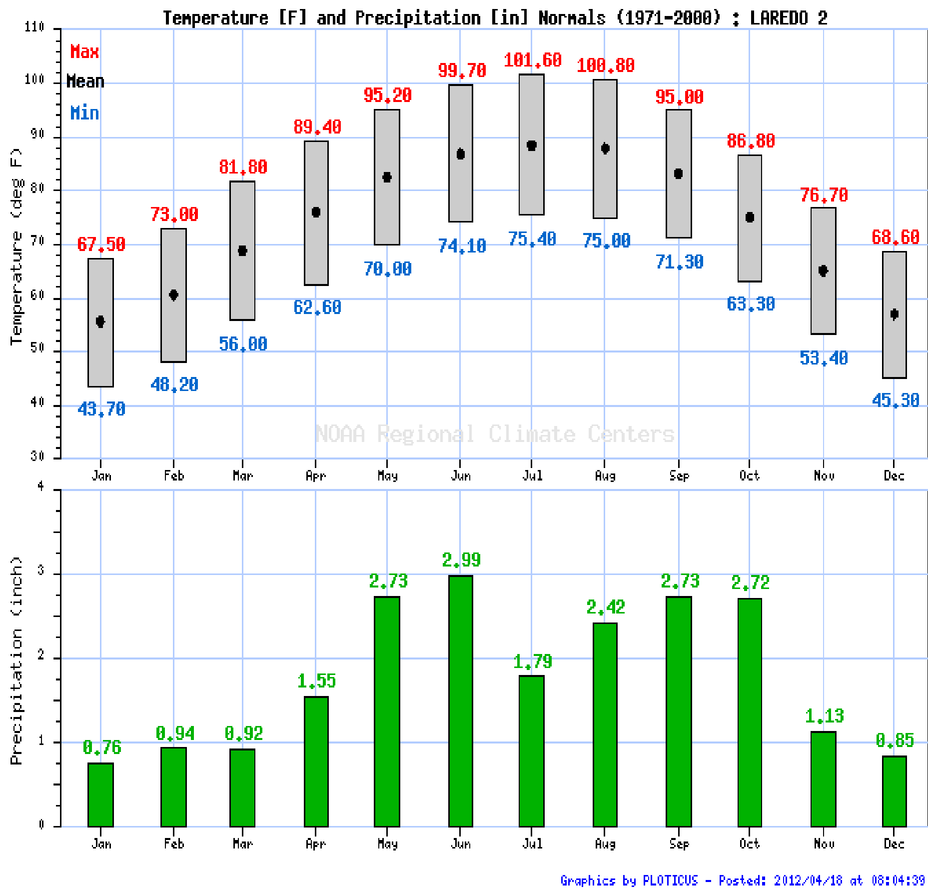

Figure 3-1. Average temperature and precipitation in South Texas, 1971-2000. Credit: Southern Regional Climate Center.

Ozone, a criteria pollutant, is formed in the atmosphere by photochemical reactions involving sunlight and oxides of nitrogen (NO_x) and volatile organic compounds (VOCs). Major sources of NO_x and VOCs include industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents (EPA, 2012). Regulatory agencies limit atmospheric ozone concentrations by controlling the release of VOCs and NO_x.

Table 3-1. Primary and Secondary National Ambient Air Quality Standards (40 CFR § 50)[1,2]

Pollutant	Averaging Time	Standard Value[3]	Standard Type
Carbon Monoxide (CO)	8-hour	9 ppm	Primary
	1-hour	35 ppm	Primary
Lead (Pb)	Rolling 3-month average	0.15 µg/m[4]	Primary and Secondary
Nitrogen Dioxide (NO_2)	1-hour[3]	100 ppb	Primary
	Annual	53 ppb	Primary and Secondary
Ozone (O_3)	8-hour	0.075 ppm[5]	Primary and Secondary
Particulate Matter <2.5 Micrometers ($PM_{2.5}$)	Annual	15 µg/m[4]	Primary and Secondary
	24-hour	35 µg/m[4]	Primary and Secondary
Particulate Matter <10 Micrometers (PM_{10})	24-hour	150 µg/m[4]	Primary and Secondary
Sulfur Dioxide (SO_2)	1-hour	75 ppb[6]	Primary
	3-hour	0.5 ppm	Secondary

[1]As of October 2011.
[2]These EPA standards (promulgated pursuant to section 109 of the CAA (40 CFR § 50)), were adopted by Texas in 1976, effective 1979 (30 TAC 101.21).
[3]ppm – parts per million; ppb – parts per billion; mg/m3 – milligrams per cubic meter; µg/m^3 – micrograms per cubic meter.
[4]In February 2010, EPA established a new 1-hour standard at a level of 0.100 ppm, based on the 3-year average of the 98th percentile of the yearly distribution concentration, to supplement the existing annual standard.
[5]The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years) and related implementation rules remain in place. In 1997, EPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than or equal to 1.
[6]In June 2010, EPA established a new 1-hour SO_2 standard at a level of 75 parts per billion (ppb), based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations.

Particulate matter emissions can have different health effects depending on the particle size; therefore, EPA developed separate National Ambient Air Quality Standards for coarse particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$) (40 CFR § 50, Appendices I-L). Fine particulate matter, also known as a primary pollutant, is emitted from sources such as diesel engines, power plants, and refineries as a fine dust or liquid mist (soot). This matter can become a secondary pollutant as a result of a chemical reaction between two primary pollutants by forming nitrate and sulfate compounds. Precursors of fine particulate matter include SO_2, NO_x, VOC, and ammonia. Metropolitan areas have greater levels of $PM_{2.5}$ than other areas of the country (figure 3-2).

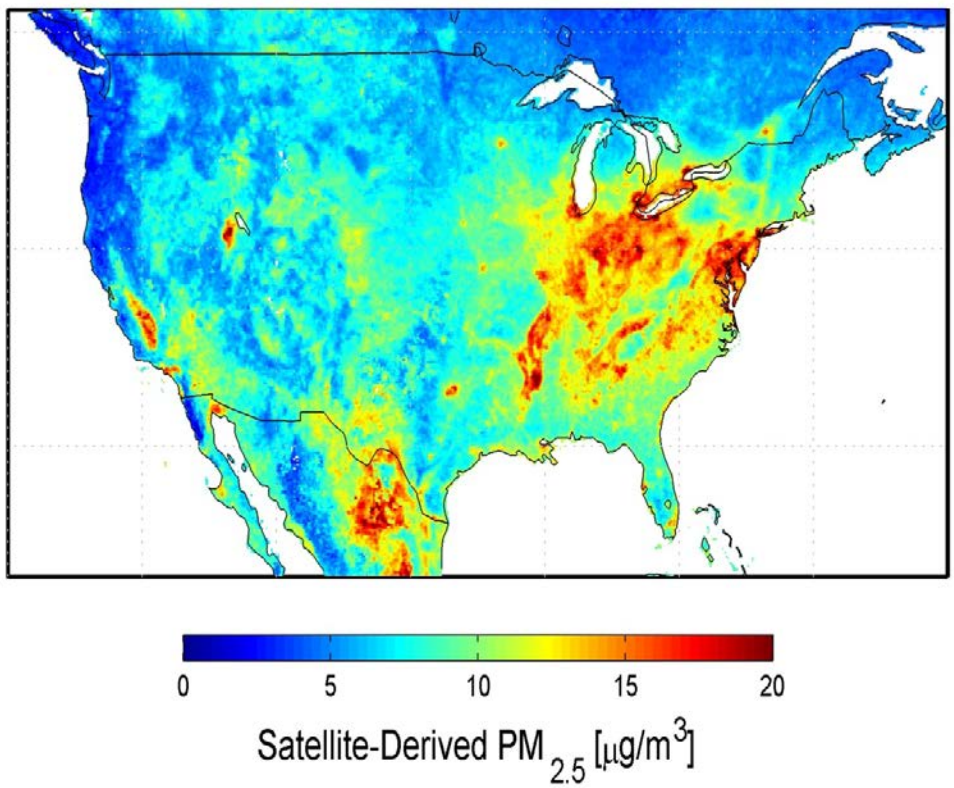

Figure 3-2. Global satellite-derived map of fine particulate matter ($PM_{2.5}$) from 2001-2006. Credit: National Aeronautics and Space Administration.

Greenhouse gases are gases emitted from natural processes and human activities that trap heat in the atmosphere. While greenhouse gases help regulate the earth's temperature, they also contribute to global climate change. Greenhouse gases consist of water vapor, carbon dioxide (CO_2), methane, NO, O_3, hydrocarbons, and chlorofluorcarbons.

On February 18, 2010, CEQ issued a draft guidance memorandum advising Federal agencies to consider whether analysis of the direct and indirect greenhouse gas emissions from an agency's proposed actions may provide meaningful information to decision makers and the public (CEQ, 2010). If a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO_2-equivalent greenhouse gases on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful. CEQ also encourages Federal agencies to consider whether the action's long-term emissions should receive similar analysis, even if the annual direct emissions of CO_2-equivalent greenhouse gases are less than 25,000 metric tons (CEQ, 2010). This serves as a baseline for the minimum level of greenhouse gas emissions from an action that may warrant further discussion in the NEPA analysis.

To enforce requirements under the CAA, the EPA has delegated responsibility for ensuring compliance of the National Ambient Air Quality Standards to States and local agencies. The Texas Commission on Environmental Quality (TCEQ) is the State agency responsible for monitoring and regulating air quality. Maverick, Webb, and Zapata Counties are within Region 16 of the TCEQ Air Quality Control Area, while Starr County is in Region 15 (figure 3-3).

TCEQ collects data for the Texas Air Quality Index based on EPA standards; small particulate matter and ozone because are the two pollutants that pose the greatest threat to human health. According to TCEQ, scores for Maverick, Starr, Webb, and Zapata Counties typically fall in the "good" range and occasionally in the "moderate" range. The major sources of air pollution in these counties are highway vehicle traffic, petroleum production, and agriculture (TCPS, 1995). The South Texas counties have better air quality than many of the other major urban areas around the State, which more often see Air Quality Indices in the "moderate" range and "unhealthy for sensitive groups" range (Combs, 2008).

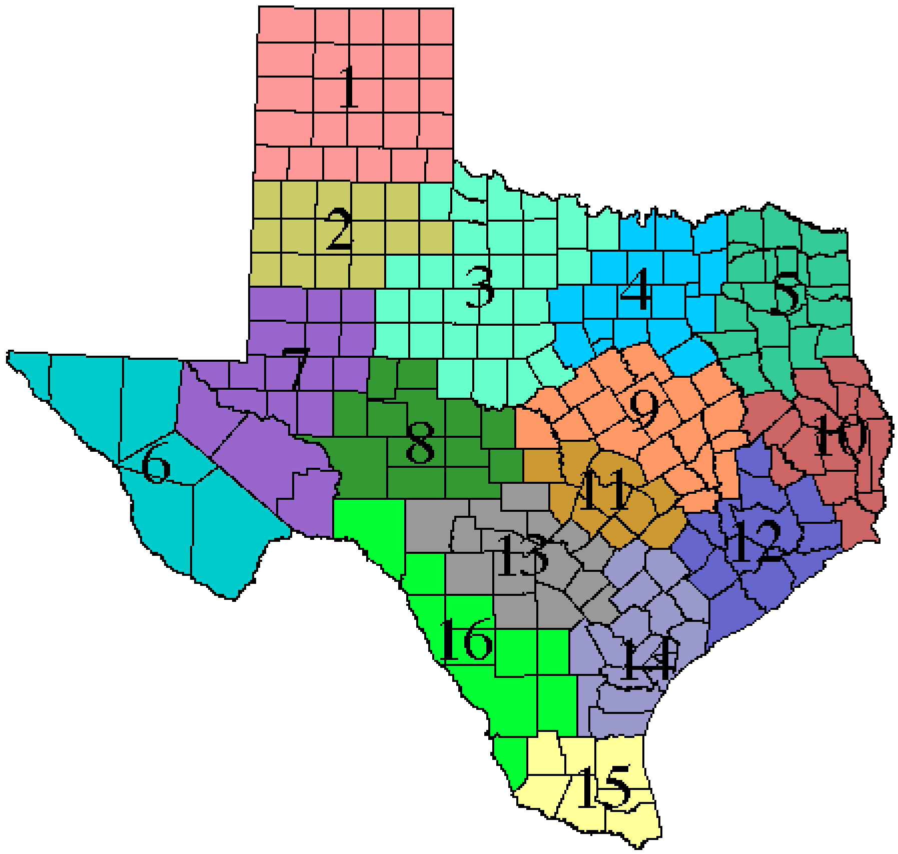

Figure 3-3. TCEQ Air Quality Control Areas. Credit: TCEQ.

E. Water Quality

The proposed CFTEP fence is located within the central portion of the Rio Grande watershed. A "watershed" is an area of land that contributes water to a river or stream. The project area includes a total of 27 reservoirs, streams, rivers, ephemeral (short-lived), intermittent, and perennial drainage features that are considered jurisdictional waters of the United States and are subject to CWA regulations (40 CFR §§ 136, 230-233) (see Appendix I). The major water bodies of this watershed include the Rio Grande bordering the west or southwest of all four counties, the Main Canal in Maverick County, Falcon Dam on the west border of Zapata and Starr Counties, and Falcon Reservoir and its three arms that extend into Zapata County (Arroyo Burro, Arroyo del Tigre Grande, and Arroyo del Tigre Chiquito). Minor water bodies include streams and arroyos (table 3-2).

Table 3-2. Jurisdictional and Non-Jurisdictional Water Bodies Along the Proposed Fencing Area (APHIS & EPA Office of Water)

County	Water Body
Maverick[1]	Rosita Creek Cuevas Creek Cuervo Creek
Starr[2]	Arroyo Minita Arroyo del Tigre Arroyo de Los Mudos
Webb[3]	Carricitos Creek
Zapata[4]	Dolores Creek Arroyo Salado Arroyo San Francisco El Grullo Creek Marcial Creek Arroyo Zacatosa Chapote Creek Arroyo Molletes Arroyo Ranchito Arroyo San Bartolo Falcon Reservoir Arroyo Clareno Arroyo del Tigre Grande Arroyo del Tigre Chiquita Arroyo Los Guajes Arroyo Tinajas

[1]Maverick County has four unnamed streams near the proposed fencing area.
[2]Starr County has two unnamed streams near the proposed fencing area.
[3]Webb County has four unnamed streams near the proposed fencing area.
[4]Zapata County has five unnamed streams near the proposed fencing area.

States are required to monitor and regulate water quality in their rivers and streams under Section 303(d) of the CWA (40 CFR § 131). If a water body is deemed impaired by the State, this means that it does not meet a particular water quality standard. In Texas, water quality standards are established by TCEQ. Water bodies identified as impaired are targeted for pollution management under the TCEQ Continuing Planning Process (TCEQ, 2013). Although segments of the Rio Grande basin (immediately downstream of Del Rio and Laredo) are listed in the 2010 State of Texas CWA Section 303(d) List, the fence will only come in close proximity to a

303(d) impaired water designated “TX-2304” just south of Ramireno, Texas. Construction will not occur over or in this water body (TCEQ, 2011).

The Rio Grande and Falcon Reservoir provide much of the public water supply in the project area. However, because of the rural nature of the project area, we believe that private wells also provide water. The Texas Water Development Board’s Water Information Integration Dissemination System identifies water wells within the region and along U.S. Highway 83 (FHWA, 2007).

The proposed tick fence is located in an area that is not supported by any major or minor aquifers (George et al., 2011). The southwestern extents of the Carrizo-Wilcox and Gulf Coast aquifers are located to the north and south of the project area, respectively.

The proposed project would cross 100-year floodplains in 12 locations in three counties (Starr, Webb, and Zapata), as identified by the Federal Emergency Management Agency (table 3-3; Appendix I).

The proposed project is located in Maverick, Starr, Webb, and Zapata Counties, which are not coastal counties. Therefore, the project is not under the jurisdiction of the Texas Coastal Management Program and would not require coordination under the Texas Coastal Management Program rules. However, stormwater runoff in the project area flows into the Rio Grande basin, and therefore, APHIS should contact TCEQ regarding the potential need to work under the Texas Pollutant Discharge Elimination System Construction General Permit and the need for a Stormwater Pollution Prevention Plan (TCEQ, 2013).

1. Arroyos/Streams with Defined Channels

Of the 27 bodies of water identified in the project area, 25 consist only of defined channels with no wetland component. Many of these are ephemeral (a channel that only holds water during and immediately after rain events) arroyos that begin as headwaters on hillsides. Others are intermittent (a stream that holds water during wet times of the year) and perennial (a stream that holds water throughout the year) features that contain water during part or most of the year. Eighteen of the arroyos/streams have defined channels that vary from 1 to 6 feet wide at the ordinary high water mark. These arroyos include Arroyo Zacatoso, Chapote Creek, Arroyo Clareno, Arroyo del Tigre, and 14 unnamed tributaries (FHWA, 2007). Four arroyos/streams have defined channels that vary from 8 to 20 feet wide at the ordinary high water mark. These larger arroyos include Arroyo San Bartolo, Arroyo los Guajes, Arroyo la Minita, and one unnamed tributary.

Table 3-3. Water Bodies in 100-year Floodplain (TXDOT in FHWA, 2007)

County	Water Body
Starr	Arroyo Minita Arroyo del Tigre
Webb	Carricitos Creek
Zapata	Arroyo Burro Arroyo Molletes Arroyo Ranchito Arroyo San Bartolo Falcon Reservoir Arroyo Clareno Arroyo del Tigre Grande Arroyo del Tigre Chiquita Arroyo Los Guajes

2. Arroyos/ Streams without Defined Channels

Several drainage features in the project area do not exhibit defined channels but convey water through the project area via sheet flow. The portions of these drainages located in the project area are not considered jurisdictional under the CWA (40 CFR §§ 136, 230-233). Some of these features, such as Arroyo Tinajas and Arroyo de los Mudos, are relatively large and have floodplains associated with them that drain the project region (FHWA, 2007).

3. Jurisdictional Wetlands

There are two wetlands in the project area subject to regulations under the CWA (§§ 136, 230-233). These aquatic sites are associated with Arroyo Molletes and Arroyo Ranchito, which are located 1 mile north of the city of Zapata, just west of U.S. Highway 83. At Arroyo Molletes, the total area of wetland in the proposed fence area is 0.1 acre. This wetland is located west of U.S. Highway 83 in the right-of-way. At Arroyo Ranchito, approximately 0.14 acre of wetland is located west of U.S. Highway 83 in the right-of-way.

4. Open Water

The proposed project would come up to but not cross three arms of the Falcon Reservoir: Arroyo Burro, Arroyo del Tigre Grande, and Arroyo del Tigre Chiquito. Although most of the area located within these arms is dry (FHWA, 2007), the U.S. Army Corps of Engineers maintains jurisdiction of these navigable waters.

5. Isolated Features

Stock Tank – The 2007 Texas U.S. Highway 83 study (FHWA, 2007) found that a man-made stock tank is located on the east side of the highway, approximately two miles north of Falcon. This stock tank is approximately 0.13 acre and is used for agricultural activities. The tank is not associated with any defined stream channel or floodplains. Water is pumped into the stock tank from a well or water pipeline, and overflow drains into the U.S. Highway 83 roadway drainage ditches. This stock tank is not considered a jurisdictional water of the United States and is not subject to the CWA (§§ 136, 230-233).

Isolated Wetland – The 2007 U.S. Highway 83 Texas study (FHWA, 2007) also found one isolated wetland near U.S. Highway 83 immediately south of FM 2098 (South). This wetland is approximately 0.08 acre and is in a depression that receives water from an overflow pipe that releases water from a rural Falcon water supply corporation storage tank (standpipe). This wetland is not connected to any defined stream channel and is not located within any floodplains. This isolated wetland is not subject to regulations under the CWA (§§ 136, 230-233).

