

**United States Fish and Wildlife Service
Environmental Action Statement**

Within the spirit and intent of the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (NEPA), and other statutes, orders, and policies that protect fish and wildlife resources, I have established the following administrative record and determined that the action of continuing the Cooperative Farming and Habitat Restoration Program on the South Texas Refuge Complex (Laguna and Lower Rio Grande National Wildlife Refuges):

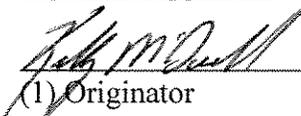
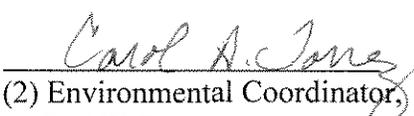
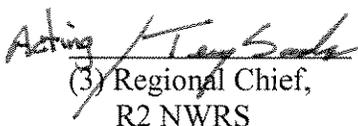
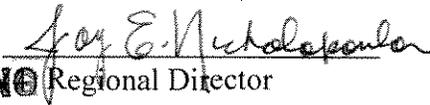
Check One:

- is a categorical exclusion as provided by 516 DM Chapter 8 [*specify CE category and include text of the citation*]. No further NEPA documentation will therefore be made.
- is found not to have significant environmental effects as determined by the attached environmental assessment and finding of no significant impact.
- is found to have significant effects and, therefore, further consideration of this action will require a notice of intent to be published in the Federal Register announcing the decision to prepare an EIS.
- is not approved because of unacceptable environmental damage, or violation of Fish and Wildlife Service mandates, policy, regulations, or procedures.
- is an emergency action within the context of 40 CFR 1506.11. Only those actions necessary to control the immediate impacts of the emergency will be taken. Other related actions remain subject to NEPA review.

Other supporting documents:

Finding of No Significant Impact and Environmental Assessment for the Cooperative Farming and Habitat Restoration Program on the South Texas Refuge Complex.

Signature Approval:

 _____ (1) Originator	<u>12/14/2010</u> Date	 _____ (2) Environmental Coordinator, R2 NWRS	<u>12/21/10</u> Date
 _____ (3) Regional Chief, R2 NWRS	<u>12/21/10</u> Date	 _____ ACTING Regional Director	<u>12/21/10</u> Date

FINDING OF NO SIGNIFICANT IMPACT
ENVIRONMENTAL ASSESSMENT
FOR
SOUTH TEXAS REFUGE COMPLEX
COOPERATIVE FARMING AND HABITAT RESTORATION PROGRAM

The U.S. Fish and Wildlife Service is proposing to continue farming on the South Texas Refuge Complex (STRC) (Lower Rio Grande Valley and Laguna Atascosa National Wildlife Refuges (NWR)), near McAllen and Harlingen, Texas. An Environmental Assessment (EA) was prepared in compliance with the National Environmental Policy Act (NEPA) to provide decision-making framework that 1) explores a reasonable range of alternatives to meet project objectives, 2) evaluate potential issues and impacts to the refuge, resources and values, and 3) identifies mitigation measures to lessen the degree or extent of these impacts. The EA evaluated the effects associated with two alternatives.

Alternatives Considered and Analyzed

Alternative A – No Action (Current Management/Proposed Action)

Under the no action alternative, the Cooperative Farming/Habitat Restoration Program would remain unchanged. Cooperating farmers would continue to farm 7,995 acres of the STRC available to them, and the main crops grown will be sorghum, corn, vegetables, and watermelons. As lands are added to the refuges through acquisition, the amount of cropland within the Complex may increase, but this increase is limited by a finite acquisition authority. Cooperators would continue to restore native plant communities by taking farmland out of production and planting native species as part of their annual agreements. In addition, cooperators would provide habitat restoration activities such as providing native tree and shrub seedlings, soil preparation such as disking and bedding, planting seedling trees and shrubs, pre- and post-planting irrigation, and pre- and post-planting invasive species control. This alternative would provide long-term beneficial services to the STRC by continuing to control invasive grasses and planting cropland back to native species. Habitat for threatened or endangered species would be enhanced and native plant communities would be re-established. Short-term adverse impacts from soil erosion and herbicide application would be continually reduced as croplands are converted back to native plant communities. This alternative does not require the immediate, significant increase in annual funding and personnel and does not require the significant acquisition of farm equipment for the STRC.

Alternative B – Eliminate Cooperative Farming Program and Restore Native Communities Using Refuge Resources

The STRC would terminate all cooperative farming agreements at the end of their current term, and agreements would not be renewed for succeeding years. Farming agreements would not be initiated on cropland tracts acquired by the Refuge in future years. The STRC would continue an active habitat restoration program using only refuge resources. Areas currently being farmed would be maintained as fallow fields using standard farming practices such as disking and herbicide application in order to prevent establishment of invasive species. Crops would not be planted. This program would be accomplished by refuge personnel, volunteers, or through contracts and would not rely on inputs from cooperating farmers. Refuge personnel and

equipment would be used to collect native tree and shrub seeds, grow seedlings, prepare the soil, plant seedlings, cultivate and irrigate newly planted areas, control erosion, and provide invasive species control.

Under this alternative, the STRC would be responsible for keeping land relatively free of undesirable annual weeds, annual and perennial grasses, and non-native woody species until such time as that land could be planted to native species. This would require disking all areas 3-4 times each year or herbicide application 1-2 times per year, or a combination of the two. On some lands, this might require continued maintenance of the land in this state for 18-25 years until it could be planted with native species. In order to make future use of existing irrigation systems, these systems would have to be tested and maintained at least annually, a service currently provided by the cooperators in order to produce crops on irrigable lands. This time period does not include any new lands acquired for the Refuges. This alternative would impose an additional significant expense for the STRC, an expense that would otherwise not be incurred under the previous alternative. The implementation of this alternative would require an immediate, significant increase in annual funding and personnel. In addition, a significant amount of equipment would need to be acquired.

Proposed Action

Alternative A, continuing farming, was selected because it best satisfies the purpose and need for the project. Although Alternative B provides for the same level of habitat restoration, implementation requires immediate significant increases in funding needed for additional manpower and equipment in order to maintain the lands pending restoration. The negative impacts associated with farming would not be entirely eliminated because lands would be maintained using the same standard practices. The only difference would be that no crops would be produced.

Detailed descriptions and range of effects for all alternatives can be found in Section 2.0 and 4.0 of the EA respectively.

Summary of Effects

Implementation of the Agency's decision would be expected to result in the following environmental, physical, and social and economic effects. The proposed action involves continuing the existing farming program and restoration prescriptions.

Under the proposed action, the need for farm field preparation and maintenance, including soil disturbance and chemical treatment, would be diminished as lands are planted back to native plant communities. Elimination of farming (crop production) on the STRC would not reduce adverse impacts to Refuge resources, but would increase the amount of funding and manpower required by the STRC to maintain the lands currently in the program until such time as they could be restored to native habitat. The potential for soil erosion, sedimentation, siltation, degradation of air quality due to fugitive dust, exhaust gas, and chemical drift would not change with either alternative. Elimination of crop production would result in adverse economic impacts to the current cooperators, their employees, and other entities with which they do business.

The proposal is not expected to have any significant effects on the human environment because: (1) this proposal is compatible with the general Service policy regarding invasive species management on National Wildlife Refuges; (2) this proposal is compatible with the purposes for which Lower Rio Grande Valley and Laguna Atascosa NWRs were established; (3) this proposal does not initiate widespread controversy or litigation; and (4) there are no conflicts with local, regional, state, or federal plans or policies.

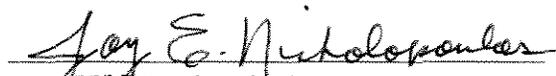
Public Review

The proposal has been thoroughly coordinated with all interested and/or affected parties, including the general public, Service staff biologists, and the immediate neighbors adjacent to the site. The FWS has encouraged public participation throughout the NEPA process during which the public had two opportunities to comment on this project; once during initial project scoping and again following the release of the Draft EA. On July 1, 2010, the Service released a News Release to 11 media outlets and posted a public notice soliciting comments on the Refuge's farming program. The Service also sent a letter soliciting feedback on all of the farming programs on refuges in the region to 263 interested parties. A two-month scoping period was established, which ceased on August 31, 2010. Two comments were received as a result of public scoping, and the Service incorporated those comments into the Draft EA.