F. Vegetation

The affected environment discussed in this document occurs within a distinct ecoregion (McMahan et al., 1984) known as South Texas Brush Country (TPWD, 2013 a), South Texas Plains, or the Rio Grande Plains (Bailey, 2009) (figure 3-4). It is an arid expanse of Texas that begins south of San Antonio and extends down to the Rio Grande. This region encompasses about 20.5 million acres, covering much of southwest region of the State (Taylor et al., 1997). Some ecologists consider the South Texas Brush County to be a biologically diverse region that supports a wide array of wildlife species ranging from migratory birds to more permanent residents such as ocelots and white-tailed deer (Maywald and Doan-Crider, 2008).

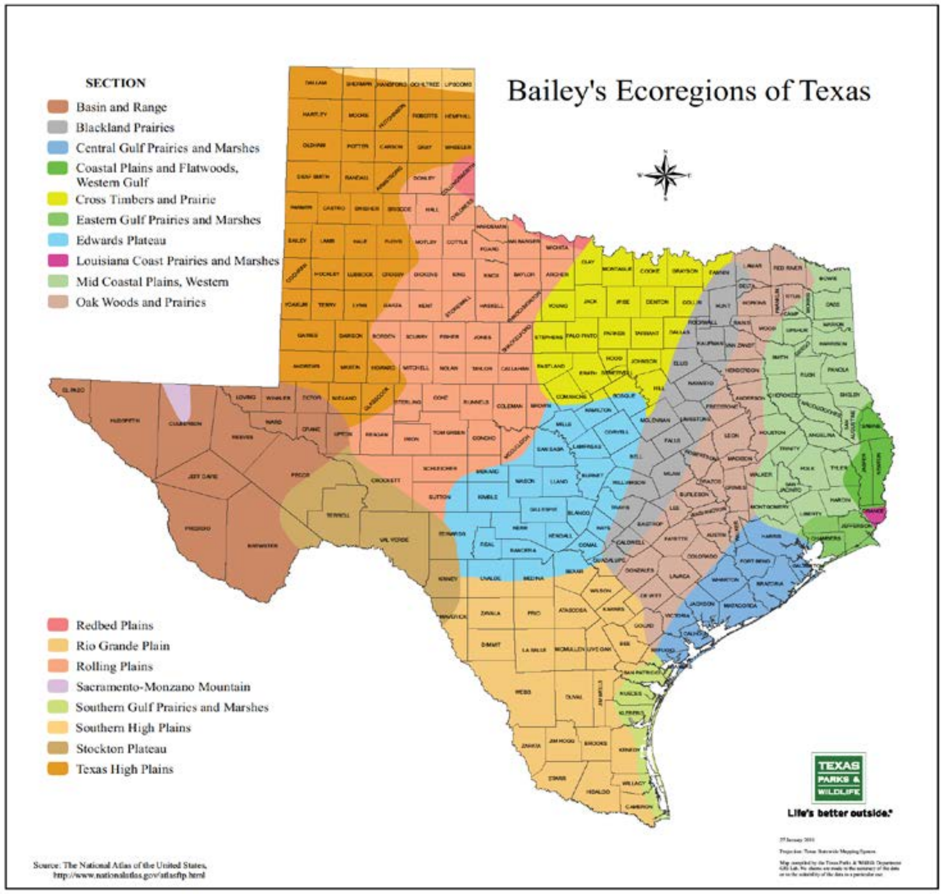

Figure 3-4. Ecoregions of Texas, as described by R.G Bailey (1995).

Present in the South Texas Brush County are elements of the Chihuahuan Desert to the west, the Tamaulipan thornscrub and subtropical woodlands along the Rio Grande, and the coastal grasslands to the east. These elements include arid to semi-arid landscapes that feature a limited number of ephemeral wetlands, and distinct examples of the conversion of grasslands and savannas to woodlands. The Chihuahuan Desert features a series of lower basin slopes and basin floors and is considered cool compared to other deserts located in the Western Hemisphere (average temperature of 65.5 degrees Fahrenheit), receiving higher rates of rainfall than other warm desert ecoregions (average annual rate of 5.9 inches to 15.7 inches). The region is isolated from other arid regions such as the Sonoran Desert by the large mountain ranges of the Sierra Madres, which has allowed the evolution of many native plant species that are restricted to the Chihuahuan Desert. The Tamaulipan thornscrub features a subtropical climate and consists of drought-tolerant woody plants that grow to heights up to 9 feet. These plants tend to cluster into dense thickets that can cover up to 75 percent of the ground in some areas (McMahan et al., 1984), with the densest areas limited to the western 30 to 50 percent of Starr County. The coastal grassland to the east of the South Texas Brush County is a grassland ecoregion featuring a mix of tallgrass prairie similar to that found in inland Texas.

The native plant communities of this ecoregion have been shaped by natural features, including rainfall rates and long growing seasons, averaging 340 to 360 days each year (Taylor et al., 1997). Much of the vegetation found in this ecoregion features small leaves and thorns, typical of xerophytic (drought-tolerant) brush communities. Though recurrent droughts are typical, the region boasts the longest growing season in Texas.

Human activity (since European colonization) also has had a tremendous impact on the landscape (McMahan et al., 1984) via brush control and grazing practices associated with cattle ranching. Shrub species such as blackbrush, palo verde, and allthorn that were previously restricted to thickets, upland areas, major drainages, and river bottoms are now prevalent in this region due to land use practices of early settlers, primarily through the installation of fencing and fire suppression. Cattle have grazed this region since the late 1800s, and the region has experienced a 23 percent increase in woody cover since 1941 (Council, 1994). Additionally, soil compaction and periodic droughts have aided a gradual migration of brush species into open grassland.

Within Maverick, Starr, Webb, and Zapata Counties, two vegetation types are dominant: ceniza-blackbrush-creosote, which is found on the slopes of the Rio Grande basin, from near Langtry in Val Verde County to near San Ygnacio in Zapata County, and mesquite-blackbrush, which is found principally on shallow, gravelly, or loamy soils and is common to the South Texas Plains. The plants commonly associated with each vegetation type are listed in table 3-4.

1. Current Restoration Activities

Within the affected environment, efforts to restore native species of the South Texas Brush Country are ongoing and include planting native grasses and forb (herbaceous flowering plant) species in upland habitat (FWS, 2006). One such project taking place within the Tamaulipan thornscrub ecoregion of Starr County focuses on the star cactus (*Astrophytum asterias*) (FWS, 2003). Habitat destruction and years of

Table 3-4: Predominant plants of the ceniza-blackbrush-creosote (C-B-C) and mesquite-blackbrush (M-B) communities (Bailey, 2009)

Common	Scientific	Present in C-B-C	Present in M-B
Allthorn	*Koeberlinia spinosa*	Yes	Yes
Bluewood	*Condalia hookeri*	No	Yes
Catclaw acacia	*Acacia greggii*	Yes	No
Catclaw mimosa	*Mimosa biuncifera*	No	No
Ceniza	*Leucophyllum frutescens*	No	Yes
Coldenia	*Coldenia spp.*	No	No
Curly mesquite	*Hilaria belangeri*	Yes	No
Desert Olive	*Forestiera angustifolia*	No	Yes
Desert Yaupon	*Shaefferia cuneifolia*	Yes	Yes
Dogweed	*Dyssodia pentachaeta var. pentachaeta*	No	Yes
Goatbush	*Castela texana*	Yes	No
Granjeno	*Celtis pallid*	No	Yes
Guajillo	*Acacia berlandieri*	Yes	Yes
Guayacan	*Porlieria angustifolia*	Yes	Yes
Hairy grama	*Bouteloua hirsute*	No	Yes
Hairy tridens	*Frioneuron pilosum*	Yes	Yes
Kidneywood	*Eysenhardtia texana*	Yes	Yes
Knotweed leafflower	*Phyllanthus polygonoides*	No	Yes
Leatherstem	*Jatropha dioica*	No	Yes
Lotebush	*Ziziphus obtusifolia*	Yes	Yes
Mat euphorbia	*Euphorbia serpens*	No	Yes
Mesquite	*Prosopis glandulosa*	Yes	No
Paloverde	*Cercidium texanum*	Yes	No
Pink pappusgrass	*Pappophorum bicolor*	Yes	Yes
Purple three-awn	*Aristida purpurea*	No	Yes
Slim tridens	*Tridens muticus var. muticus*	Yes	Yes
Sotol	*Dasylirion spp.*	Yes	
Tasajillo	*Opuntia leptocaulis*	No	Yes
Texas grama	*Bouteloua rigidiseta*	Yes	No
Texas pricklypear	*Opuntia lindheimeri*	Yes	Yes
Two-leaved senna	*Cassia roemeriana*	Yes	Yes
Whitebrush	*Aloysia gratissima*	No	Yes
Yucca	*Yucca spp.*	Yes	Yes

over-collection by cactus enthusiasts have led to the listing of this species as endangered by FWS (58 FR 53804-53807 (1993); 50 CFR § 17.12(h)). All known locations of the star cactus occur on 20 acres of privately owned land.

Restoration efforts include a monitoring plan for more than 300 transplanted individuals over a 10-year period, beginning in 2012. Because there are currently no known Federal- or State-owned properties with star cactus, the conservation and preservation of these populations on private land is crucial in preventing extinction of this species from Texas. The construction of fence portions in Starr County will not impact these conservation efforts since the nearest restoration site is more than 9 miles from the proposed fence location (figure 3-5).

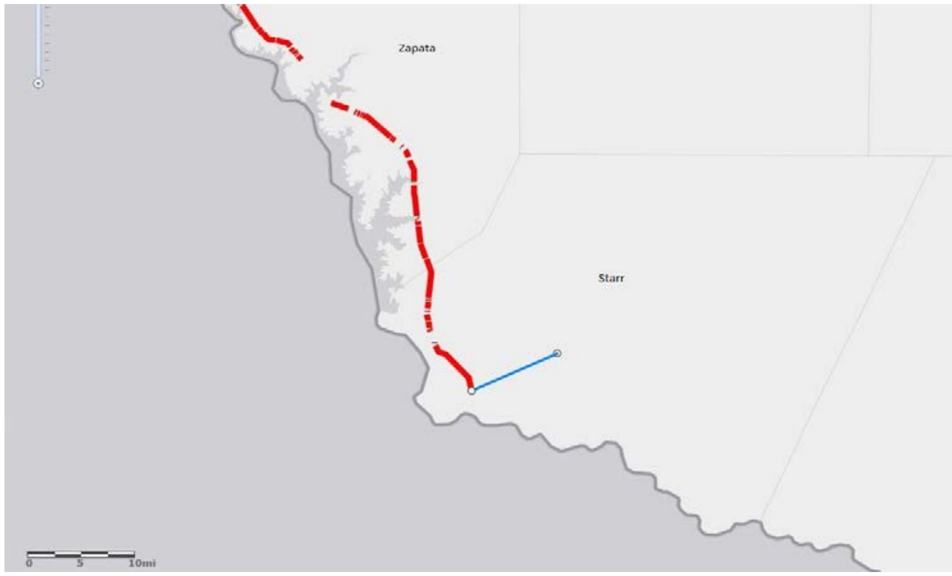

Figure 3-5. Map depicting the distance between the nearest star cactus restoration site and the location of the proposed fence. (The red line depicts the proposed fencing location, and the blue line indicates the distance between the fence and the critical habitat for the star cactus.) Credit: USDA, APHIS.

2. Invasive Vegetation

Ecosystems are defined by interactions between organisms and their environment. In South Texas, native plants are critical to the overall resilience and stability of the region and are a critical component of the ecosystem function, which in turn maintains greater levels of species biodiversity, especially of birds (Karr and Roth, 1971; MacArthur and MacArthur, 1961; Maywald and Doan-Crider, 2008; Roth, 1976; Willson, 1974). Invasive species can disrupt the balance in an ecosystem by outcompeting native species and changing the way in which nutrients and water are cycled (Sands et al., 2009). Invasive species represent one of the greatest threats to rangelands, degrading ecosystem productivity and reducing biodiversity (Mullin et al., 2000).

Biodiversity describes the variety of plant, animal, and microbial life found within an ecosystem. Biodiversity is considered an important component of ecosystem function (Loreau et al., 2002). Deserts and other arid environments are better able to sustain critical ecosystem functions when they contain a greater variety of plants (Maestre et al., 2012). For example, communities with a greater number of plant species are more resistant to drought. When invasive plants establish within an ecosystem, the number of different plant species characterizing a native plant community changes, causing a reduction in biodiversity, and in turn, reducing ecosystem function. Reductions in biodiversity can often result in long-term and often irreversible habitat degradation by disrupting ecosystem processes, such as nutrient cycling and soil stability (Sands et al., 2009).

Native plant species vary in timing of growth, seed, and fruit production, which subsequently provides food and shelter for herbivores such as the white-tailed deer and northern bobwhite quail at different times during the year (Arredondo et al., 2007; Sands et al., 2009). The environmental changes related to the presence of exotic (native in a country other than the United States) vegetation can have negative impacts on both plant and animal communities. For example, Flanders et al. (2006) identified reduced numbers of birds and insects within habitats where exotic grass displaced native grasses. This is primarily driven by a reduction in the species diversity of native plant communities. Exotic plant species tend to invade areas of recent disturbance including areas cleared for fence construction and maintenance.

Buffelgrass (*Pennisetum ciliare*) is an invasive plant species common to South Texas. Sands et al. (2009) observed that increasing abundance of buffelgrass indicated lower abundance of native grass coverage and diversity. Dense monocultures of exotic grasses, such as buffelgrass, can displace native grass species, reducing ecosystem function and increasing the frequency and intensity of fires on the landscape (Sands et al., 2009). Native to Africa, buffelgrass has the ability to tolerate extremely hot and dry conditions and does well under a frequent fire regime. It also produces many seeds and is considered an aggressive colonizer.

In response to an extended period of drought in the early 1950s, ranchers began to plant buffelgrass seed as a “high producing, nutritious forage grass… [that could allow] for the advancement of livestock ranching in the region” (Hanselka, 1988) and fill the void left by the low quality yields of less drought-tolerant grass species. Subsequent to root plowing, many ranchers seeded their rangelands with the perennial bunchgrass (grasses that grow in clumps). This practice continues in the United States and Mexico to support livestock (Hoyt, 2006).

Table 3-5. List of exotic invasive plant species known to inhabit Maverick, Starr, Webb, and Zapata Counties, Texas (TIPPC, 2011)

Common Name	Scientific Name	Maverick	Webb	Zapata	Starr
Bermudagrass	*Cynodon dactylon*	N	Y	N	N
Buffelgrass	*Pennisetum ciliare*	Y	Y	Y	Y
Castorbean	*Ricinus communis*	N	N	Y	N
Chinaberrytree	*Melia azedarach*	Y	Y	Y	N
Common dandelion	*Tarazacum officinale*	Y	N	N	N
Dallisgrass	*Paspalum dilatatum*	N	N	N	Y
Fivestamen tamarisk	*Tamarix chinensis*	N	Y	Y	N
French tamarisk	*Tamarix gallica*	N	Y	N	N
Giant reed[1]	*Arundo donax*	Y	Y	Y	Y
Johnsongrass	*Sorghum halepense*	Y	Y	N	N
Kleberg's bluestem	*Dichanthium annulatum*	N	N	N	Y
Lehmann lovegrass	*Eragrostis lehmanniana Nees*	N	Y	N	Y
Maltese star-thistle	*Centaurea melitensis*	Y	Y	N	N
Nutgrass	*Cyperus rotundus*	N	Y	N	Y
Palay rubbervine	*Cryptostegia grandiflora*	N	N	N	Y
Pampas grass	*Cortaderia selloana*	N	N	N	Y
Puncturevine	*Tribulus terrestris*	N	Y	N	Y
Russian thistle	*Salsola tragus*	N	Y	Y	Y
Saltcedar[1]	*Tamarix ramosissima*	N	Y	Y	N
South American mock vervain	*Glandularia pulchella*	N	Y	Y	Y
Tree tobacco	*Nicotiana glauca*	N	Y	Y	Y
Vasey's grass	*Paspalum urvillei*	N	N	N	Y
White horehound	*Marrubium vulgare*	Y	N	N	N
White leadtree	*Leucaena leucocephala*	N	Y	Y	N
White mulberry	*Morus alba*	N	Y	Y	N
Yellow sweetclover	*Melilotus officinalis*	N	Y	N	N

[1]Giant reed and saltcedar are listed by the State of Texas as noxious weeds (4 TAC §19.300 (a)).

G. Wildlife

Maverick, Starr, Webb, and Zapata Counties are located in the South Texas Wildlife Management Area. This area has long been noted for its cattle industry and abundant wildlife. During the 1600s and 1700s, there was some natural grazing pressure on this area with buffalo, antelope, and deer as the predominant ungulates (TPWD, 2013 b). In the 1800s, South Texas became colonized, livestock quantities grew, and fences were built to contain the livestock. These activities resulted in an increase in grazing pressure, a decrease in the occurrence of natural fires, an increase in brush (TPWD, 2013 b), and an overall reduction in plant and animal species diversity (Kozicky and Fulbright, 1991). Beginning in the 1960s, wildlife biologists began to make an effort to control brush while minimizing negative impacts to wildlife. The trend of habitat improvement and restoration continues today.

Despite the changes in vegetation, the South Texas Brush Country has more biodiversity than any other ecoregion in Texas (TEA, 2010) due to the distinctive Rio Grande Valley Region (TPWD, 2013 b). Unique species such as the ocelot, jaguarundi, ferruginous pygmy-owl, green jay, elf owl, Texas tortoise, indigo snake, and Mexican burrowing toad have been observed in this ecoregion (TPWD, 2013 a).

1. Birds

Maverick, Starr, Webb, and Zapata Counties are situated in the Tamaulipan Brushlands Bird Conservation Region (NABCI, undated & supp. 2000). The biodiversity in this region is primarily influenced by variability in temperature, soils, and precipitation. Within Maverick, Starr, Webb, and Zapata Counties, 351 avian species have been observed since January 2000. Spring migration typically results in 309 species moving through the area while fall migration accounts for the movement of 291 species. One hundred and sixty-seven of these species have the potential to breed in these counties (78 species Maverick; 148 species Starr; 117 species Webb; 95 species Zapata), and 283 species overwinter here (eBird, 2012).

2. Big Game Species

The South Texas Wildlife Management Area, which covers 5,255,676 acres, boasts premium deer habitat resulting in trophy white-tailed deer (*Odocoileus virginianus*) (Cain, 2012; Davis, 1990; TPWD, 2013 b). From 2005 to 2010, however, the number of deer decreased from 19 deer/ acre to 13 deer/ acre. In addition, the number of does per buck decreased from 4.14 to 1.83; the number of fawns experienced similar decreases (Cain, 2012). According to the Big Game Harvest Survey Results generated by the Texas Parks and Wildlife Department (Purvis, 2012), 68 percent of hunters were successful in harvesting 112,139 deer from 2010-2011 in the South Texas Brush Country.

While commonly located in the Trans Pecos, some mule deer (*Odocoileus hemionus crooki*) are located in the western South Texas Brush Country.

Mule deer are dependent upon forbs, so their populations decline during years of drought. This species also is susceptible to overgrazing and brush encroachment. Mule deer, unlike white-tailed deer, prefer open rangeland (TPWD, undated a). Approximately 25 percent of hunters were successful in harvesting 136 mule deer in the South Texas Brush Country during the 2010-2011 hunting season (Purvis, 2012).

Peccaries, or also known as javelinas, are found in arid or semi-arid parts of the State with most located in the South Texas Brush Country, the Trans-Pecos' desert grasslands, and the Edwards Plateau's oak-juniper woodlands. This species has a limited home range and is active in the early morning and late afternoon during the winter; the species becomes nocturnal when the temperature increases (TPWD, undated a). Approximately 15,938 javelinas were harvested from 2010-2011 with 72 percent hunter success (Purvis, 2012). It is important to note that some hunters may confuse feral swine with javelinas.