The Draft EA was released for a 30-day public review period, which ended December 5, 2010, to the same interested parties and media contacts as mentioned above. In addition, copies of the Draft EA were provided in the Refuge office and online at the National Wildlife Refuge System Southwest Region Division of Planning website. No comments were received during the Draft EA review period.

Determination

Based upon a review and evaluation of the information contained in the EA as well as other documents and actions of record affiliated with this proposal, the Service has determined that the proposal to control hogs on the refuge does not constitute a major Federal action significantly affecting the quality of the human environment under the meaning of section 102 (2) (c) of the National Environmental Policy Act of 1969 (as amended). As such, an environmental impact statement is not required. An environmental assessment has been prepared in support of this finding and is available upon request to the U.S. Fish and Wildlife Service facility identified above.


ACTING Regional Director

12/21/10
Date

Environmental Assessment

South Texas Refuge Complex Cooperative Farming and Habitat Restoration Program

December 15, 2010

**Prepared by
Lower Rio Grande Valley NWR
Alamo, TX**

&

**National Wildlife Refuge System
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1.0 PURPOSE OF AND NEED FOR PROPOSED ACTION ALTERNATIVE

1.1 Introduction

The United States Fish and Wildlife Service (Service), is proposing to continue a cooperative farming program and associated habitat restoration program within the South Texas Refuge Complex. This Environmental Assessment (EA) is being prepared to evaluate the effects associated with this proposal and complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 CFR 1500-1509) and Department of the Interior (516 DM 8) and Service (550 FW 3) policies (see Section 1.7 for a list of additional regulations that this EA complies with). NEPA requires examination of the effects of proposed actions on the natural and human environment. In the following chapters, two alternatives are described and environmental consequences of each alternative are analyzed.

1.2 Location

The South Texas Refuge Complex (STRC) is comprised of the Lower Rio Grande Valley (LRGVNWR), Laguna Atascosa (LANWR) and Santa Ana (SANWR) National Wildlife Refuges. The LRGVNWR (92,740 acres) is composed of more than 130 separate tracts of land in Starr, Hidalgo, Cameron and Willacy counties; LANWR (97,007 acres) is in Cameron County; and SANWR (2,088 acres) is in Hidalgo County, Texas. There are no farming operations at SANWR so further discussion of this refuge in the context of the farming program is not necessary. Farming operations on LANWR occur mostly on the main Laguna Atascosa Unit (45,187 acres) and several small tracts located near this unit. No farming operations are anticipated for the Bahia Grande and South Padre Island units of LANWR.

1.3 Background

Lower Rio Grande Valley NWR (LRGVNWR)

The LRGVNWR was established in 1979 under the authority of the Fish and Wildlife Act of 1956 and the Migratory Bird Treaty Act as a long-term program of acquiring lands to protect and restore the unique biodiversity of the Lower Rio Grande Valley (LRGV). The stated purpose of this refuge was "...the development, advancement, management, conservation, and protection of fish and wildlife resources ..." (16 USC 742(a)4). A Land Protection Plan (LPP) was developed in 1983 (USFWS 1983) to protect the remnants of existing native habitat and to form a riparian corridor for plants and wildlife. Additionally, the LPP called for the reclamation of acquired agricultural lands in order to reestablish native habitats for the benefit of native wildlife

resources throughout the LRGV. As a result, land acquisition and revegetation are primary activities in support of Refuge purposes and conservation goals. Currently, 132,500 acres are proposed for acquisition and approximately 93,000 acres are currently managed by the Refuge.

Much of the land that has been acquired for inclusion in LRGVNWR was cleared for agricultural purposes prior to acquisition. Active farming operations occurred on approximately 50% of the Refuge land when it was acquired. The primary objective of revegetation is to restore high-quality habitat on disturbed sites (mainly croplands), modeled on undisturbed sites with similar characteristics. Much of the revegetation effort, which involves cooperative farming, is concentrated within the deltaic and floodplain portions of the STRC. Since the Refuge was established, approximately 16,500 acres have been planted back to native vegetation. Some of the areas that were planted have met with low establishment rates due to environmental factors, wildfires, flooding, and invasive grasses.