3. Non-native Species

Texas has more non-native species and greater numbers of non-native species than any other State. Approximately 70 percent of these species are confined on pastures by game-proof fences, and the remaining 30 percent are free range. Surveys for non-native species began in the 1960s, with 13 species and 13,000 individuals identified. The last survey was conducted in 1996 and at that time, there were 190,000 individuals from 76 different species (Sheffield, 2013). The most numerous non-native species in Texas include nilgai antelope (from India), sika deer (Southeast Asia), mouflon sheep (Sardinia and Corsica), fallow deer (Asia Minor and southern Europe), and feral swine (Europe) (Sheffield, 2013). South Texas is host to approximately 18 percent of the non-native species in Texas (Sheffield, 2013).

Nilgai antelope (*Boselaphus tragocamelus)* were introduced into Texas in the 1940s (Sheffield et al., 1983) and are the most abundant free-ranging ungulate in South Texas (Bradley, 1997) with population estimates of more than 36,000 individuals (Traweek and Welch, 1992). Nilgai antelopes also are potential carriers of the cattle fever tick (Cardenas-Canales et al., 2011; Moczygemba et al., 2012). Nilgai populations are highly mobile and can shift home ranges under pressure. They are a large species (males weigh in excess of 600 pounds) and can easily compete with cattle and native deer (Bradley, 1997; Moczygemba et al., 2012). White-tailed deer prefer forbs and browse (leaves of woody plants) and consume little grass. If forbs and browse become scarce from competition or weather-related events, exotics have the ability to shift their diet to grass whereas white-tailed deer are unable to do this and subsequently can suffer from malnutrition. The ability of nilgai to consume a variety of resources also can have an impact on the carrying capacity of a range (Armstrong and Harmel, 1981).

Feral hogs (*Sus scrofa*) in Texas are domestic hogs that escaped or were released for hunting purposes. Feral hogs are located throughout Texas, with the greatest population densities in East, South, and Central Texas. The estimated population of feral hogs in Texas is 1.5 million. Feral hogs are successful due to limited natural predators and high reproductive potential. Feral hogs compete with livestock, game, and non-game wildlife species for food and are responsible for destruction of habitat and damage to agriculture commodities (Taylor, 2003).

4. Threatened and Endangered Species

Federal agencies must ensure their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of critical habitat (50 CFR § 402). Eight federally listed species and one candidate for listing occur in the four counties (Maverick, Starr, Webb, and Zapata). Thirty-two state-listed species (table 3-6) and 37 species of concern (table 3-7) are also listed in the four counties. Texas laws and regulations prohibit commerce or collection from public lands of state-listed plants, or the taking, possession, transportation, and sale of any state-listed animal species without the issuance of a permit by the Texas Parks and Wildlife Department. Species of concern is an informal term used to describe species that may have declining populations, but they do not receive protection from Federal or State laws.

Federally listed endangered species in the four counties include the ocelot (*Leopardus (=Felis) pardalis*), Gulf Coast jaguarundi (*Herpailurus* (=*Felis*) *yagouaroundi cacomitli*), least tern (interior population) (*Sterna antillarum*), Ashy dogweed (*Thymophylla tephroleuca*), Johnston's frankenia (*Frankenia johnstonii*), Zapata bladderpod (*Lesquerella thamnophila*) and its designated critical habitat, Star cactus (*Astrophytum* asterias), and Walker's manioc (*Manihot walkerae*) (FWS, 2013). The Texas hornshell (*Popenaias popei*) is a candidate for federal listing.

Table 3-6. State-listed Species (excluding federally listed species discussed above) in Maverick, Starr, Webb, and Zapata Counties (TPWD, 2012)

Category	Scientific Name	Common Name
Mammals	*Nasua narica*	White-nosed coati
	Oryzomys couesi	Coues' rice rat
	Canis lupus	Gray wolf
Birds	*Falco peregrinus anatum*	American peregrine falcon
	Glaucidium brasilianum cactorum	Cactus ferruginous pygmy-owl
	Buteogallus anthracinus	Common black-hawk
	Asturina nitida	Gray hawk
	Camptostoma imberbe	Northern-beardless-tyrannulet
	Falco peregrines	Peregrine falcon
	Pachyramphus aglaiae	Rose-throated becard
	Parula pitiayumi	Tropical parula
	Buteo albicaudatus	White-tailed hawk
	Mycteria americana	Wood stork
	Buteo albonotatus	Zone-tailed hawk
Fish	*Cycleptus elongates*	Blue sucker
	Cyprinella proserpina	Proserpine shiner
	Hybognathus amarus	Rio Grande silvery minnow
	Etheostoma graham	Rio Grande darter
Reptiles and Amphibians	*Crotaphytus reticulatus*	Reticulate collared lizard
	Drymarchon melanurus erebennus	Texas indigo snake
	Leptodeira septentrionalis septentrionalis	Northern cat-eyed snake
	Gopherus berlandieri	Texas tortoise
	Phrynosoma cornutum	Texas horned lizard
	Notophthalmus meridionalis	Black-spotted newt
	Rhinophrynus dorsalis	Mexican burrowing toad
	Smilisca baudinii	Mexican treefrog
	Hypopachus variolosus	Sheep frog
	Siren sp. 1	South Texas siren
	Leptodactylus fragilis	White-lipped frog
Mussels	*Potamilus metnecktayi*	Salina mucket
	Truncilla cognata	Mexican fawnsfoot mussel
	Quadrula mitchelli	False spike mussel

Table 3-7. Species of Concern in Maverick, Starr, Webb, and Zapata Counties (TPWD, 2012)

Category	Scientific Name	Common Name
Mammals	*Myotis velifer*	Cave myotis bat
	Myotis yumanensis	Yuma myotis bat
	Choeronycteris mexicana	Mexican long-tongued bat
	Geomys personatus davisi	Davis pocket gopher
	Spilogale putorius interrupta	Plains spotted skunk
	Mormoops megalophylla	Ghost-faced bat
Birds	*Icterus cucullatus cucullatus*	Mexican hooded oriole
	Charadrius montanus	Mountain plover
	Falco peregrinus tundrius	Arctic peregrine falcon
	Icterus graduacauda audubonii	Audubon's oriole
	Icterus cucullatus sennetti	Sennett's hooded oriole
	Ammodramus bairdii	Baird's sparrow
	Cyanocorax morio	Brown jay
	Chondrohierax uncinatus	Hook-billed kite
	Geothlypis trichas insperata	Brownsville common yellowthroat
	Athene cunicularia hypugaea	Western burrowing owl
Fish	*Notropis jemezanus*	Rio Grande shiner
	Moxostoma austrinum	Mexican redhorse
	Ictalurus sp. 1	Chihuahua catfish
	Ictalurus lupus	Headwater catfish
Reptiles and Amphibians	*Holbrookia lacerata*	Spot-tailed earless lizard
Insects	*Cicindela obsoleta neojuvenilis*	Neojuvenile tiger beetle
	Cicindela cazieri	Cazier's tiger beetle
	Tetracha affinis angustata	Tiger beetle
Plants	*Asclepias prostrata*	Prostrate milkweed
	Atriplex klebergorum	Kleberg saltbush
	Cardiospermum dissectum	Chihuahua balloon-vine
	Houstonia correllii	Correll's bluet
	Physostegia correllii	Correll's false dragon-head
	Coryphantha macromeris var. *runyonii*	Runyon's cory cactus
	Eriogonum greggii	Gregg's wild-buckwheat
	Paronychia maccartii	McCart's whitlow-wort
	Coryphantha nickelsiae	Nickel's cory cactus
	Manfreda longiflora	St. Joseph's staff
	Thelypodiopsis shinnersii	Shinners' rocket
	Acleisanthes crassifolia	Texas trumpets
	Argythamnia argyraea	Silvery wild-mercury

The ocelot and Gulf Coast jaguarundi are known or believed to occur in all four program counties. They hunt for small prey and prefer dense, thorny, low brush. The Gulf Coast jaguarundi inhabits similar habitat to the ocelot but is more active in the daytime than the ocelot, a nighttime hunter (FWS, 2010; FWS, 2012 a). The least tern nests on bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs in Starr, Webb, and Zapata Counties (FWS, 2013). In particular, least terns nesting at Falcon Reservoir are near the proposed fence location (FWS, 1990). Ashy dogweed occurs on the sandy pockets of Maverick-Catarina, Copita-Zapata, and Nueces-Comita soils of southern Webb and northern Zapata Counties (TPWD, undated b). Johnston's frankenia tends to occur within openings in the blackbrush-dominated brushlands on pockets of highly saline soils, often in association with saladillo (*Varilla texana*), in Starr, Webb, and Zapata Counties (TPWD, undated c). Zapata bladderpod and its designated critical habitat occur in Starr and Zapata Counties. Zapata bladderpod critical habitat refuge tracts (Cuellar, Chapeno, Arroyo Morteros, Las Ruinas, Arroyo Ramirez, and Los Negros Creek) are near the proposed fence location (FWS, 2000).

In the United States, star cactus occurs in Starr County (see restoration efforts Section F). It grows on sparsely vegetated areas in gravelly, saline clays, or loams at low elevations in the Rio Grande Plains (FWS, 2003). Walker's manioc grows in dense stands of native brush or in small openings in Starr County. Many of the listed plants could be present in the proposed fencing locations (TPWD, undated d). The Texas hornshell is a freshwater mussel known to occur in the Rio Grande near Laredo, in Webb County and is unlikely to be in areas proposed for fence installation (FWS, 2012 b).

H. Human Health and Safety

1. Environmental Justice

Federal agencies must identify and address disproportionately high and adverse human health or environmental effects of its proposed programs, policies, and activities on minority and low-income populations in the United States and its territories and possessions as described in Executive Order 12898. Executive Order 13045 encourages similar considerations for children.

2. Colonias

Colonia is a term used in the southwestern States to describe a subdivision where developers divide the land into small lots and offer affordable housing to low-income families. These lots are often purchased through a contract for a deed with a low down payment and low monthly payments. The title for the house is not issued until the final payment is made by the homeowner (Anon., 2013 a). Housing in these locations is built by residents over time as they can afford materials. Consequently, many residences lack connections to sewers or running water, and residents may not be able to access water lines because their homes do not meet county building codes (Anon., 2013 a). The U.S. Census Bureau reports that up to 3 percent of households in Maverick, Starr, Webb, and Zapata Counties lack complete plumbing, and some lack basic amenities (Census, 2010-2011). Residents often rely on septic tank systems, but because of inadequate drainage and installation combined with elevation and topography issues, sewage may overflow (Anon., 2013 a). The proposed fence segments are unlikely to alter or address any of these issues because the proposed fence construction is not expected to change topography or drainage.

Approximately 400,000 Texans live in colonias, and reportedly 85 percent of those residents under 18 were born in the United States (Anon., 2013 a). APHIS identified areas where residents in colonias may be impacted by the proposed project (Appendix J) and ensured that residents of these local colonias were notified of the project and represented at public meetings.

In Maverick County, fence segments are proposed for construction within the El Indio Townsite colonia in El Indio along the irrigation canal and near Loma Linda #1 colonia in Rosita North. There are no Maverick County schools located near the project area. In Starr County, fence segments are proposed near the following schools: Lago Vista, Indio #1, Indio #2, La Loma de Falcon, Salineno North, and Los Arrieros colonias near Falcon Heights. Three miles south of the proposed fence segments, near Roma Creek, four schools are located (Scott Elementary School, Barrera Elementary School, Roma Accelerated Learning Academy, and Roma Intermediate School). We are proposing fence segments for two areas adjacent to the Dolores and Lopena colonias and for two locations on either side of the Morales-Sanchez and the San Ygnacio colonias in Zapata County. Benavides Elementary School, located approximately 0.3 miles north of the proposed fence segment, is within the San Ygnacio colonia. APHIS considers potentially impacted schools as important because of the high likelihood for children to play in areas less than 1 mile from fence locations.

3. Schools

Identification of nearby school areas is important to APHIS to ensure access to these institutions and because the fencing will become part of the children's every day environment. As discussed in the previous section, only one school is located within 0.5 miles from the proposed fence segments (approximately 0.3 miles). The four other identified schools are located approximately 3 miles from the proposed fence segments.

4. Socio-economics

The proposed fence installation in Maverick, Starr, Webb, and Zapata Counties would occur where the populations are predominantly of Hispanic origin, and more than one quarter of the population has annual earnings below the poverty line (Appendix J). Fewer than 4,400 people reside within 0.25 miles of the proposed fencing in fewer than 2,000 housing units. Webb County does not have any residential housing within 0.25 miles of the proposed fencing (Census, 2010-2011).

In Webb County, approximately 73,000 residents were born outside of the United States, while in Maverick and Starr Counties, each has approximately 18,000 residents born outside of the country. Zapata County is reported to have slightly more than 3,000 residents born outside of the United States. In the last decade, populations in the four counties rose 10 to 30 percent. The median age of residents varies from 27 to 30 years old (Census, 2010-2011).

In all four counties, more than 85 percent of the households speak a language other than English at home, and fewer than 60 percent identify themselves as speaking English "very well" (Census, 2010-2011). For this reason, APHIS met with NRCS and USDA's National Institute of Food and Agriculture in August and September 2010 to discuss the best outreach methods for this area. In addition, the APHIS Administrator sent an invitation to the Director of the Colonia Initiatives Program regarding public meetings. APHIS provided documents in Spanish as well as English prior to and at public meetings and also posted flyers in public places near colonias. APHIS also will provide a translated copy of the EIS Executive Summary on its website. Based on these efforts, residents of these communities are aware of the proposed project.

Fewer than 60 percent of residents in each county are involved with the labor force, and fewer than 16 percent of the workforce in each of these counties is involved with agriculture, forestry, fishing, hunting, and mining (Census, 2010-2011). To the extent that fence construction efforts may hire from these local communities, the proposed project may provide assistance to local economies primarily in the form of temporary job opportunities.

From 2002 to 2007, the number of farms increased 46 percent in Maverick County, 27 percent in Starr County, and by nearly 20 percent in Webb and Zapata Counties. The majority of farms in Maverick County are small (10-49 acres) while farms in the other three counties tend to be mid-sized (50-499 acres) or large (more than 1,000 acres). While the market value of products sold in Zapata County was not disclosed, the majority of farmland in the other counties is used as pasture, with livestock sales accounting for 80 percent or more of the market value of products sold (NASS, 2007).

I. Cultural, Historic, and Visual Resources

Federal agencies providing funds, or otherwise providing assistance or approval for agency actions, must account for the effects of the impact on historic properties included in, or eligible for inclusion in, the National Register of Historic Places (16 U.S.C. § 470). The National Register is the basic inventory for historic resources in the United States maintained by the Secretary of the Interior. Any property listed in, or eligible for listing in, the National Register of Historic Places is considered historic (36 CFR §§ 63, 800).

APHIS identified 27 registered Historic Places in the four counties (Appendix K). Specifically, there are two listed Historic Places in Maverick County, nine in Starr County, ten in Webb County, and six in Zapata County. APHIS compared these locations to those listed in the Atlas database on the Texas Historical Commission web site (http://www.thc.state.tx.us/). We placed all locations of historic resources on a Geographic Information System map and overlaid it with the proposed locations for game fencing.

The historic sites within Maverick County are within city limits and more than 10 miles from areas proposed for game fencing. The nearest historic sites within Starr County are approximately 2 miles from areas proposed for game fencing. All of the Historic Places in Starr County are near the U.S./Mexican border. They all appear to be located within township or city areas and are not located near proposed CFTEP fencing areas. The historic sites within Webb County are more than 20 miles from areas proposed for game fencing. Most of the historic sites within Zapata County are more than 2 miles from areas proposed for game fencing. Three historic sites are located less than 1 mile from the proposed fencing: Corralitos Ranch (0.4 miles from fence); Trevino-Uribe Rancho (0.6 miles from fence); San Ygnacio Historic District (0.6 miles from fence).

Using the NAGPRA Online Databases (NPS, 2013), APHIS determined that there is only one tribe, the Tonkawa Tribe of Oklahoma, with former land in the area of the proposed fence.

The visual resources for rural border counties in Texas are the rangeland and pastures this proposed project intends to secure. These counties are of minimal recreational or scenic interest except for areas directly along the Rio Grande River. For each National Historic Site identified within 1mile of the proposed game fencing, the visual resources also include any buildings, street patterns and road characteristics, in addition to view corridors and vistas.

APHIS recognizes that while the proposed fencing may be visible from some vantages, mere visibility does not constitute a significant adverse impact. The significance of the visibility depends on context and intensity-related factors, which include the rangeland as a scenic resource within the view of the proposed fencing, general characteristics of the surrounding landscape, and the extent to which the visibility of the proposed fencing interferes with the public’s enjoyment or appreciation of these resources. A significant adverse visual impact occurs if the visibility of the game fencing significantly detracts from the public’s enjoyment of a resource or if the game fence’s design, distance, intervening topography and vegetation, and context exceed the minimal impact to be effective.

The proposed game fence is expected to be visible from highways or roads that parallel fence sections. The fence design will not block the view to the other side of the fence because it will be constructed of a strong tensile woven wire, with 4-inch by 3-inch openings (figure 2-1). The proposed game fencing is designed to prevent animals from jumping over it. In areas where current wire fencing is too short to stop these animals, the proposed installation of game fence would add 3 to 4 feet of additional height to the wire fence. The game fencing will not be continuous in areas where townships are located, and people would not see fencing in those areas. Non-property owners are not likely to see the proposed fencing unless they are travelling on a road that parallels the game fencing, or when travelling among townships along the U.S./Mexican border near the fencing. Fencing would not be placed on river banks due to the unpredictable flooding of the Rio Grande. Hikers would only notice game fencing if they are on a trail that parallels the fence line.

In general, various types of fencing already are maintained in areas where APHIS proposes game fencing for tick control. Low fencing is used to maintain livestock, prevent wildlife access, or for aesthetic purposes. In addition, wildlife access to properties is prevented by high fencing in areas of Maverick County.

IV. Environmental Consequences

This chapter discusses the direct and indirect effects associated with the No Action and Proposed Action alternatives. Each section within the chapter is divided into descriptions of program compliance with statutes and Executive Orders, when relevant, followed by a description of the potential impacts from each alternative. The No Action alternative includes current program operations to help prevent the spread of ticks and potential exposure of cattle to babesiosis without the aid of game fencing. The Proposed Action alternative includes installation of game fencing on privately owned property with landowner consent. Relevant issues evaluated under each alternative include:

- Land Characteristics
- Climate
- Air Quality
- Water Quality
- Livestock Health
- Vegetation
- Wildlife
- Human Health and Safety
- Cultural, Historic, and Visual Resources
- Cumulative Impacts

A. Land Characteristics

Maverick, Starr, Webb, and Zapata Counties lie within an area designated by NRCS as the Rio Grande Plain. Soils are fine- to course-textured, well drained, and have limited soil moisture for use by vegetation during the growing season (McNab and Avers, 1994). Soils range from alkaline to slightly acidic clays and clay loams. The predominant soils in the fence areas are deep clay loams and sandy clay loam over clay.

APHIS obtained soil surveys for Maverick, Starr, Webb, and Zapata Counties (Molina and Guerra, 2011; Sanders and Gabriel, 1985; Stevens and Arriaga, 1977; Thompson et al., 1972) and consolidated the information into table 4-1. This table shows the type and location of the soil series identified by Federal surveyors. Areas with similar soils are grouped and labeled as a soil series because their comparable origins and chemical and physical properties cause the soils to perform similarly under various land uses (NRCS, 1999). Table 4-1 indicates in a general manner which physical attributes of a soil series may present potential environmental hazards.