Laguna Atascosa NWR (LANWR)

Laguna Atascosa NWR (LANWR) lies along the Gulf of Mexico at the southern tip of Texas, along the northeastern edge of Cameron County and the southeastern edge of Willacy County. Following years of reconnaissance surveys and coordination with various interests, LANWR was formally established by the Migratory Bird Commission on October 31, 1945, as a unit of the National Wildlife Refuge System, and the first 11,275-acre tract forming the Refuge was acquired on March 29, 1946. On January 12, 1949, 8,486 acres of the Refuge were acquired by transfer from the War Assets Administration to the Secretary of Interior under Public Law 80-537. These and subsequent Refuge tracts were acquired under the authorities of the Migratory Bird Conservation Act of 1929, the Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948, and the Fish and Wildlife Act of 1956. The 97,007-acre refuge consists of four main units: Laguna Atascosa Unit (45,187 acres), Bahia Grande Unit (21,762 acres), South Padre Island Unit (24,808 acres) and Coastal Corridor Unit (5,250 acres) (USFWS 2010). Currently, 153,314 acres are proposed for acquisition and approximately 97,007 acres are currently managed by the Refuge.

The majority of the Refuge occurs along the coast and contains large expanses of tidally influenced wetlands and salt prairies that are unsuitable for agriculture. In the past, some of the uplands were used to produce grain crops to support wintering waterfowl. However, most of these areas were abandoned as croplands and allowed to revegetate naturally without assistance. Some of the more recently acquired tracts were in agricultural production at the time of acquisition and, given the current land acquisition goals (USFWS 2010), it is likely that additional acquisitions will be cropland or poor quality brushlands that require restoration to achieve habitat goals.

Overview of the Farming Program

Of the 92,740 acres in LRGVNWR and 97,007 acres at LANWR (total of 189,747 acres), only 7,995 acres (4.2%) were available for farming in FY2010. During the Fall 2009 through Summer 2010 farming season, 7,995 acres were available for farming although only 7,401 acres (3.9%) were actually farmed. Of the total acres available, the main crops grown were sorghum (7,069 acres = 88.4%) and corn (roundup-ready) (316 acres = 3.9%). The remaining acres were in fallow fields (381 acres=4.8%), vegetables such as onions and watermelons (16 acres = 0.2%), and 213 acres (2.7%) of cropland were removed from production and planted back to native brush communities. The Cooperative Farming/Revegetation Programs account for more than 95% of the native brush restoration projects completed each year, the other 5% is accomplished as a volunteer effort to promote habitat conservation and provide an environmental education opportunity. An environmental assessment for these programs was completed in 1994 (USFWS 1994). Since then, the Refuges have increased in area through land acquisitions, agricultural practices have changed, and revegetation techniques have been modified, warranting additional analysis.

Use of genetically modified crops (GMCs) was approved for use on the STRC in August 2006. The approval was for use of Liberty-Link and Roundup-Ready corn on a maximum of 900 acres during any given year. During the 2007-08 farming season the only GMCs used were Liberty-Link corn on 142 acres. During the 2008-09 farming season only 55 acres were planted to Liberty-Link corn. During the 2009-10 farming season Roundup-Ready corn was planted on only 316 acres. During the 2009-10 farming season, the use of GMCs was evaluated in relationship to all the farming in the existing program. It was found that less than 4% of all the crops grown were GMCs and GMCs were not grown every year by the same cooperators. Because other crop varieties could be grown in place of the GMCs, it was determined that use of GMCs was not essential to the farming and habitat restoration programs. New farming agreements for the 2011 season that are effective from September 2010 through August 2011 specifically exclude use of GMCs on the Refuges of the Complex.

1.4 Purpose of Action

The purpose of the Proposed Action is to restore native plant communities by reclaiming acquired agricultural lands and planting native brush species for the benefit of native wildlife resources and their habitats throughout the ecosystem. The purpose of this EA is to evaluate the environmental consequences of continuing the cooperative farming and alternative revegetation programs for the STRC due to increased size of the STRC, changes in agricultural practices, and changes in revegetation techniques that have been made since 1994.