1. No Action Alternative

If the No Action Alternative were implemented, surface soil disturbance would continue to occur during patrols for stray or smuggled livestock and ongoing maintenance of existing fences. This could result in minor erosion; however, this alternative will not influence flooding potential of the soils, nor will flooding impact the outcome of the alternative if it is selected.

2. Proposed Action Alternative

If the Proposed Action Alternative is selected, surface soil disturbance and soil loss would be limited to the corridor where the fence would be installed. Sites with soil loss to a depth of 3 feet could cause long-term environmental impacts; however, erosion to this extent is not expected. Therefore, we believe the impacts of building the fence would be transient.

Table 4-1 focuses on those soil attributes that are most likely to increase the risk of environmental impact, should the fence be installed in certain types of soil. Physical attributes of greatest concern in the project area include erosion and shrink-swell potential (the extent to which soil shrinks or swells with changes in soil moisture content). Flooding also has the potential to occur; however, flooding will not be impacted by the fencing due to its permeable nature. Additionally, soil compaction will be confined to the fence line, so the fence is unlikely to influence the potential for flooding. The table also estimates a hazard level as compared to undisturbed soils. In the project area, most of the proposed fence segments are located in previously disturbed soils along U.S. Highway 83.

Other physical attributes, such soil layering, clay/sand/loam content, water, and organic matter content, are not expected to be affected long-term by project activities; environmental impacts are expected to be minimal due to implementation of proposed mitigations discussed below.

Table 4-1. Soil series identified in Maverick (M), Starr (S), Webb (W), and Zapata (Z) Counties (Molina and Guerra, 2011; Sanders and Gabriel, 1985; Stevens and Arriaga, 1977; Thompson et al., 1972)

Series	Location	Project-related attributes[1]	Hazard level[2]
Aguilares	W, Z	Erosion	Moderate
Arroyada	**W**	**Erosion; Shrink-swell potential**	**Moderate to Severe**
Brennan	S, Z	Erosion; Flooding; Shrink-swell potential	Moderate
Brundage	M, W, Z	Erosion; Shrink-swell potential	Slight to Moderate
Brystal	M, W	Erosion	Slight to Moderate
Camargo	S	Flooding; Shrink-swell potential	Moderate
Catarina	**M, S, W, Z**	**Erosion; Shrink-swell potential**	**Moderate to Severe**
Comitas	**S, W, Z**	**Erosion**	**Moderate to Severe**
Copita	M, S, W, Z	Erosion	Slight to Moderate
Cuevitas	W, Z	Erosion	Slight to Moderate
Dant	M	Erosion	Moderate
Darl	M	Water	Moderate
Delfina	W	Erosion	Slight to Moderate
Delmita	**S, W, Z**	**Erosion**	**Slight to Severe**
Dilley	W	Erosion	Slight to Moderate
Duval	W	Erosion	Slight to Moderate
Elindio	M	Erosion	Slight to Moderate
Escobas	Z	Erosion	Moderate
Falfurrias	**S, Z**	**Erosion**	**Severe**
Garceno	**S, Z**	**Erosion; Shrink-swell potential**	**Moderate to Severe**
Grulla	**S**	**Flooding; Shrink-swell potential**	**Severe**
Hebbronville	**W, Z**	**Erosion**	**Slight to Severe**
Houla	Z	Erosion; Shrink-swell potential	Moderate
Jimenez	**M, S, W, Z**	**Erosion**	**Slight to Severe**
Lagloria	M, W, Z	Erosion	Slight to Moderate
Laredo	M, W, Z	Erosion; Shrink-swell potential	Slight to Moderate
Matamoros	**S**	**Shrink-swell potential**	**Severe**
Mavco	M	Erosion	Moderate
Maverick	**M, S, W, Z**	**Erosion; Shrink-swell potential**	**Moderate to Severe**
McAllen	S	Shrink-swell potential	Slight to Moderate
Mercedes	M	Erosion	Slight
Moglia	**W, Z**	**Erosion; Shrink-swell potential**	**Moderate to Severe**

(Table 4-1, continued)

Series	Location	Project-related attributes[1]	Hazard level[2]
Montell	**M, S, W, Z**	**Erosion; Shrink-swell potential**	**Moderate to Severe**
Monwebb	**Z**	**Erosion; Shrink-swell potential**	**Moderate to Severe**
Nido	W, Z	Erosion; Shrink-swell potential	Low to Moderate
Nido variant	W	Erosion; Shrink-swell potential	Low to Moderate
Nueces	**W, Z**	**Erosion**	**Slight to Severe**
Olmos	**M**	**Erosion**	**Severe**
Palafox	W	Erosion; Shrink-swell potential	Moderate
Pryor	M	Erosion	Slight to Moderate
Quemado	M, S, W, Z	Erosion	Slight to Moderate
Ramadero	**S**	**Flooding**	**Severe**
Randado	W, Z	Erosion	Slight to Moderate
Reynosa	M, S	Erosion	Slight
Rio	**S**	**Shrink-swell potential**	**Moderate to Severe**
Rio Grande	**M, S, W, Z**	**Erosion; Flooding; Soil blowing**	**Slight to Severe**
Sarita	**S, Z**	**Erosion**	**Severe**
Tela	W, Z	Erosion	Slight
Tiocano	**S**	**Erosion; Flooding; Shrink-swell potential**	**Severe**
Tonio	Z	Erosion	Slight to Moderate
Veleno	Z	Erosion; Shrink-swell potential	Moderate
Verick	**M, W, Z**	Erosion; Shrink-swell potential	**Slight to Severe**
Viboras	**W, S, Z**	**Erosion; Shrink-swell potential**	**Slight to Severe**
Zalla	**M, S**	**Erosion; Flooding; Soil blowing**	**Moderate to Severe**
Zapata	**M, S, W, Z**	**Erosion**	**Slight to Severe**

[1]Soil attributes relevant to the project also may include: erosion; compaction or shrink-swell potential; flooding; acid-alkaline balance; salinity; slope and depth; clay/sand/organic matter content; etc. The attributes considered most likely to affect, or be affected by, the program activities are considered here. Hazard level estimates are for undisturbed soils. The erosion hazard is always listed, regardless of level (slight/moderate/severe). Other hazards are listed only when they can be identified as moderate or severe. This table lists some of the physical attributes of 55 soil series in the four counties.

[2]Soil series hazard levels as presented in this table vary depending upon their association with one another and where they were observed by the surveyors. An erosion hazard for one soil series may be reported as “slight” in one survey location, and as “severe” in another; in those instances the table indicates the range of reported levels. This table provides a condensed overview of a wide range of soil attributes and potential hazards and should not be used in determining the final location and construction method for the proposed fence installation. Soil hazards and their proper management by landowners and project participants will vary depending upon (a) location of a given soil relative to the program area, and (b) other contributing factors such as slope, depth, drainage, season of the year, weather events, traffic, etc.

We did not include chemical attributes for soils within the four counties in table 4-1. The proposed fencepost foundation and fencing materials are designed to be inert and to resist rust and corrosion. Therefore, a soil's chemical attributes, such as pH or salinity, are expected to be only temporarily affected, resulting in minimal or no environmental impact.

3. Potential Mitigation Measures

Potential mitigation measures used to reduce the impact of fence installation on soils in Maverick, Starr, Webb, and Zapata Counties include language in the APHIS contracts with landowners to encourage clearing the smallest amount of vegetation necessary for fence installation and staging fence supplies in previously cleared areas so as to not remove additional vegetation. Vegetation should be allowed to regenerate in the cleared area after fence installation to prevent erosion.

B. Climate

1. Impacts Common to Both Alternatives

Climate in South Texas is considered subtropical, with hot temperatures in the summer and mild temperatures in the winter. Precipitation averages 20 inches annually (Bomar, 2008). Based on observations of tick populations in areas of Mexico that are already experiencing warming cycles (Estrada-Pena, 2001), tick populations that establish themselves in the United States are anticipated to fluctuate as the temperature increases and precipitation decreases.

Tick prevalence and range increase with adequate habitat conditions, including shrub cover or mesquite, due to microclimate effects of shade and humidity (Corson et al., 2001; Teel, 1984). Tick survival is greater in areas infested with giant reed (*Arundo donax*, a woody, non-native invasive grass) than in open pastures and closed canopy native forests (Racelis et al., 2012). Zones close to optimum habitat conditions that experience sudden changes outside of these limits are expected to show the highest enzootic (affecting animals of a specific geographic area) instability (Estrada-Pena, 2001).

Tick populations decrease when habitat suitability is poor (Coburn, 2010; Estrada-Pena, 2001; Estrada-Pena and Venzal, 2006), temperatures are constantly over 77 degrees Fahrenheit (Corson et al., 2004), and there is less grazing (Estrada-Pena et al., 2006; Teel et al., 1996). Uncanopied buffelgrass (*Cenchrus ciliaris* syn. *Pennisetum ciliare*) does not support ticks laying eggs (Racelis et al., 2012) and is an inhospitable microclimate for eggs that are laid (Teel, 1984); therefore, reduced tick populations would be expected in border areas where there is encroachment by this invasive grass.

Based upon historically available data within APHIS records, there appears to be a lag after hurricane events before tick populations rise to the level of detection. The frequency of severe weather events (such as hurricanes and tornadoes) in South Texas may increase with global warming (Pérez de León et al., 2012). Additional rainfall (as occurs with hurricanes) is well documented as a trigger for an increase in tick populations (Coburn, 2010; Corson et al., 2004; Davey et al., 1991; Edney, 1982; Estrada-Pena, 2001; Estrada-Pena et al., 2006; Teel, 1984). Additional tick mitigation measures must continue to be developed and used commensurate with environmentally induced changes in tick populations.

2. No Action Alternative

Under the No Action Alternative, tick populations could become re-established throughout their original ranges in the United States (Pérez de León et al., 2012). Climate change would likely lead to localized effects as tick populations quickly responded to open/dry versus closed canopy/ moist conditions throughout the range of establishment (Estrada-Pena, 2001). As climate change occurs, the distribution of favorable vegetation is expected to shift north. In the absence of fencing, the distribution of ticks capable of infesting this vegetation and infecting livestock would shift north because of the unrestricted movement of an increasing population of white-tailed deer. This is because the spatial distribution of habitats with optimal microclimates interacts with host-landscape behavior to disperse and sustain tick populations (Pérez de León et al., 2012). The potential expansion of current program actions north would be associated with increased greenhouse gas production and effects to climate change commensurate with the level of increased control action required for the program. Therefore, the No Action Alternative has the potential for greater impact on climate change in the long term than the Proposed Action Alternative.

3. Proposed Action Alternative

South Texas has rolling-plains vegetation (Aiken, 2005; Davis, 1990), and much of the proposed fence would be along highways and right-of-ways where vegetation already is controlled; therefore, very few forested areas would be affected under this alternative. More tick-favorable microclimates near fencing could lead to increased populations (Pérez de

León et al., 2012) if the ticks were not precluded and the vegetation was not controlled near the fence. Nevertheless, the Proposed Action Alternative is not likely to induce rapid, large-scale vegetation changes similar to those observed in Africa after fence installation (Boone and Hobbs, 2004; Gadd, 2010). This is based on both the prior history of fencing in this Texas border area (Bram et al., 2002) and on other interactive factors (grazing, fire, and climate change) that are responsible for species composition changes in South Texas areas (Grover and Musick, 1990).

Fences are associated with changes in migration patterns and vegetation (Boone and Hobbs, 2004; Gadd, 2010), and these changes in turn affect the amount of greenhouse gases sequestered in the local flora (Butcher et al., undated). If shrubs are allowed to grow near fenced areas (Pérez de León et al., 2012), then these fenced areas could become associated with increased sequestration of carbon stored in the environment. If the habitat shifts to more closed-canopy microclimates near the fence, then the effects of climate change on land and resource management activities may include a shift to increased hunting in the affected area.

The presence of a non-electrified fence, by itself, does not directly contribute to climate change by emitting greenhouse gases. Despite the efficacy of electric fences in reducing movement of deer and other wildlife (McAtee, 1939), the direct and indirect effects, as well as monetary costs associated with electrified fences (which include ongoing greenhouse gas emissions associated with the use of electricity) do not make this a viable option.

The Proposed Action is associated with minimal CO_2 emissions into the human environment in comparison to the 25,000 metric ton reference point suggested by the CEQ (CEQ, 2010). The vast majority of CO_2 emissions in the Proposed Action Alternative occur during the production of the steel fencing materials. The estimated CO_2 emissions for travel during maintenance activities for the current fencing could be used as a baseline for comparison between the alternatives; however, APHIS inspectors only monitor fence integrity as a collateral duty while on other travel (2013) and older (existing) fencing is more likely to need increased maintenance.

Maintenance needs usually arise from humans cutting or climbing on the fence, accidental vehicle penetrations, and animals (feral swine, javelinas, or coyotes) digging under the fence. Weather conditions may deteriorate the fence over a long period (e.g., more than 15 years) (Messenger, 2013). Consequently, vehicle travel for maintenance would be incurred regardless of which alternative is chosen, given that existing fencing is older and would likely require more maintenance than new fencing. Emissions associated with installation travel are negligible in comparison to the CO_2 emissions involved in steel production. To the extent that the Proposed Action Alternative could use more efficiently produced steel, APHIS could achieve an off-site reduction in greenhouse gas emissions.

C. Air Quality

Maverick, Starr, Webb, and Zapata Counties have better air quality than many of the other major urban areas around the State (Combs, 2008), with major sources of air pollution coming from highway vehicular traffic, petroleum production, and agriculture (TCPS, 1995).

1. Clean Air Act

Air emissions from stationary and mobile sources are regulated as a way to protect and improve air quality (42 U.S.C. §§ 7401 et seq.). In a given region or area, air quality is measured by the concentration of pollutants in the atmosphere. Air quality also is influenced by surface topography and prevailing meteorological conditions. Under the CAA, the EPA established National Ambient Air Quality Standards (40 CFR 50)) to protect public health and welfare and to regulate emissions of hazardous air pollutants (EPA, 2012).

2. No Action Alternative

If the No Action Alternative were implemented, vehicular traffic, land uses, and ranching would remain the same, and there would be no change to air quality in South Texas. The portions of existing fence in the project area would continue to have minor impacts to air quality caused by some fence maintenance activities producing vehicle emissions.

3. Proposed Action Alternative

The proposed CFTEP fence would be constructed near highways and roads where major sources of air pollution in these regions are highway vehicular traffic and agriculture (FHWA, 2007). Criteria pollutants (pollutants for which maximum allowable emission levels and concentrations are enforced by State agencies) will be produced by construction vehicles during fence installation and maintenance activities.

Effects will be localized and minimal compared to vehicular activities in the area and will have little or no impact on air quality in South Texas. Fence construction will result in some soil and debris disturbance that may become airborne during installation. The airborne particles should quickly settle and not have any significant or long-term impact.

Greenhouse gas emissions associated with the Proposed Action Alternative arise from the production of fencing materials, fencing installation (including travel to/from construction sites), and subsequent travel associated with fence maintenance. Calculations based on CO_2 emissions can only be estimated. These estimates include: (a) the manufacturing efficiency in the country of the steel's origin, (b) carbon emissions associated with the zinc coating and painting processes, (c) carbon emissions associated with installation of concrete footers, (d) topography at each site of installation, (e) the extent of partial construction at sites where prior fencing is being extended or land is already cleared of vegetation, and (f) the number of agreements in the project, which affects the total length of fencing in the project. Similarly, the distance to supply repositories will directly impact the greenhouse gas emissions associated with installation and maintenance, even though we project fewer than 70 miles of fencing to be installed. APHIS cannot predict the frequency of fencing repairs, as well as the fuel efficiency of vehicles used to deliver fencing materials or perform fence maintenance (Messenger, 2013). For these reasons, APHIS acknowledges this alternative would be associated with small, off-site greenhouse gas emissions that can be estimated only with low confidence.[6] This alternative does not exhibit on-site, continuous, or large greenhouse gas emissions over 25,000 metric tons (a reference point for quantitative analysis suggested by CEQ) (CEQ, 2010).

[6] Assume: (1) the galvanized steel is produced with CO_2 emissions of 1.9 tons of CO_2 per metric tonne (mt) of steel (Kundak et al., 2009), (2) all 70 miles is fenced, (3) a 330-foot length of fixed knot woven mesh fencing weighs 400 pounds (203 mt steel over 70 miles), (4) each T-post weighs 14 pounds, and posts are installed every 20 feet (117 mt steel over 70 miles), and (5) other fence components (H-braces, ends, angles, and clips) total 80 mt of steel over the 70 miles. At 1.9 tons of CO_2 emitted per mt of steel produced (400 mt of steel)(1.9 mt of CO_2 / 1 mt steel), we estimate 760 mt of CO_2 emissions associated with the production of fencing materials. Also assume: (1) each construction vehicle emits 350 g CO_2 per passenger mile (Bradley, 2007), and (2) construction travel requires 10 vehicles to make 10 trips along all 70 miles (7,000 miles). When converted to mt, this is an estimated 2.45 mt CO_2 emission associated with construction travel. These assumptions lead to a total estimate of 763 mt of greenhouse gas emissions for the fence alternative.

4. Potential Mitigation Measures

Impacts can be avoided by clearing land and construction activities in damp soil and avoiding construction activities during windy days. The APHIS agreements with landowners can encourage such practices.

D. Water Quality

The proposed CFTEP fence is located within the central portion of the Rio Grande watershed. The major water bodies of this watershed include the Rio Grande bordering the west or southwest of all four counties, the Main Canal in Maverick County, Falcon Dam on the west border of Starr and Zapata Counties, and Falcon Reservoir and its three arms that extend into Zapata County (Arroyo Burro, Arroyo del Tigre Grande, and Arroyo del Tigre Chiquito). Minor water bodies include streams and arroyos (Appendix I).

1. Clean Water Act

The CWA (33 U.S.C. §§ 1251 et seq.), regulates surface water quality standards and the discharge of pollutants into U.S. waters. The CWA regulates the placement of dredged or fill material into waters of the United States (40 CFR § 232). The proposed project will not cross any bodies of water and therefore will not require Section 404 permitting.

2. Texas Pollutant Discharge Elimination System

The National Pollutant Discharge Elimination System (40 CFR §§ 122-503) regulates pollutant discharge into surface waters of the United States, and TCEQ administers this System (30 TAC §§ 305.533 - 305.541). The Texas Pollutant Discharge Elimination System (§§ 305.533, 305.541) improves the quality of rivers, lakes, and streams by regulating pollution released from multiple sources (TCEQ, 2013). APHIS would be required to comply with requirements outlined by the Texas Pollutant Discharge Elimination System.

3. Executive Order 11988 – Floodplain Management

Federal agencies must avoid, to the extent practicable, impacts associated with the occupancy and modification of floodplains as directed by EO 11988. The proposed project would cross 100-year floodplains in 12 locations (table 3-3; Appendix I). No special fence construction methods would be needed in the floodplain areas. The extreme permeability of the CFTEP proposed fence will allow high levels of water to penetrate and will be secure enough that it is not likely to dislodge during floods. We do not anticipate that the proposed CFTEP fence will alter the floodplains due to the permeability of the fence and the absence of any substantial ground removal or alterations.

4. Executive Order 11990 – Protection of Wetlands

Federal agencies must consider alternatives to wetland sites to minimize destruction, loss, or degradation of wetlands as directed by EO 11990. We identified two areas meeting the requirements to be called wetlands (40 CFR §§ 122-503). These aquatic sites are associated with Arroyo Molletes and Arroyo Ranchito, which are located one mile north of the city of Zapata, just west of U.S. Highway 83. At Arroyo Molletes, the total area of wetland in the proposed fence area is 0.1 acre. This wetland is located west of U.S. Highway 83 in the right-of-way. At Arroyo Ranchito, approximately 0.14 acre of wetland is located west of U.S. Highway 83 in the right-of-way (FHWA, 2007).

The proposed fence construction will result in some vegetation clearing and some soil disturbance that could result in an increase in erosion into wetlands and some disturbance of wetlands due to land clearing for the fence and vehicle traffic. The impacts are expected to be extremely minor and not result in permanent impacts. Furthermore, our agreements with landowners will encourage efforts to avoid or minimize impacts to these wetlands and to use silt curtains and vegetation restoration to prevent any soil runoff into wetland areas. We do not anticipate that the Proposed Action will impact wetlands, therefore mitigations are not needed. This final determination will be made by the U.S. Army Corps of Engineers.

5. No Action Alternative

If the No Action Alternative were implemented, there would not be any impacts to 27 jurisdictional waters associated with the project area or to water quality, and permits from the U.S. Army Corps of Engineers would not be required. Current land uses, ranching, and activities (including urban development) would continue uninterrupted, incrementally affecting water quality. The portions of existing fence in the project area would continue to have minor impacts to water quality caused by some fence maintenance activities. These maintenance activities may result in some erosion into waterways due to foot traffic, maintenance, and vehicular traffic.

6. Proposed Action Alternative

If the Proposed Action Alternative is selected, there is the potential to impact 27 jurisdictional waters associated with the project area, including two wetlands. However, the proposed game fence will not be installed across any U.S. waterways and will only be installed up to and adjacent to the high water mark. Impacts to waterways will be limited to some soil disturbance during fence installation that may erode into waterways or wetlands. Similarly, vehicular traffic may also cause some disturbance to soil during construction and maintenance. There are no impacts of the proposed project on water bodies; therefore, permits are not needed.

During construction, stormwater runoff would flow into natural drainage areas before reaching the Rio Grande. Although portions of the proposed fence will be in areas drained by segments of the Rio Grande currently recognized as an impaired waterway (Anon., 2011), the project does not encroach on the portions of these segments that have water quality concerns, and no substantial impacts are anticipated to the ambient water quality of the basin segments. This is due to a small area of impervious cover in the project area compared to the total area of the watershed.

We would encourage landowners to avoid or minimize impacts to water bodies during fence construction. Indirect effects of the proposed game fencing to water resources include increased potential for erosion and sedimentation during construction activities and fence maintenance activities. Clearing vegetation for the proposed project could increase the potential for erosion and sedimentation into nearby local drainages and receiving streams. These effects are expected to be temporary and minor and would be reduced by the appropriate use of Best Management Practices during construction. No long-term water quality impacts are expected as a result of the proposed project.

The proposed project would not alter the U.S.-Mexico border, alter water distribution or use between the countries, affect levees or floodways, or impact border sanitation or water quality issues. Consequently, there do not appear to be any treaty requirements for the United States section of the International Boundary and Water Commission (IBWC, 2013) to address. Any work proposed within the floodplain and adjacent to the main channel of the Rio Grande, including the Falcon Reservoir where it forms the international boundary between the United States and Mexico, must be submitted to the International Boundary and Water Commission for its review and approval. Fence segments are not proposed for Falcon Reservoir, so it is unlikely that we will need to take this action.

Groundwater sources are several miles from the proposed game fence and the minor amount of sedimentation and/or ground disturbance resulting from construction and maintenance of the fence would have no appreciable effect on groundwater resources (George et al., 2011).

Construction of the fence is not expected to impact the amount or quality of run-off water into the navigable waterways of the Rio Grande and Falcon Reservoirs because the construction area at each site is small, less than 5 feet deep, and of short-duration. These parameters suggest that any run-off water will not contain substantial particulates, chlorine, or heavy metals. Presence of fencing is not expected to impact the amount or quality of run-off water into the navigable waterways of the Rio Grande and Falcon Reservoirs based on its construction parameters that allow water to flow unimpeded through and around fence segments.

The CFTEP proposed fence construction does not include any activities that would significantly increase stormwater runoff. Land clearing during construction would be minor, with minimal disturbance anticipated for fence maintenance activities. The fence would be located in developed areas next to major highways and commercial and residential land parcels. No alteration in the ground permeability to stormwater would occur as a result of the fence.

7. Potential Mitigation Measures

Impacts can be avoided by working closely with the TCEQ and encouraging landowners to ensure Best Management Practices during fence construction.

E. Livestock Health

The CFTEP in the United States initially used fences in combination with other mitigation measures such as acaricide treatments, pasture vacation, and inspection (Anon., 1965; Bram et al., 2002). As mentioned in Chapter 1, wildlife managers installed an 80-mile, 6-strand, electrified barbed-wire fence in Florida and had much success with this tool in combination with other mitigation measures. However, the same outcome has not yet occurred in Texas because existing fencing is segmented and very few sections are considered to be game fencing. Game fencing has proven to be an important part of the management strategy to reduce migration of tick-infested cattle, and stray and exotic livestock (Anderson et al., 2010).

This section covers the impacts to livestock health that may result from construction of additional fencing to prevent the entry and spread of cattle fever ticks into South Texas. While we consider a range of health impacts that may be seen in all livestock species, we focus on impacts to tick-susceptible livestock raised in the affected area and discuss the effects to animal health from both ticks and the diseases they vector. Animal diseases not spread by ticks or limited by the installation of fencing will be unaffected by the proposed action and are not considered further (e.g., spread of diseases such as rabies that can be transmitted by bats or small mammals not restricted by the fencing).

The cattle fever tick life cycle consists of four stages: egg, larva, nymph, and adult. Hosts for the larva are usually cattle, but ticks also will occasionally infest, horses, mules, deer, sheep, or goats. Cattle fever ticks are a one-host tick, meaning that they feed on only one host during their life stages (larva, nymph, and adult). A blood-engorged female tick detaches from its host and can release 1,000 to 2,000 eggs before dying on the ground. For a complete description of the life cycle of cattle fever ticks, see Chapter 1 (Purpose and Need) and Chapter 3 (Affected Environment).

USDA defines “livestock” as all farm-raised animals (7 U.S.C. § 8302(10)). Cattle are the primary tick-susceptible livestock in the proposed fence areas. Other tick-susceptible livestock raised in the affected area include horses (*Equus* spp.), sheep (*Ovis* spp.), angora goats (*Capra aegagrus hircus*), and swine (*Sus scrofa*).

“Exotic livestock,” grass-eating or plant-eating, single-hooved or cloven-hooved mammals that are not indigenous to the State and are ungulates, are also raised in Texas. These include animals from the swine, horse, tapir, rhinoceros, elephant, deer, and antelope families (6 Texas Agriculture Code § 161.001(4)). Also, landowners who wish to own, breed, sell, or restock properties with privately owned white-tailed deer (*Odocoileus virginianus*) can obtain a Deer Breeder Permit. Under this permit, a breeder actually owns the animals and can propagate, sell, or purchase deer similar to other forms of livestock. Deer held by a permitted deer breeder belong to the individual; however, if released from the Breeder Facility, the deer enters into the State’s population and becomes property of the State of Texas.

White-tailed deer can be infested by ticks but function as diluting hosts for the disease babesiosis because the protozoan parasites do not reproduce to become an infective stage within the deer (Pérez de León et al., 2012). In addition, cattle fever ticks have been identified on other exotic livestock including nilgai (*Boselaphus tragocamelus*), aoudad sheep (*Ammotragus* *lervia*), elk (*Cervus canadensis*), fallow deer (*Dama dama*), axis deer (*Cervus axis Erxleben*), red deer (*Cervus elaphus*), and American bison (*Bison* spp.) in South Texas (Duhaime, 2009; Pérez de León et al., 2012).

Since cattle are the predominant livestock species in Maverick, Starr, Webb, and Zapata Counties, the impacts analysis is primarily focused on impacts to cattle health with consideration given to potential impacts to livestock health from deer and other wildlife.

1. Disease Transmission between Feral or Wild Animals and Livestock

The World Organization for Animal Health defines a disease vector as an insect or any living carrier that transports an infectious agent from an infected individual to a susceptible individual or its food or immediate surroundings (OIE, 2010). Cattle fever ticks can reduce livestock productivity and well-being as obligate blood-feeding parasites when present in relatively high numbers; they can indirectly harm hosts even when present in relatively low numbers by serving as vectors of the infectious agents that cause bovine babesiosis (*Babesia bovis*, and *B. bigemina*) and anaplasmosis (*Anaplasma marginale*) (Aubry and Geale, 2011; Pérez de León et al., 2012). Babesiosis generally is characterized by extensive intravascular hemolysis (rupture of red blood cells) leading to depression, anemia, icterus (jaundice), hemoglobinuria (presence in the urine of hemoglobin from ruptured red blood cells), and neurological signs (Barros and Fighera, 2008).

In general, tick infestation in cattle without the protozoan-causing disease triggers anemia from blood loss. This anemia is accompanied by decreased appetite and weight loss. Each engorging tick can cause more than one gram in weight loss (the engorging durations varied between 28 and 810 days) (Jonsson, 2006). In cattle, tick feeding can reduce the weight of a 1,000-pound steer by 200 pounds in a year (APHIS, 2010) and eventually result in death (APHIS, 2010; Jonsson, 2006).

Cattle with the acute form of babesiosis develop high temperatures (106 °F or higher; the normal rectal temperature range for a cow is 98 to 102.8 °F) (Lew-Tabor, 2011). Usually, the cattle die 3 to 4 days after the high fever develops. Prior to death, cattle will stand abnormally with their heads lowered and backs arched. These cattle exhibit a loss of appetite combined with constipation followed by diarrhea, and they produce less milk. Hemoglobinuria, or “red water,” is common (Barros and Fighera, 2008; CFSPH, 2008; APHIS, 2010).

Cattle affected with the chronic form of babesiosis develop a mild fever, generally stop eating and chewing their cud, and develop anemia and rapidly lose weight. This chronic form may last for many weeks, after which most animals gradually recover. Infected cattle are likely to suffer from relapses in the first several months after resolution of clinical signs. Infected cattle may also experience increased susceptibility to other diseases such as bovine tuberculosis (TB) and may display nervous behaviors called “tick poverty” (also known as “tick worry”). The growth of chronically infected immature cattle becomes stunted, and these animals are typically weak. Surviving cattle that are infected continue to suffer from anemia associated with the continual loss of blood due to babesiosis as well as ongoing tick feeding. In the summer, the disease incubation period (the time from when an animal is exposed until it first shows symptoms) can be as short as 10 to 15 days after the larvae (seed ticks) begin to feed on the animal. During the winter months, the incubation period may take as long as 90 days (APHIS, 2010; Ellenberger, 1940).

Cattle fever ticks also are capable of carrying and transmitting the infectious agent that causes bovine anaplasmosis (Aubry and Geale, 2011). This disease causes progressive anemia due to extravascular (outside of blood vessels) destruction of infected and uninfected red blood cells. In the late stages, acutely infected animals become weak and milk production declines. They experience a lack of appetite, loss of coordination, breathlessness when exerted, and a rapid pulse (Lew-Tabor, 2011).

Other livestock in the proposed fencing areas, such as horses, also can carry ticks and tick-borne diseases. Horses are not only a host for cattle fever ticks causing babesiosis, but also are a host for numerous other tick vectors that can cause the tick-borne disease called equine piroplasmosis. This disease is caused by *B. caballi* or *B. (Theileria) equi* (Barros and Fighera, 2008). Stray horses from Mexico can spread southern cattle ticks, American dog ticks (*Dermacentor variabilis*), and cayenne ticks (*Amblyomma cajennense* and *A. imitator*) transmitting equine piroplasmosis (Barros and Fighera, 2008).

Additional livestock diseases reported in Texas that are not tick-borne but can be transmitted through infected stray livestock or exotic livestock such as feral swine include Johne's disease, brucellosis, and pseudorabies. Johne's disease, which affects cattle, sheep, and goats, is caused by the bacterium *Mycobacterium paratuberculosis*. If stray livestock from Mexico are infected with this disease, they can transmit the disease to healthy cattle, sheep, and goats. Swine brucellosis and pseudorabies are diseases that affect pigs and are caused by the bacteria *Brucella suis*, and the virus Suid herpesvirus, respectively. Domestic swine in the United States are currently free of swine brucellosis and pseudorabies. However, stray or feral swine can transmit these diseases to domestic swine, thereby reintroducing diseases that have been eradicated in U.S. livestock. In addition, feral swine could spread other foreign animal diseases, such as classical swine fever or foot-and-mouth disease, to domestic swine or other susceptible animals if these diseases were to enter the United States (TAHC, 2012).

As previously mentioned, deer are a vehicle for tick propagation and relocation by serving as hosts for completion of the tick life cycle. Deer also can be a vector for other diseases such as TB (MDNR, 2011-2013). This disease was once the most prevalent infectious disease of cattle and swine in the United States. Currently, Texas is recognized as free of bovine TB (TAHC, 2013).

The remaining subsections examine aspects of ticks and diseases that APHIS expects to vary in intensity depending on the alternative chosen.

2. No Action Alternative

Under the No Action Alternative, the free-ranging movement of stray livestock (e.g., cattle) and deer across non-fenced or ineffectively fenced properties would continue. This unrestricted movement was reflected in an observed increase in the number of cattle fever ticks and cattle fever tick infestations in South Texas in recent years (Duhaime, 2009; Pound et al., 2010). The number of infested premises increased eight-fold in 6 years (FY 2003 to FY 2009) (Duhaime, 2009). By FY 2011, 108 new infestations were reported both within and outside of the Permanent Tick Quarantine Zone. There were 17 new infestations in the Temporary Preventative Quarantine Areas along Highway 83–one in Webb County and 16 in Zapata County. In FY 2011, almost one-quarter of the new infestations were found in white-tailed deer (Duhaime, 2011).

Movement of tick-infested, white-tailed deer from Mexico across the Rio Grande is often a suspect source of infestations in Texas because increasing numbers of cattle fever ticks have been identified on white-tailed deer and both cattle fever ticks and babesiosis are endemic to Mexico. In endemic areas, animals tend to become infected when young, do not become as ill, and recover to become immune (Barros and Fighera, 2008). Furthermore, many of these ticks are acaricide-resistant strains (Pérez de León et al., 2012). Acaricide-resistant ticks are increasingly detected around the quarantine buffer zone along the Mexican border (Duhaime, 2011; Pérez de León et al., 2012) because of the large numbers of stray cattle and white-tailed deer that may carry acaricide-resistant tick strains as they cross the Rio Grande for grazing purposes or in search of water during drought conditions (Pérez de León et al., 2012).

Introductions of tick vectors (as carriers of pathogens) may lead to devastating and widespread babesiosis outbreaks in the U.S. cattle population (Pérez de León et al., 2012). The presence of a vector population would rapidly spread any introductions of the disease because vector-borne diseases require both a competent vector and the pathogenic organism. When *Babesia*-bearing animals enter into an area where the tick vector already is present, susceptible hosts that subsequently graze in the infested pastureland are likely to become diseased. This entry of *Babesia*-infested ticks into areas that were previously tick-free would be problematic for immunologically naïve cattle because these cattle have not been previously exposed to the protozoan pathogen (Angus, 1996). Naïve cattle become sicker and are more likely to become clinically affected leading to death than cattle in areas where babesiosis is endemic. Even if these cattle survive the infection, they become less productive throughout their lives and do not grow and fatten normally (Barros and Fighera, 2008; CFSPH, 2008).

In the absence of effective fencing, producers and government agencies rely on other measures to control ticks, such as acaricide treatment and vacation of pastures (Pérez de León et al., 2012; Pound et al., 2010). Cattle may experience increased physical stress and fatigue from being gathered for the bi-weekly process of acaricide treatments. Increasing use of acaricides is likely to lead to development of more acaricide-resistant strains of ticks that could eventually spread northward.

3. Proposed Action Alternative

Under the Proposed Action Alternative, the free-ranging movement of stray or exotic livestock across fenced properties would be restricted by the game fencing. Few mammals are capable of jumping over an 8-foot high fence. Therefore, APHIS expects that the proposed fencing will restrict the movement of ticks beyond the permanent tick quarantine line into the free area of Texas. APHIS also anticipates that preventing movement of tick-carrying animals may reduce other diseases in U.S. cattle and other livestock. For example, the proposed fence may assist in preventing movement of feral swine that can carry brucellosis and pseudorabies. Under this alternative, animal health is likely to be improved because fewer infested and infected animals (stray/exotic livestock and wildlife reservoir populations) would come in contact with U.S. livestock or be able to carry ticks and the diseases they may transmit (Angus, 1996; Gadd, 2010; Pérez de León et al., 2010; Taylor and Martin, 1987).

In comparison to the No Action Alternative, we expect that the Proposed Action Alternative will result in a decreased need for acaricide treatments because of the lower tick burdens north of the installed fencing. Decreased frequency of acaricide treatments may reduce the rate at which acaricide-resistant tick strains develop. Fewer acaricide treatments also should decrease the physical stress on livestock associated with being gathered for acaricide treatment.

We expect that preventing the movement of ticks beyond the Permanent Tick Quarantine Zone will greatly reduce the likelihood of tick introduction into northern Texas Concentrated Animal Feeding Operations (CAFOs). Impacts from uncontrolled tick populations in CAFOs could become severe because of the close proximity of the animals in these confined herds.

Under the Proposed Action Alternative, ticks are less likely to become established in Texas and subsequently disseminated throughout the country. If controlled by an integrated management strategy that includes the use of fencing, ticks and tick-borne diseases located in Mexico would be less likely to negatively impact U.S. agriculture.

4. Potential Mitigation Measures

Since the proposed alternative benefits livestock and reduces potential impacts from ticks and tick-vectored diseases, we do not recommend any additional mitigation measures pertaining to livestock health.

F. Vegetation

Maverick, Starr, Webb, and Zapata Counties are located within a distinct ecoregion known as the South Texas Brush Country. It is an arid to semi-arid region with drought-tolerant vegetation. Native species are reliant on soil moisture made available by seasonal rains, occurring primarily during the early summer and fall months (Jahrsdoerfer and Leslie, 1988; Taylor et al., 1997).

Human activity has had a tremendous impact on the landscape (McMahan et al., 1984), via brush control and grazing practices associated with cattle ranching. This region has experienced a 23 percent increase in woody cover since 1941 (Council, 1994). Previously restricted to thickets, upland areas, major drainages, and river bottoms, shrub species are now prevalent across the landscape. In addition to human activity, periodic droughts have aided the gradual migration of brush species into open grassland. These periodic droughts are predicted to increase in frequency and duration as the effects of climate change become more prevalent (Karl and Knight, 1998).

1. Noxious Weed and Invasive Species Concerns

Federal agencies are directed by EO 13112 to prevent the introduction or spread of non-native invasive species and to control populations of non-native invasive species to minimize economic, ecological, and human health impacts. Federal agencies cannot authorize, fund, or carry out actions that they believe are likely to cause or promote the introduction or spread of non-native invasive species in the United States unless they analyze and consider all reasonable measures to minimize risk of harm. Cooperation with State, local, and other Federal agencies for the management and control of noxious weeds and non-native invasive plant species is required under the PPA (7 U.S.C. §§ 7701-7786).

The National Invasive Species Council ensures that Federal efforts to prevent and control invasive species are coordinated, effective, and efficient (EO 13112). Texas defines “invasive species” as those, “not native to an ecosystem and whose introduction to the ecosystem causes or has been demonstrated to cause economic harm, environmental harm, or harm to human health” (Texas Government Code § 776.001 (b)). To help prevent the spread of noxious weeds and non-native invasive plant species within the State, the TISCC works with the Texas Invasive Plant and Pest Council (TIPPC), an advisory council regarding policy and management of invasive species, to coordinate activities and programs with Federal and State agencies.

The TISCC and the TIPPC advise Federal and State agencies about practices that prevent the inadvertent movement of invasive plant or animal species by vehicles or in materials such as soil, mulch, gravel, or sod that are transferred from one site to another. For the Proposed Action, any materials excavated during fence installation would remain on site, preventing the spread of weed seeds or invertebrates in this manner. Requirements of the project are such that animal species would not be inadvertently introduced or spread during the installation process; therefore, we focus on the potential spread of noxious weeds and non-native invasive plant species associated with the Proposed Action.

Until an approved national list of invasive plant species is defined by the National Invasive Species Council, the FHWA issued guidance on August 10, 1999 encouraging each State's Department of Transportation to use the State's noxious and invasive plant species list in defining the invasive plants that must be considered under EO 13112 and as part of the NEPA analysis for a proposed project. A total of 26 invasive plant species occur within the area proposed for fence construction (TIPPC, 2011) (see table 3-5). Of these species, we consider saltcedar (*Tamarix* spp.) and giant reed (*Arundo donax*) (4 TAC § 19.300(a)).

Saltcedar (*Tamarix* spp.)

Tamarix species are spreading shrubs or small trees, 5 to 20 feet tall, with numerous slender branches and small, alternate, scale-like leaves. Plants tend to grow densely and form thickets along streambeds (arroyos) that flood seasonally. Seeds generally require soils that are seasonally saturated at the surface with extended periods of soil saturation for establishment. Saltcedar (tamarisk) also can spread by roots or submerged stems and is adaptable and tolerant of a wide variety of environmental conditions (Baum, 1978).

Saltcedar disrupts the structure and stability of native plant communities and degrades native wildlife habitat by outcompeting and replacing native plant species. Saltcedar is a fire-adapted species and has long tap roots that can obtain water from deep reservoirs (Flanders et al., 2006). The species consumes water more rapidly than native vegetation; on average, saltcedar stands consume 3,000 to 4,600 cubic meters of water per hectare per year, nearly twice the total annual precipitation for the region (Flanders et al., 2006).

Along with limiting the groundwater supply, saltcedar stands draw salts up to the surface from deep in the soil. Once secreted by the leaves of the plant, salt deposits give rise to increasingly saline soils that are not tolerated by many native plant species (Zavaleta, 2000). Although it provides some shelter for wildlife, the foliage and flowers of saltcedar provide little food value for native wildlife species that depend on nutrient-rich, native plant resources (Flanders et al., 2006). Saltcedar fails to harbor plant-eating insects that insectivorous birds, reptiles, and mammals can eat, provides poor structural or microclimate diversity, and is too small in stature or limb size to support large birds such as raptors (Zavaleta, 2000).

Giant reed (*Arundo donax* L.)

Arundo donax L., or giant reed, is a vigorous, invasive perennial grass capable of growing up to 25 feet high with stems up to 1.5 inches in diameter. Giant reed develops a deep, fibrous root system and large creeping rhizomes. The plant reproduces quickly via vegetative reproduction, a form of asexual reproduction in plants. This allows giant reed to out-compete native vegetation and dramatically alter ecological processes (Bell, 1997). Any disturbance that breaks up the shoots or rhizomes (horizontal underground stem that is capable of producing shoots and roots), including the use of bulldozers and plows, has the potential to spread this plant to new areas (Boland, 2006). Pieces of shoot remain viable up to 123 days after separation from the parent plant, while rhizomes can sprout up to 132 days after separation. Giant reed grows best near water, though its occurrence in a variety of habitats suggests the invasive grass can adapt to drier conditions. A recent study found stands growing as far away as one half mile from the Rio Grande in South Texas (Yang et al., 2011).

Through its deep root system, giant reed consumes more water than native vegetation and is capable of growing more than 2 feet per week during warm months (Iverson, 1994). This rate of growth and water consumption displaces native vegetation. During winter dry periods, the dense, massive stands increase the risk of wildfire. The presence of giant reed has a negative effect on bird, reptile, and mammal species by reducing invertebrate diversity (Herrera and Dudley, 2003) and suitable habitat.

2. Potential Environmental Consequences

Noxious and invasive species may spread either by seed, root, or plant parts. They are naturally dispersed by a variety of means including wind, water, and wildlife. However, dispersal can be assisted by human activity through the use of vehicles and construction equipment. Vehicle traffic is a major contributor to weeds invading a new area, as seeds and plant parts can become embedded in tire treads and mud carried on a vehicle from an infested area (Sheley et al., 1996). Seeds and plant parts also can get caught in construction equipment or embedded in soil and dust that collects on construction equipment. After the construction equipment has been transported to another site, the weed seeds and plant parts can be washed off the equipment as a result of precipitation and introduce the invasive plant species into new or restored areas. In addition, fence maintenance activities that require the use of vehicles or construction equipment, such as repairing holes or fence posts, may also be a means of transporting and spreading non-native invasive plant species.

Potential direct impacts associated with the introduction or spread of noxious weeds and non-native invasive plant species includes the establishment of infestation areas and the loss or degradation of native vegetation communities, which could provide a niche for noxious weeds and invasive plant species to flourish. Potential indirect impacts may include loss of wildlife habitat and rangeland for grazing livestock due to diminished native plant communities, as well as soil erosion due to the establishment of non-native plant species. In addition, the spread of noxious weeds and non-native invasive plant species may increase the susceptibility of fire on the landscape (Sands et al., 2009).

Within the fence installation areas, however, saltcedar and giant reed habitat do not have any suitable habitat. Therefore, mitigation measures will reflect general activities that minimize the risk of inadvertent dispersal of non-native species.

3. Endangered Species Act

Federal agencies must ensure that their actions are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat (16 U.S.C. 1531-1544; 50 CFR § 402). APHIS considered the impacts of the proposed action on federally listed threatened and endangered species and designated critical habitat, and is currently engaged in formal consultation with the FWS because of potential effects on listed species in the action area. Fence construction activities will not occur until we have completed the Section 7 consultation 50 CFR § 402).

Ashy dogweed, Johnston's frankenia, Zapata bladderpod, Star cactus, and Walker's manioc

Adverse effects on federally listed plants in the action area could occur from fence construction and maintenance activities, such as land clearing, herbicide use, and trampling. In addition, seeds of invasive weeds that may compete with listed plants could be carried on construction equipment to cleared sites.

APHIS will conduct surveys to determine the location of listed plant species in the project area. This information will be used to make determinations of effects of the Proposed Action on listed plants, and to avoid those effects either by realigning the proposed fence or by relocating listed plants. The Proposed Action will not adversely modify the designated critical habitat for the Zapata bladderpod because fence construction will not occur there. APHIS is developing other conservation measures, such as requiring contractors to clean equipment between sites, to minimize effects on federally listed plants in the project area.

4. No Action Alternative

The vegetative cover will continue to mature and produce seeds and rhizomes if the No Action Alternative is chosen. Reproduction and moderate spread of existing non-native invasive plant populations by natural means of dispersal (i.e., wind, water, and wildlife) can be anticipated. In addition, occasional maintenance of existing fencing will likely require the use of vehicles, which are a major contributor to weeds invading new areas. Woody plants are expected to continue their increase in density as a result of climate change.

5. Proposed Action Alternative

The Proposed Action Alternative would require removal of vegetation in the construction area, which will subsequently cause direct impacts to the microclimate in the immediate vicinity of the proposed game fencing. The canopies of woody plants modify the microclimate beneath and around them by intercepting precipitation and shading the ground, both of which influence the amount of soil moisture available to plants (Breshears et al., 1998). The removal of woody plant canopy is likely to result in higher soil temperatures, which in turn decreases the amount of surface soil moisture available to plants. These changes to the microhabitat are likely to indirectly impact invertebrate, reptile, and mammal species; however, the impact to most species is expected to be short term and limited in area as vegetation will regrow upon completion of fence installation. Impacts to threatened and endangered species and species of concern will be discussed in a separate section following completion of the Section 7 formal consultation with FWS.

Native plants are critical to the overall resilience and stability of the South Texas Brush Country ecoregion and help maintain greater levels of species biodiversity (Karr and Roth, 1971; MacArthur and MacArthur, 1961; Maywald and Doan-Crider, 2008; Roth, 1976; Willson, 1974). Additionally, arid environments are better able to sustain critical ecosystem services when they contain a greater variety of plants (Schulze and Mooney, 1994). Land that is subject to disturbance, however, favors the establishment of non-native invasive species. The establishment of these plant species tends to degrade ecosystem productivity and reduce biodiversity by out-competing native plant species (Mullin et al., 2000; Sands et al., 2009). Non-native grass and shrub species, such as saltcedar, buffelgrass, and giant reed can have negative impacts on both plant and animal communities by decreasing the availability and quality of species' habitat and food sources (Herrera and Dudley, 2003; Hoyt et al., 2006; Sands et al., 2009). In addition, the spread of noxious weeds and non-native invasive plant species may increase the susceptibility of the landscape to fire (Sands et al., 2009).

Within South Texas, the establishment of several non-native invasive species is a concern (table 3-5). These plant species may reproduce either by seed, root, or plant parts. They are naturally dispersed by a variety of natural means but can also be assisted by human activity through the use of vehicles, construction equipment, and materials (per EO 13112). Within the fence installation areas, however, saltcedar and giant reed do not have any suitable habitat. Therefore, mitigation measures pertaining to non-native vegetation will reflect general activities that minimize the risk of their inadvertent dispersal.

6. Potential Mitigation Measures

APHIS will conduct surveys to determine the location of listed plant species in the project area. This information will be used to make determinations of effects of the Proposed Action on listed plants, and to avoid those effects either by relocating segments of the proposed fence or by relocating listed plants. The Proposed Action will not adversely modify the designated critical habitat for the Zapata bladderpod because fence construction will not occur there. APHIS is developing other mitigation measures, such as requiring contractors to clean equipment between sites, to minimize effects on federally listed plants in the project area.

To reduce direct and indirect impacts of the Proposed Action on native vegetation, APHIS agreements with landowners would specify that the amount of vegetation removed for fence installation will be no more than 10 feet on either side of the proposed fence line (20 foot-wide strips). Private landowners will be responsible for clearing new vegetation growth along the fence after installation. FWS will provide additional mitigation measures to reduce impacts to threatened and endangered species and species of concern in the proposed project area.

To reduce the potential for spread of non-native invasive weeds species during construction activities, agreements should specify that equipment used at a site will be visually inspected prior to removal from the worksite. If the visual inspection finds seeds, roots, or plant parts on the equipment, then the equipment will be cleaned using a backpack hand sprayer or pressure washer to the greatest extent practicable prior to leaving the site.

G. Wildlife

Maverick, Starr, Webb, and Zapata Counties are located in the South Texas Wildlife Management Area and the South Texas Brush Country ecoregion. This area is noted for its cattle industry and diverse wildlife. Grassland has been converted to shrublands in South Texas (Pérez de León et al., 2012) due in part to the increase in hunting in these areas (Pérez de León et al., 2010) as well as for the agriculture and energy industries. Bram et al. (2002) report that the progressive conversion of the grassland savanna of South Texas and adjacent areas of Mexico to shrublands provides a habitat more favorable to the survival of nonparasitic life stages of cattle fever ticks. This conversion of land for agriculture, commercial, and residential uses increases habitat fragmentation (small discontinuous parcels of vegetation) and decreases the availability of wildlife corridors. Wildlife corridors are linked parcels of land that allow wildlife to travel from one location to another to find food, water, and shelter, and they also ensure genetic variability within a wildlife population (FWS, 2012 c).

1. Migratory Bird Treaty Act

Federal law prohibits an individual to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird or any part, nest, or egg of any such bird (16 U.S.C. §§ 703-712; 50 CFR § 21).

Texas occurs within the Central Flyway, a bird migration route that is composed of the States of Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kansas, Nebraska, South Dakota, and North Dakota, and the Canadian provinces of Alberta, Saskatchewan, and the Northwest Territories. Many of the migratory bird species of the Central Flyway winter in Central and South America. Some migrate across the Western Hemisphere to the Arctic Circle, and others migrate to South America (NAS, 2013). Birds in this flyway include the American oystercatcher, black skimmer, brown pelican, greater sage-grouse, least tern, lesser prairie chicken, piping plover, reddish egret, redhead, red knot, ruddy turnstone, sanderling, sandhill crane, whooping crane, and Wilson's plover (NAS, 2013). Birds that migrate along this route depend on stopover habitat, such as native prairie and wetland areas, along the flyway. Removal of vegetation during the nesting season of migratory birds could result in incidental take of active bird nests, eggs, or hatchlings by physical removal or by disturbance from noise of fence construction activities.

2. Executive Order 13186 – Responsibilities of Agencies to Protect Migratory Birds

Federal agencies taking actions with a measurable negative effect on migratory bird populations are directed by EO 13186 to develop and implement a Memorandum of Understanding with the FWS that promotes the conservation of migratory bird populations. On August 2, 2012, APHIS and FWS signed a Memorandum of Understanding to facilitate the implementation of this Executive Order.

3. Bald and Golden Eagle Protection Act

The BGEPA (16 U.S.C. § 668) prohibits the take of bald or golden eagles unless permitted by FWS. The term "take" is defined as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR § 22.3). Disturb means to agitate or bother to a degree that causes . . . injury . . . a decrease in its productivity . . . or nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (§ 22.3).

Bald eagle breeding populations occur primarily in the eastern half of Texas and along coastal counties from Rockport to Houston (TPWD, undated e). Nonbreeding or wintering populations are located primarily in the Panhandle, Central, and East Texas, although they may be present in areas of suitable habitat throughout the State (TPWD, undated e). Golden eagles are rare to locally uncommon in their range in West Texas (Lockwood and Freeman, 2004). Golden eagle nests are usually placed at higher elevations in remote areas on cliffs, in trees, or structures (Tweit, 2007). Therefore, neither bald nor golden eagle nests are likely to be present near fence construction areas.

If a bald eagle nest were discovered in the vicinity of a fence construction site, APHIS would contact the FWS in Clear Lake, Texas and implement recommendations for avoiding disturbance at nest sites as provided in the National Bald Eagle Management Guidelines (FWS, 2007). These guidelines include a 330- to 660-foot buffer from an active nest, depending on the visibility and level of activity near the nest.

4. Endangered Species Act

Federal agencies must ensure their actions are not likely to jeopardize the continued existence of threatened or endangered species or result in the destruction or adverse modification of critical habitat (16 U.S.C. §§ 1531-1544; 50 CFR § 402). APHIS considered the impacts of the proposed action on federally listed threatened and endangered species and designated critical habitat, and is currently engaged in formal consultation with the FWS because of potential effects on listed species in the action area. Fence construction activities will not occur before this consultation is completed.

<u>Ocelot and Gulf Coast Jaguarundi</u>

Currently in South Texas, there are only two known breeding populations of ocelots: one in Laguna Atascosa National Wildlife Refuge in eastern Cameron County and one in Willacy County (Haines et al., 2005). The number of ocelots is estimated as 38 in Cameron County (Haines et al., 2005) and seven in Willacy County (FWS, 2010). Gulf Coast jaguarundis are not known to occur in Texas at this time (FWS, 2012 a).

A short-term effect of the proposed action on the ocelot and jaguarundi would be related to disturbance from fence construction. Noise and human presence from fence construction activities could cause these species to avoid areas where construction activity is occurring. Because the ocelot is active at night, APHIS expects disturbance effects on this species to be minimal because construction activities would occur only in the daytime. In a study of the impacts of seismic oil exploration on ocelots in the Amazon, no changes in ocelot movements were detected from this activity (Kolowski and Alonso, 2010). Although the jaguarundi is active in the daytime and human activities can adversely affect it, no jaguarundis are known to occur in Texas at this time (FWS, 2012 a); thus, disturbance of jaguarundis from fence construction activities is unlikely.

Construction of high-game fences may cause long-term loss of connectivity of ocelot and jaguarundi populations ranging between Mexico and Texas, resulting in genetic isolation. This is especially a concern since the South Texas population of ocelot already has reduced genetic variability compared to other ocelot populations. The South Texas ocelots are found in such small and isolated groups that inbreeding occurs, making them increasingly vulnerable to localized extinction. Also, fence construction could block wildlife access to freshwater resources. In Africa, fences have contributed to the decline of species such as wildebeests, giraffes, buffalo, and tsessebes because of blockage of their migratory routes, dehydration, and fence entanglement (Mbaiwa and Mbaiwa, 2006; Taylor and Martin, 1987).

Because of these effects, APHIS has determined that the proposed action may affect, and is likely to adversely affect the ocelot and the Gulf Coast jaguarundi. APHIS is developing conservation measures to benefit or promote the recovery of these species as part of the proposed action to minimize or compensate for project effects on them. Gaps in the fence at water resources, including streams and arroyos, will provide areas of crossing for ocelots and jaguarundi and allow them access to freshwater resources. In addition, APHIS will survey the entire length of the proposed fence location and map areas of potential ocelot and jaguarundi habitat. In these areas of appropriate habitat, openings may be placed at the base of the fence to allow passage of ocelots and jaguarundi and to ensure that impermeable barriers to these species are not created.

Texas hornshell

Fence construction will have no effect on this freshwater mussel, known to occur in the Rio Grande near Laredo, in Webb County. In Webb County, the distance of the proposed fence from the Rio Grande ranges from 1.5 to 4.5 miles.

Least Tern

Lake Casa Blanca, where least terns breed in Webb County, is 26 miles from the fence. However, activities associated with fence construction could disturb least terns at Falcon Reservoir in Starr and Zapata Counties. Avoidance of construction activities near these counties during the least tern breeding season (May through August) would avoid disturbance of nesting terns.

5. No Action Alternative

Under the No Action Alternative, wildlife movements would not be further limited, and wildlife corridors would not be further decreased. White-tailed deer would continue to have access to multiple pastures in South Texas, many of which contain cattle. When livestock producers round up their cattle for biweekly treatment of cattle with acaricide, white-tailed deer generally move temporarily to an adjacent premises, and then most return to the pasture after activities have subsided (Hood and Inglis, 1974, *in* Pérez de León et al., 2012). This occurs within the Permanent Tick Quarantine Zone, which also increases the likelihood that pastures will become re-infested with *Babesia*-infected ticks. In addition to acaricide treatment, ranchers may choose to use pasture vacation as a method to eradicate ticks from their property; however, wildlife using these areas defeats the purpose of pasture vacation if the wild animals are tick-infested.

Movement of tick-infested, white-tailed deer from Mexico across the Rio Grande is a confirmed source of infestations in Texas (Pérez de León et al., 2010). Periods of low rainfall contribute to ease of access across the Rio Grande. Without game fencing to prevent their interaction with livestock, tick-infested, white-tailed deer have the potential to prolong quarantines of pastures.

Under the No Action Alternative, movement of native wildlife, species of concern, and threatened and endangered species would continue uninhibited. Impacts to bird species would not be changed by the ongoing

CFTEP activities, and birds that have demonstrated evidence of northward or eastward extension of their breeding range in the South Texas vicinity due to climate change would not be affected by the No Action Alternative. Wildlife also would be able to freely move as they do now in search of food and water should a severe and prolonged drought occur in Mexico and South Texas.

6. Proposed Action Alternative

The South Texas Brush Country has one of the greatest concentrations of exotic animals in Texas. Free-ranging exotic species reported to have infestations of either *R. microplus* or *R. annulatus* include nilgai, aoudad sheep, wapiti (*Cerous Canadensis*), red deer, fallow deer, and axis deer (Pound et al., 2010; Sheffield et al., 1983). The identification of these exotic species and white-tailed deer as tick hosts presents a threat to the CFTEP by compromising the success of ongoing eradication efforts. The unrestricted movement of these animals between Mexico and South Texas, and between the quarantined and tick-free pasture areas, further complicates the eradication efforts.

Livestock benefit from fencing by the reduction of disease transmission from wildlife reservoir populations (Angus, 1996; Gadd, 2010; Pérez de León et al., 2010; Taylor and Martin, 1987). In contrast, game fencing impacts wildlife by hindering access to forage and water resources during seasonal migration (Boone and Hobbs, 2004; Gadd, 2010) or could impact their ability to exploit resources located within their home range (Urness, 1976). In Africa, fences exacerbate the effects of climate variability and climate change by limiting migration to dry season destinations (Gadd, 2010; Taylor and Martin, 1987). Similarly, fences in Texas reduced range access of native pronghorn antelope by impeding movement, particularly to winter-spring ranges (Aiken, 2005). Severe, prolonged drought could prompt deer migration from Mexico into the South Texas quarantine zone (Davis, 1990; Gonzalez-V. et al., 2010; Pound et al., 2010), particularly as deer search for water (Webb et al., 2007). Increased risk for cattle fever tick establishment also may arise in additional native deer populations maintained for deer hunting (Anon., 2013 b; Davis, 1990; Pérez de León et al., 2010).

Other potential impacts to wildlife from game fencing include entanglement during crossing attempts. Crossing attempts will be minimized by the 8-foot fence height (Perry, undated); however, Harrington and Conover (2006) reported that higher mortality rates were associated with woven wire fences with one strand of barbed wire versus woven wire fences with no strands of barbed wire or two strands of barbed wire. The proposed game fencing would be woven-wire; however, it would not include any strands of barbed wire, thereby reducing the potential to entangle ungulates during crossing attempts.

There have been some reports of predators using fences to catch prey. For example, along the Trans-Canada Highway, coyotes learned to run bighorn sheep into the fencing because the fencing blocked their escape corridor (Gibeau and Heuer, 1996). In addition, sheep may have been unable to clearly see the fencing due to poor depth perception (Schoenian, 2011). Deer also are reported to have poor depth perception; however, the use of flagging on top of the fencing will make the fence more visible to deer (Perry, undated).

Fences could fail under increased migration attempts (Aiken, 2005; Falk et al., 1978; Gadd, 2010; Pérez de León et al., 2010), leading to an increase in exposure of U.S. livestock to cattle fever ticks. Feral swine also can breach livestock fences (Pérez de León et al., 2012). Wildlife is less likely to break through game fencing if gaps in the fence are provided, which would occur with the installation of this fencing. Fencing will not cross roads, arroyos, or other bodies of water, providing periodic opportunities for wildlife movements. Openings at the bottom of the fences also will be provided to allow for unimpeded movement of threatened and endangered species while maintaining a separation between potentially tick-infested ungulates and U.S. livestock.

Free movement of small to medium-sized mammals (such as American badger, desert cottontail, and western spotted skunk) and rodents (such as the Mexican ground squirrel, desert shrew, and southern plains woodrat) in the proposed fencing areas are unlikely to be impacted because of their size respective to the holes in the fence, small natural gaps underneath the fence as a result of variations in the landscape, and/or their characteristic behaviors. Larger mammals such as coyotes, foxes, and dogs may be able to move through the proposed openings in the fence. No published studies were located that indicate these animals are hosts for cattle fever ticks.

Birds have the potential to be impacted by the proposed game fencing. Ground-dwelling birds such as the wild turkey (*Meleagris gallopavo*) and bobwhite quail (*Colinus virginianus*) may be impacted by the loss of connectivity due to reduced ground-cover vegetation after fence installation (Stromberg, 1990). Populations of rodents and some bird species may be impacted by increased hunting from predatory birds that use the game fencing as a perching location (Burger et al., 1994; Suhonen et al., 1994). Birds also have the potential to collide with fences (Baines and Summers, 1997).

7. Potential Mitigation Measures

Monitoring of unintended harm to wildlife species as a result of the proposed game fencing could occur during inspections of fencing by livestock producers. Mitigation measures could be implemented, if necessary, to prevent further harm of these species. Flagging could be placed on the top of fencing by landowners to serve as a warning to wildlife in the area, and openings will be provided so that threatened and endangered species are allowed freedom of movement within their home ranges and migration corridors.

The following measures would be specified in APHIS agreements with landowners to avoid impacts to migratory birds:

- Avoid vegetation removal and use of loud equipment (e.g., bulldozer, chipper, chain saw) for fence construction during the nesting season (March 15-August 15).
- If vegetation removal or loud equipment use is necessary during the nesting season, a nest survey will first be conducted by a qualified surveyor to ensure that no nests containing eggs or birds that have not yet fledged will be destroyed or disturbed.
- If a nest containing eggs or unfledged birds is on a branch or other vegetation that must be removed, APHIS will obtain a permit to move the nest to a licensed wildlife rehabilitator or else wait until the birds have fledged to remove the vegetation.

H. Human Health and Safety

Cattle fever ticks are damaging ectoparasites (parasites that live on the skin) that cause reduced cattle productivity (Pelzel, 2005) and transmit protozoan parasites that cause tick fever (Radunz, 2008), which can be fatal when genes for immunity are not present in the animals (White et al., 2003). Humans are not hosts of these species of ticks (Barros and Fighera, 2008); however, humans can serve as hosts to a wide variety of other ticks that carry diseases.

Both project alternatives incorporate acaricide use, inspection, and patrol activities that impact humans as they perform these activities. The No Action Alternative will impact humans across the United States by allowing unrestricted tick entry and dissemination to occur with concurrent increased risks to human health. The Proposed Action Alternative will impact construction workers, residents, landowners and also has potential impacts on children and hunters. We address both the general human health impacts along with special considerations for residents of colonias. Because of the proposed fence locations near colonias, APHIS is committed to reaching out wherever possible to address the needs of this segment of the population.

1. Executive Order 13045 – Protection of Children from Environmental Health Risks and Safety Risks

Federal agencies identify and assess environmental health and safety risks that may disproportionately affect children as a result of agency actions as directed by EO 13045. We discuss an assessment of the risks associated with this project below.

2. Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations

Federal agencies must identify and address any ". . . disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations . . ." (EO 12898).

APHIS has considered whether project impacts occurring in minority and low-income populations appreciably exceed or are likely to appreciably exceed those on the general public, and whether there will be an impact on the natural or physical environment that significantly and adversely affects an environmental justice population. These impacts are discussed below.

3. Impacts Common to Both Alternatives

Both alternatives in this EIS include a series of eradication activities (Angus, 1996) designed to continue the tick-free status in the United States. Program activities likely to affect humans include: (a) inspection of livestock at selected South Texas markets originating from the Permanent Tick Quarantine Zone, (b) patrols for stray or smuggled livestock in the Permanent Tick Quarantine Zone along the Rio Grande, and (c) inspection and pesticide treatment of tick-host livestock (mostly cattle and horses) on quarantined premises. Hunters who harvest animals from the counties in the quarantine zone are required to take precautions in the handling and transport of hides and carcasses. Specifically, the hides of harvested animals from cattle fever tick-infested or exposed premises must be left behind until they are inspected, treated, and the hunter is issued a permit to move the hide (4 TAC § 41.7(b)).

Although the literature does not show that cattle fever ticks present a health threat to humans, people can become infected by protozoan parasites and get tick fever. Diseases induced by *B. microti, B. divergens,* and *B. bovis* are reported in immune-compromised humans. For example, the tick-borne rodent parasite *B. microti* is recognized to cause human disease (Barros and Fighera, 2008). Other ticks can transmit human diseases--most notably is the transmission of Lyme's disease (caused by the bacteria *Borrelia burgdorferi*), which is vectored by deer ticks (*Ixodes scapularis*). For these reasons, tick control on animals is important for human health.

The impacts common to both alternatives include baseline health impacts related to ticks and potential exposure to acaricide residues. The extent to which activities occur is likely to differ under each alternative and is separately discussed.

Human populations in the vicinity of the proposed fence areas include nearby residents, hunters, cattle ranchers, and CFTEP employees. Residents include people living in colonias and children. These population groups may be exposed to ticks under both alternatives; however, the extent of the exposure to each group is expected to vary. Hunters are likely to be exposed to ticks during the hunting seasons. Residents and ranchers are highly unlikely to be exposed to ticks during the course of their normal activities. In contrast, children are at increased risk for tick exposure due to their outdoor play.

The exposure to acaricide residues is highly unlikely for residents, hunters, and cattle ranchers because acaricide is only used during pesticide treatment and access to treatment areas is restricted to authorized personnel. CFTEP employees' exposure to ticks is likely while patrolling the border and/or conducting animal inspections, but the exposure is not daily. Significant exposure to acaricide for CFTEP employees is unlikely because they are trained personnel who wear proper personal protection equipment during treatment. The post-application exposure for CFTEP employees or ranchers contacting treated animals is minimal because the product label does not permit contact with treated livestock immediately after application.

4. No Action Alternative

The magnitude of effects from program activities on humans is anticipated to be greater under the No Action Alternative due to greater tick distribution with the lack of new fencing. Some humans in the following groups may experience the following beneficial effects of the No Action Alternative:

- Cattle ranchers may benefit from the lack of disturbances to their property and by not experiencing stress associated with coping with change.
- Residents and hunters may benefit from unrestricted access to unfenced areas.
- Employees may experience additional job security based on the need for increased inspections.

In the absence of the fence, health impacts from increased exposure to ticks are expected to rise. Residents and hunters will have increased exposure to ticks, increasing their potential exposure to tick-borne diseases. The continued increase of tick outbreaks in the tick-free quarantine zone would require more personnel time and effort to check cattle for ticks and treat cattle affected by the ticks. Adverse effects to CFTEP employees are expected to arise from performing more inspections and treatments (whenever a premise is under quarantine, pesticide applications will be performed every 7 to 14 days), with an increased risk of exposure to ticks and potential incidental exposure to acaricide and tick-borne diseases. The livelihood and income of local cattle ranchers will negatively be impacted, creating stress and reducing their well-being. These additional efforts would result in more costs to cattle producers and animal health agencies, based on U.S. cattle industry history and experiences in other countries (Angus, 1996).

5. Proposed Action Alternative

Under the Proposed Action Alternative, fencing is expected to reduce reliance on the existing tick control methodologies by adding another control measure. Fencing is a passive structural control measure against tick movement, so it is non-invasive to humans. There is not likely to be any ongoing, obvious impact on the general public because game fencing would not obstruct public or private access roads or driveways or be installed through township areas or across water resources, including streams and arroyos.

Relatively few people would be affected by construction because the fencing would be installed on fewer than 70 miles and in sparsely populated rural areas. Webb County lacks any nearby population, while Starr and Zapata Counties have an estimated combined 1,903 households within 0.25 mile of the planned fence locations (Census, 2010-2011). Construction workers, rural private landowners, and residents would be among the most impacted individuals. Other casual passersby are not likely to be affected by construction activities.

Construction hazards are likely to include limited exposure to noise and dust, particularly during installation of concrete footers, from equipment and weed control activities if mower or "weed eaters" are used. While there may be some noise increase during installation and maintenance, it is expected to be infrequent, intermittent, and relatively low. We expect any temporary construction debris and dust to be minimal, short-term, and in limited locations, with limited negative effects to air, drinking water, and consumable vegetation (e.g., crops) nearby. Therefore, these exposures would be minimal both in time and duration. There is a minor safety concern arising from general construction hazards to employees during installation, but this is not an ongoing or continuous physical hazard after construction is complete.

APHIS anticipates that landowners would opt for gates and/or overpasses to accommodate the need for human access across fenced areas if necessary. APHIS expects that landowners, hunters, utility companies, and emergency personnel or equipment that need to traverse the fence would access these facilities.

As a result of adding fencing on their property, there may be a socioeconomic impact to landowners if their property taxes increase due to perceived added value because of the fence. Also, cattle ranchers may experience fence maintenance concerns because the integrity of the fence is essential for effectiveness.

Fewer than 2,000 people reside within one-tenth of a mile of the proposed fencing in fewer than 600 units. In addition, we identified one school within 0.3 miles of the proposed fence segment. It appears the border locations appropriate for effective fencing would disproportionately affect nearby colonias populations in comparison to the rest of the nation. People living in the colonias are hoping to benefit from temporary construction jobs. The lure of jobs/economic resources being spent in those areas, when combined with the continued assurance of high-quality cheap meat and animal products and an added health benefit (created by any reduction in exposure to ticks and tick-borne diseases), can reduce any potential negative effects. Access to water in the El Indio Townsite is through the city water supply, so disproportionate effects to these colonia residents is less likely to occur.

The increased potential for tick exposure by children during play cannot be addressed by restricting their movement. Yet children would be less susceptible to traffic accidents because the fence could serve as a barrier to them accessing the roadway. The primary benefit to children in the vicinity of the proposed fence is from reduced risk of exposure to zoonotic diseases carried by stray animals that are precluded from entry into areas by the fence.

The lack of loose wire ends projecting from the fence reduces the likelihood of children injuring themselves while playing near the fence. While children may be able to climb the fence more easily than an adult because of their small size/ weight, each wire's weight-bearing capacity is low. As a result, climbing attempts by young children appear more likely to bend or break wires before the child is likely to fall from a dangerous height.

APHIS planned the fence design to reduce the likelihood that people would feel "fenced in" even when near the fence. These psychological aspects are enhanced by the fence not being solid, lacking dangerous top elements (like barbed wire or angled projections), and not being electrified. The psychological adaptation associated with needing to "see through" the proposed type of fence is expected to be temporary and something that people are likely to ignore after a while.

Beneficial effects associated with the fencing are expected to include: (a) reduced tick spread and disease transmission, (b) excluded livestock and wildlife reduces the human health risk of other pests and/or diseases, (c) more productive animal husbandry, and (d) reduced costs of meat and animal products to U.S. human populations. Hunters in areas with game fencing are likely to take tick-free, healthier deer. Residents and hunters are likely to have less potential for exposure to ticks, while cattle ranchers may also experience reassurance from seeing the fencing, and reduced concerns regarding cattle security. The large reduction in incidental acaricide exposure is likely to benefit workers who conduct cattle treatments.

6. Potential Mitigation Measures

APHIS expects limited impacts from the noise and dust generated during the installation of the proposed fences near Benavides Elementary School in Zapata County, despite the location of the fences being close to the school. To the greatest extent possible, APHIS will ask landowners to avoid fence installation activities during school hours. By implementing the identified mitigation measures, there would be no short- or long-term impacts on the health and safety of children.

Any concerns regarding the safety of construction workers with respect to construction equipment, dust, and noise will be mitigated through the use of personal protective equipment in accordance with applicable safety and health regulations (29 CFR §§ 1910 et seq.). To the greatest extent possible, APHIS will seek to have contractors implement the general construction practice of periodically spraying water to control dust during installation.

If the proposed alternative is adopted, APHIS will actively discuss with contracting landowners their options for including gates and/or overpasses to accommodate human access so that access points are convenient and visible from a distance.

I. Cultural, Historic, and Visual Resources

This proposed Federal action seeks to avoid, minimize, and mitigate potential negative impacts to cultural and historic resources as part of APHIS’ compliance with the NHPA and ARPA (16 U.S.C. § 470), and NEPA (42 U.S.C. §§ 4321-4347). This would primarily occur by selecting game fence materials that minimally impact the environment, both during construction and afterward.

APHIS originally contacted the County Historical Commission Chairs in Maverick, Starr, and Zapata Counties in 2009 regarding the proposed Federal action. Additional locations were added to the project, and the County Historical Commission Chairs in Webb and Zapata Counties were contacted in 2013 (Appendix K). The area of potential effect includes all areas where game fence segments exist, will be modified, or added within

Maverick, Starr, Webb, and Zapata Counties. The potential effects are already realized in areas where high (8-foot) game fencing now exists, and are not considered further. This section considers the potential effects from the addition of high game fencing to new areas and the increase in height where low (4-foot) game fences already exist. The impacts are exclusive to each alternative and will be discussed separately below.

1. Archaeological Resources Protection Act

ARPA secures the protection of archaeological resources and sites on public and Indian lands and fosters increased cooperation and exchange of information among governmental authorities, the professional archaeological community, and private individuals (16 U.S.C. §§ 470aa-mm). ARPA requirements extend only to public and Indian-held lands. Consequently, ARPA requirements do not apply to the proposed action of APHIS providing funding to private landowners for installation of game fencing and is therefore removed from further consideration.

2. Native American Graves Protection and Repatriation Act and Executive Order 13045

APHIS will meet requirements in the NAGPRA with respect to Native American artifacts (25 U.S.C. § 3301-3013). This section also addresses children's play behaviors as related to EO 13045.

3. No Action Alternative

Existing unmaintained game fence segments are expected to lose functionality, deteriorate, and look worse over time. If the No Action alternative is chosen, there would not be any inadvertent uncovering or disruption of previously unknown or undisturbed historic sites or artifacts, and the view along the roadsides would continue in its current condition or degrade as roadside fencing deteriorates.

4. Proposed Action Alternative

APHIS expects minor ground disturbance for vegetation removal, installation of the game fence supports, and fence maintenance. Additional population settlements developing along the areas with fencing are not likely because current land use involves highways and privately owned property. In all these areas, auditory effects are not likely to be more intrusive than infrequent and short-term noises associated with installation and maintenance of the game fencing. Visual effects during the proposed installation activities would be people seeing a work crew installing the fence segments or seeing fencing material staged for installation.

Conversion of 4-foot-high animal fencing along the highway to an 8-foot height would not alter traffic patterns or land use. Based on the careful selection of sites, we do not expect that the addition of high fencing into proposed areas would alter traffic patterns or land use.

The proposed alternative does not create a significant adverse visual impact because the game fence's design, the distance, and the intervening topography and vegetation do not exceed the minimal impact to be effective. The ability to see through the wire fence mesh means that it does not detract from the public's enjoyment of a resource, such as a roadside view or the anticipation associated with seeing a historic site at a distance.

The fence sections are proposed for installation on privately owned land. Within the project area, we will make individual agreements with each participating private landowner. Disposition of privately held land is controlled by the landowner, who retains control over the extent to which the integrity of any historical site is maintained. Through these contracts, the agency not only flexibly accommodates landowners' interest in protection of known archeological resources, but also encourages landowners to consider how any potential impacts to resources on their property could be minimized. While we recognize archeological resources may exist on a variety of properties, we have not identified specific potential impacts of the game fencing on identified sites within these counties because APHIS relies on informed owner consent to minimize potential impacts.

5. National Historic Preservation Act Consultation

The original consultation with the Texas State Historic Preservation Officer (Martin, 2009) found that the area of potential effects at each historic site does not extend to proposed fence locations, primarily because of the distance from fence to site. For example, short-term construction activities are not likely to be seen or heard over one-tenth of a mile from a historic site. (We discussed potential long-term impacts of the proposed fence and public access issues in the "Human Health and Safety" section of this chapter.)

According to the State Historic Preservation Officer materials available in 2009, Maverick County had not been surveyed for cultural resources. Consequently, county officials recommended a survey by a professional archeologist. We did not follow this recommendation at that time because APHIS had not determined whether to proceed with the fence proposal. Since then, there have not been any additional sites proposed for fencing in Maverick County. We are continuing consultations with the County

Historical Commission Chairs as we identify locations for fencing. Their information will be presented to the Texas Historical Commission, and at that point, a professional archeologist could be hired if additional information is necessary.

APHIS is waiting for a response from Zapata County representatives, who were contacted in 2013, based on our identification of additional sites. There were no additional sites identified in Starr County, so their representatives were not contacted a second time. Most of the areas in Starr and Zapata Counties parallel U.S. Highway 83 and have been surveyed by the TXDOT as part of their most recent expansions. Previous consultations indicated a Starr County cemetery board was not concerned because of the relatively large distance between the cemetery and the fence line. To the best of APHIS' ability to make this determination, all roadside monuments are located on the non-fenced side of the road. Webb County wasn't part of the original consultations in 2009, but APHIS did contact them in 2013. Their representative did not have any concerns and stated that we may proceed with the project as described.

Based on the National Register of Historic Places, APHIS identified 27 registered places in the four counties, and none of these sites appear to be in the line of the proposed fence. In Zapata County, there are three historic sites within one mile of the proposed fence line: (1) Corralitos Ranch (0.4 miles from fence), (2) Trevino-Uribe Rancho (0.6 miles from fence), and (3) San Ygnacio Historic District (0.6 miles from fence). At these distances, these sites are not expected to experience any ground disturbance or audible impacts during normal fence construction activities. It is very unlikely that people will be traveling on foot across private property and need to find a fence gap, bridge, or gate to cross the fence line from approximately one-half mile away as they travel to/from these historic sites. Where a historical site's location is restricted or not identified, general effects are assumed to exist if the location is within one-tenth mile of the proposed fencing locations.

It is likely that short-term visual impacts could occur as people travel along the highway to/from a historic site. In this situation, the rangeland and pastures are part of the visual resources, along with the buildings, street patterns, and road characteristics. The fencing is designed to minimally impact these vistas. The visibility of the game fence segments is not likely to significantly detract from the public's enjoyment of the roadside.

Based on APHIS review of known historic resources and cultural resources for the counties that may be affected by the proposed action, these ongoing discussions preliminarily allowed us to determine that historic resources would not be impacted from installation or maintenance of the game fence.

6. Tribal Consultation

APHIS sent a letter of inquiry on August 14, 2009 to the Tonkawa Tribe of Oklahoma (Messenger, 2009). On August 20, the Tribe replied that they did not have any concerns but would like APHIS to notify them if something is inadvertently uncovered during the fence installation process (Tonkawa Tribe Business Committee and NAGPRA Representative, 2009). When we identified additional proposed fence segments, we sent a second letter to the Tonkawa Tribe on March 21, 2013. They replied with an email on April 8 stating that they stand by their original letter (Myer, 2013).

Based on the locations, as well as limited depth and size of fence post holes, the proposed alternative is not likely to affect sacred sites and is highly unlikely to affect the physical integrity of Native American sites or artifacts (under EO 13007 or 25 U.S.C. § 3301-3013). If any fence-related ground disturbance uncovers any item of potential cultural significance, APHIS' landowner contractor would follow the contract terms based on applicable NAGPRA provisions.

7. Protection of Children

Identification of colonias showed only one school location (Benavides Elementary School, within the San Ygnacio colonia in Zapata County) approximately three-tenths of a mile north of the proposed fence segment. This distance means children are not likely to see the fence from within a classroom, but may see it when travelling to/from school.

To the extent that children may play near fence segments, the mesh size is expected to effectively prohibit most balls from passing through to the other side. The mesh is expected to be 3 x 4 inches ("), which means a ball or other toy must have a radius of 1.5" to easily pass through the mesh, but a radius of more than 2" is likely to rebound or become stuck [$2\pi(1.5)=$ 9.4 inch circumference]. Rebounded and stuck balls are easily retrieved on the same side of the fence.

Types of play objects considered are the generally available children's sized balls for: American football (sizes 2-4 exceed 22" circumference), soccer (size 3 exceed 23" circumference), basketball (size 5 exceeds 27" circumference), and baseballs (generally 9" circumference) (Wikipedia, 2013; WikiAnswers, 2013). Baseballs could pass through the mesh when the throw/hit is well-centered in a mesh square. Children capable of that kind of throw are likely to want to retrieve a lost baseball, so agency information to residents of colonias could caution parents to warn their children not to practice throwing baseballs near the fence because they could be hard to retrieve if lost. In comparison, the 1¾ to 3" diameters of golf balls, tennis balls, and badminton birdies all will easily pass through the mesh (Wikipedia, 2013; WikiAnswers, 2013). However, these sports are not generally practiced outside of specialized playing areas, so we consider the risk of lost equipment unlikely.

8. Potential Mitigation Measures

APHIS agreements with landowners are expected to contain a term that would meet the requirements of NAGPRA. Agency information to residents of colonias could caution parents to advise their children not to play near the fence line.

J. Other Considerations

1. Executive Order 13166 – Improving Access to Services for Persons with Limited English Proficiency

Federal agencies must ensure that their programs and activities are accessible to persons with limited English proficiency as directed by EO 13166. To meet this need, APHIS conducted outreach to English-speaking and Spanish-speaking communities through a variety of public notices and door-to-door solicitations about upcoming scoping meetings. All stakeholders, including colonia ombudspersons and residents of colonias, were invited to the meetings. A translator was present at the meetings to ensure all comments were captured and questions adequately addressed. The Executive Summary for the Draft and Final EIS will be translated into Spanish to provide additional information to communities interested in the Proposed Action and the associated employment opportunities.

2. Farmland Protection Policy Act

APHIS is required to protect farmland when practicable (7 U.S.C. §§ 4201-4209). Specifically, NRCS ensures Federal programs minimize contributions "to the unnecessary and irreversible conversion of farmland to nonagricultural uses" while assuring programs are compatible with "State, unit of local government, and private programs and policies to protect farmland" (§ 4201(b)). The regulations establish requirements and guidance for Federal agencies to consider the adverse effects of their programs on the preservation of farmland, consider alternative actions that could lessen adverse effects, and ensure that their programs are compatible with State and local government and private programs and policies to protect farmland.

Federal agencies that are involved in a proposed project that may convert farmland to nonagricultural uses need to determine whether their project site contains prime, unique, statewide, or locally important farmland. While each agency can choose to evaluate farmland in a project area, they also may request that NRCS assist with this process. NRCS has the final authority for designating important farmlands.

On October 20, 2011, APHIS engaged in discussion with NRCS on the Proposed Action Alternative. In an October 24, 2011 email, NRCS agreed that game fencing would not be considered farmland conversion under FFPA since it is a reversible action that does not affect the use of cropland or productivity (Gabriel, 2011). Therefore, the proposed action of installing a game fence on farmland is reversible and falls outside of the scope of the FPPA.

3. National Wild and Scenic Rivers Act

Federal activities cannot affect designated wild and scenic rivers or areas immediately adjacent to the designated rivers (16 U.S.C. §§ 1271-1287). One hundred ninety-six miles of the Rio Grande extending from Mariscal Canyon to the Terrell/Val Verde County line are designated as a wild and scenic river. The proposed project is not located within or adjacent to this section of the Rio Grande. There are no rivers designated as wild and scenic in or associated with the project area; consequently, requirements under the NWSRA (§§ 1271-1287) are not applicable to this proposed action.

4. Irreversible and Irretrievable Commitment of Resources

NEPA requires analysis of significant irreversible and irretrievable effects associated with a proposed action (40 CFR 1502.16). Irreversible and irretrievable commitment of resources applies to the use or consumption of resources that is nonrenewable or unrecoverable. At present, APHIS has not formally committed resources to the proposed action of game fencing installation; therefore, no actions related to the fencing have been taken that are considered irreversible or irretrievable. Potential future irreversible and irretrievable commitments of resources are described below.

Future Commitments

Native plant communities could be lost as a result of the fence installation, which is why APHIS will enter into a contract with a plant surveyor to identify any threatened or endangered species that are present in the proposed fencing locations. This survey is necessary for the proposed action to proceed. At the point that APHIS pays for this service, the costs associated with the survey will be considered an irretrievable commitment of resources.

Disturbance caused by temporary construction could result in changes in wildlife behavior that is irreversible. Wildlife habitat or corridors could be lost as a result of the proposed action, but openings in the fencing for animals such as ocelots and jaguarundi, in addition to gaps in the fence at water resources, would minimize impacts to these species.

Human effort put forth toward the planning and siting of the proposed game fencing is considered irretrievable. The commitment of time and labor during the construction process is also considered irretrievable; however, temporary local job opportunities could result from the installation of the proposed fence segments and are considered beneficial.

Private property would be used for installation of the proposed game fencing. Landowners are not obligated to install the fence on their property, so no irretrievable commitments of resources would occur until landowners agree to cost-share the fence installation.

Aside from some soil excavation associated with the burying of fence posts, land would not be altered as a result of the proposed action. Additionally, if the fence was removed in the future, the holes left in the soil by the fence posts could be back-filled. Some run-off could occur from soil excavation; however, water resources are not expected to be altered in the long-term by the proposed action.

Cultural and historic resources are considered non-renewable and therefore any disturbance to these resources would be irreversible and irretrievable. To ensure that this does not occur if the proposed action is selected, APHIS will continue to work closely with the County Historical Commission Chairs in Maverick, Starr, Webb, and Zapata Counties and the Tonkawa Tribe of Indians of Oklahoma.

CFTEP Commitment of Resources

The CFTEP has been in existence since 1906. Since the beginning of the eradication effort, program participants developed, tested, and refined tick eradication techniques. As a result of this effort, distribution of cattle fever ticks went from 15 States to the border of Mexico near the Permanent Tick Quarantine Zone in South Texas. Ongoing efforts include treating livestock with an approved acaricide, hand-scratch inspections, and vacating the pasture. USDA's Agricultural Research Service also has studied the efficacy of medicated bait sites and bait stations to treat white-tailed deer for ticks. This research, the establishment and maintenance of the Permanent Tick Quarantine Zone, and Mounted Patrol Inspector surveillance contributes to the success of the CFTEP, but it also constitutes an irretrievable commitment of resources toward the protection of livestock in the United States. As such, the proposed game fencing is simply part of a larger effort that has substantial commitments that are now irretrievable.

K. Cumulative Impacts

The proposed fencing would mostly occur along right-of-ways adjacent to pre-existing highways and on privately owned land that has been developed for agriculture and other uses such as energy production. Previously described baseline conditions (Chapter 3) in these four counties demonstrate a significant amount of human-related disturbance that we considered when assessing the magnitude of potential cumulative impacts from the Proposed Action Alternative in this EIS.

A majority of the land in the project area has been altered to facilitate agriculture and energy production. Agriculture within the four counties is diverse with cattle production, pasture management, and crop production as the predominant components. Energy production is also significant with more than 17,000 oil and gas leases within the four-county area. We also considered the direct and indirect effects from infrastructure projects, such as road and highway construction/maintenance, to support access to these areas in the context of the Proposed Action Alternative (FHWA, 2007).

Currently, APHIS conducts other activities that may occur within the four-county area, primarily related to plant health and vertebrate pest control. Plant pest programs such as the Boll Weevil Eradication Program and the Imported Fire Ant Quarantine exist within these counties. If detections of a boll weevil or imported fire ant are made, chemical treatments are applied to specific locations (in the case of the boll weevil) or to quarantined products shipped to an area not under quarantine, which is the case with imported fire ant. These treatments are infrequent and are made in crop fields or in nurseries using products that are registered by EPA for a wide variety of agricultural and non-agricultural uses.

1. Human Population

The potential human health impacts related to the Proposed Action are expected to be minimal, and in the context of potential cumulative impacts to past, present, and future activities, the impacts would be incrementally minor. The proposed fence is designed to connect with pre-existing fencing to decrease the probability of tick-infested cattle and wildlife from entering areas that are tick free. Direct effects from the Proposed Action Alternative would include ground disturbance and noise during the placement and maintenance of fencing; however, this effect would be short-term as the fence is completed and minor in relation to other activities in the area such as road traffic.

A positive cumulative impact from the additional game fencing as part of an integrated strategy in managing cattle fever ticks would be a reduction in interactions between tick-infested cattle coming from Mexico with those in the United States. The reduction in ticks and associated diseases would provide economic benefits to the livestock industry by providing economic stability and would position the U.S. livestock industry to remain competitive as markets evolve (Miller et al., 2013; Pérez de León et al., 2012). Economic benefits to taxpayers may also occur through decreased costs to USDA and the TAHC to maintain the CFTEP. The reduction in ticks also could result in a reduction of chemical control measures used as part of the CFTEP. The acaricides used in the CFTEP have other agricultural and/or residential uses; consequently, we cannot estimate the total amount of each product used, in addition to those with similar modes of action used by others in the affected counties. The limited chemical use in the CFTEP suggests a minor contribution to overall use when factoring in current and future uses, and therefore, the reductions in chemical loading would not be expected to be significant.

Due to the restrictions in how chemical control measures are managed by the CFTEP, risk to the general human population is not expected. However, any reductions in chemical use would benefit workers by reducing exposure and subsequent risk. The reduction in the need for chemical control measures also would have a beneficial cumulative impact to the livestock industry in reducing the probability of chemical resistance developing in cattle fever ticks, which has been observed in Mexico (Pérez de León et al., 2012).

2. Ecological Resources

The potential for cumulative impacts to ecological resources is related primarily to those species that may have their movements impeded by the additional fencing that is proposed in this EIS. The use of fencing can impact emigration, immigration, and migration of certain species and can result in fragmentation of populations with a resulting decrease in gene flow (Gadd, 2010; Lindsey et al., 2012; Mbaiwa and Mbaiwa, 2006). This may be particularly critical for species of concern such as the federally listed ocelot and jaguarundi. Habitat destruction has already contributed significantly to the decline of these species; fencing may pose an additional threat (FWS, 2010; FWS, 2012 a).

Cumulative impacts to non-target and/or non-listed species such as bobcats from the proposed fencing is difficult to quantify; however, when compared to the fencing that already exists in this area and the large-scale loss of habitat from agriculture, energy production, and the impacts of highway construction and expansion, the cumulative impacts from the Proposed Action Alternative in this EIS are not expected to contribute significantly when compared to current and future activities already underway. The additional fence would not be continuous but would have multiple openings due to roads, arroyos, and other bodies of water that would allow for the movement of wildlife. APHIS is also working with the FWS to incorporate openings at the bottom of fences that would allow unimpeded movement of threatened and endangered species and other wildlife except deer while maintaining the separation of potentially tick-infested cattle and deer from areas that are free from cattle fever ticks.

Other aspects of the CFTEP, such as chemical control measures and trail maintenance, should be considered when assessing cumulative impacts to ecological resources. We expect that these cattle fever tick management measures contribute less to the cumulative impacts to non-target wildlife, such as mammals, compared to fence construction and maintenance.

Chemical use in the CFTEP is restricted in such a way to avoid non-target fish and wildlife impacts, or the type of chemical poses a low risk to most non-target populations. Trails that allow for surveillance of cattle and wildlife coming from Mexico have been in existence since approximately 1938 and have resulted in the loss of some native habitat. Maintenance of these trails requires periodic clearing on private and public property. The loss of habitat is expected to be minor, relative to the economic development that has occurred in these four counties since the trails were established. The length of trail is not expected to increase in the future and maintenance of the trail would be coordinated with private landowners as well as affected public land management agencies to minimize impacts to ecological resources.

Other considerations for assessing cumulative impacts include ongoing APHIS programs in Maverick, Starr, Webb, and Zapata Counties. In the case of APHIS programs such as Imported Fire Ant Quarantine, chemical treatments are made to commodities such as containerized plants and sod in highly disturbed areas prior to shipment. These treatments occur in production nurseries and – due to the lack of suitable habitat for non-target wildlife – we do not expect treatments to result in population-level impacts to ecological resources. In the Boll Weevil Eradication Program, infrequent treatments are made to cotton fields during the day. Impacts to vertebrates that could have their movements affected by the fence would not be expected to be affected by these treatments since many are nocturnal and avoid the noise disturbance that would occur during treatment. In addition, off-site impacts to food and shelter for these types of wildlife would not be impacted by chemical treatments used in these programs. Vertebrate pest control measures implemented by APHIS are on an as-needed basis and currently only occur in small areas within Webb County. It is difficult to predict whether these types of actions would expand to the other three counties. Nevertheless, consultation under the Endangered Species Act on listed species, as well as mitigation measures built into the programs and listed on pesticide labels, are designed to minimize impacts to listed species such as the ocelot (FWS, 2010) and other mammals (FWS, 2012 a; FWS, 2012 b) that could be impacted by vertebrate pest control and the proposed fence.

Activities unrelated to APHIS also may contribute to the cumulative impacts to non-target mammals in this area. The maintenance of Highway 83 and other roads designed to provide access to residential, agriculture, and energy production areas may pose a threat to mammals that also could be impacted by additional fencing. Current and future activities, such as the improvement of U.S. Highway 83, would be anticipated to increase vehicular traffic. This in turn could result in a greater probability of car strikes to animals that cross these areas while moving between areas of suitable habitat. Culverts and bridges that may occur along these areas would help to reduce this potential impact allowing animals to move under roads and highways.

3. Environmental Quality

Cumulative impacts to soil, water, and air quality are not expected to be significant for the Proposed Action and the No Action Alternative. Current and future activities related to highway traffic and maintenance may impact environmental quality due to construction activities and increased road traffic. The impacts from the actions discussed in this EIS, however, are expected to result in only minor impacts or transient impacts, so any incremental cumulative impacts would be negligible. Soil disturbance relative to fence construction would be short-term and isolated since the fence would be installed at a rate of approximately one mile per day. Maintenance of the fence could result in some soil erosion since vegetation removal could expose soil to water and wind erosion.

A variety of soil types exist within the four counties, with soils having slight to severe erosion potential from wind and rain (Molina and Guerra, 2011; Sanders and Gabriel, 1985; Stevens and Arriaga, 1977; Thompson et al., 1972). The amount of erosion from fence construction and maintenance, however, would be minor relative to the erosion potential from current and future farming and energy extraction activities, as well as U.S. Highway 83 use and maintenance (FHWA, 2007; TXDOT, 2013). More than 17,000 oil and gas leases currently exist within the four-county area, with Maverick, Webb, and Zapata Counties comprising the top 100 counties (254 counties total) in Texas for energy production (TXRC, 2013).

Fencing would not be constructed or maintained within proximity to aquatic resources, so there is incrementally minor potential for cumulative impacts from sedimentation, which would be the greatest threat to water quality from fence construction and maintenance. Waterways that are currently listed as impaired or are maintaining designated uses under the CWA (33 U.S.C. §§ 1251-1387) would be expected to continue under the No Action or Proposed Action Alternative as it relates to fence construction. However, agriculture and energy-extraction activities, as well as expanded highway use in the future, could impact these designations. Regulations regarding non-point source pollution from these types of activities, as well as State and Federal programs designed to assist landowners in reducing impacts to soil and water, would help reduce the potential for soil and water impacts (TSSWCB, 2013).

Similar to cumulative impacts to soil and water, the potential for cumulative impacts to air quality are anticipated to be incrementally minor and transient under the No Action or Proposed Action Alternative. Emissions during the construction and maintenance of the fence would be minor relative to the ongoing and future emissions from highway traffic, agricultural production, and energy extraction activities that are prevalent within the four counties. Ambient air quality criteria (for attainment zones and mobile source air toxics, 40 CFR § 50) would not be reached by the Proposed Action Alternative and would only result in incrementally minor and transient increases in air quality pollutants. A comparison of the greenhouse gas emissions in Maverick County from mobile road and non-road sources to the amount of greenhouse gases estimated in this EIS demonstrates a less than 0.2% annual contribution from the Proposed Action Alternative (EPA, 2013). Future actions that could increase emissions such as highway expansion resulting in more traffic are difficult to quantify since future emissions from mobile sources are expected to decrease due to regulations regarding fuel mileage standards and emissions. However, the contribution from the proposed alternative would still remain minor to the overall emissions for the four-county area. In addition, when factoring air emissions from other sources such as agriculture and energy production, the contribution to air emissions from the proposed alternative becomes incrementally smaller.

Available data for emissions related to oil and gas exploration and production sources in the four counties evaluated in this EIS indicate that these emissions would be substantially larger on a daily and annual basis when compared to the potential emissions from equipment used to install and maintain the proposed fence and adjacent vegetation (TCEQ, 2007).

4. Conclusion

The cumulative impacts from the Proposed Action Alternative when assessed in relation to the current baseline and past, present, and future activities constitutes a small incremental change to the human environment. Some of these cumulative changes may be positive such as the reduction in cattle fever ticks and the associated economic benefits from having tick-free cattle. To preserve environmental quality for the human population and ecological resources, potentially negative cumulative impacts are minimized throughout the proposed alternative by following best management practices during construction.

(This page is intentionally left blank.)