1.5 Need for Action

The goal of the STRC is to protect and enhance native habitat within the four-county area and to establish vegetated corridors that will allow wildlife populations to move between all of the Refuge units. These vegetation communities provide habitat for numerous species of management concern, including endangered and threatened species, migratory birds, and resident wildlife. Much of the land that occurs within the priority acquisition areas is currently in agricultural production. Therefore, much of the land to be acquired to complete the corridor will need restoration to make it viable habitat for native species. As part of the habitat restoration process, farming operations provide critical services that directly aid in the maintenance and restoration of refuge lands. Due to limitations on available plant materials used in restoring habitat, restoration of current farmland acres to native plant communities will take at least 25 years. When additional acreage needing restoration is added to the Refuges through acquisition, the period of time needed to fully restore refuge lands will increase. These alternatives are discussed in Section 2.0.

1.6 Decision to be Made

This EA is an evaluation of the environmental impacts of the alternatives and provides information to help the Service fully consider these impacts and any proposed mitigation. Using the analysis in this EA, the Regional Director of the Southwest Region (Region 2 of the U.S. Fish and Wildlife Service) will decide which alternatives to implement and whether there would be any significant effects associated with the selected alternative that would require the preparation of an Environmental Impact Statement. If the selected alternative has no significant impacts, a Finding of No Significant Impact (FONSI) will be prepared.

1.7 Regulatory Compliance

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

The mission of the Refuge System is:

“... to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans” (National Wildlife Refuge System Improvement Act of 1997, Public Law 105-57).

The goals of the Refuge System are to:

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

The NWRS Improvement Act of 1997 provides guidelines and directives for the administration and management of all areas in the NWRS. It states that national wildlife refuges must be protected from incompatible or harmful human activities to ensure that Americans can enjoy Refuge System lands and waters. Before activities or uses are allowed on a national wildlife refuge, the uses must be found to be compatible. A compatible use “... will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuges.”...In addition, “wildlife-dependent recreational uses may be authorized on a refuge when they are compatible and not inconsistent with public safety.” The Act also recognized that wildlife-dependent recreational uses involving hunting, fishing, wildlife observation, photography, environmental education and interpretation, when determined to be compatible with the mission of the System and purposes of the Refuges, are legitimate and appropriate public uses of the NWRS and they shall receive priority consideration in planning and management.

This EA was prepared by the Service and represents compliance with applicable Federal statutes, regulations, Executive Orders, and other compliance documents, including the following:

- Administrative Procedures Act (5 U.S.C. 551-559, 701-706, and 801-808) as amended

- American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)
- Antiquities Act of 1906 (16 U.S.C. 431-433)
- Archaeological Resources Protection Act of 1979 (16 U.S.C. 470)
- Bald Eagle Protection Act (16 U.S.C. 668-668d) as amended
- Clean Air Act of 1972, as amended (42 U.S.C. 7401 *et seq.*)
- Clean Water Act of 1972, as amended (33 U.S.C. 1251 *et seq.*)
- Endangered Species Act of 1973, (ESA) as amended (16 U.S.C. 1531 *et seq.*)
- Executive Order 12898, Federal Action Alternatives to Address Environmental Justice in Minority Populations and Low Income Populations, 1994.
- Executive Order 13112, Invasive Species (issued in February 1999)
- Fish and Wildlife Coordination Act of 1958, as amended (16 U.S.C. 661 *et seq.*)
- Fish and Wildlife Improvement Act of 1978 (16 U.S.C. 7421)
- Floodplain Management (Executive Order 11988)
- Migratory Bird Treaty Act (16 U.S.C. 703-712 as amended)
- National Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended
- National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 *et seq.*)
- Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500 *et seq.*)
- National Historic Preservation Act of 1966, as amended (16 U.S.C. 470 *et seq.*)
- Native American Graves Protection and Repatriation Act of 1990 (25 U.S.C. 3001 *et seq.*)
- Protection and Enhancement of the Cultural Environment (Executive Order 11593)
- Protection of Wetlands (Executive Order 11990)
- National Pollutant Discharge Elimination System, as amended (33 U.S.C. 1251 *et seq.*)
- Soil and Water Conservation Act of 1977 (16 U.S.C. 2001-2009) as amended
- U.S. Fish and Wildlife Service Manual 601 FW 3, Biological Integrity, Diversity, and Environmental Health

Further, this EA reflects compliance with applicable State of Texas and local regulations, statutes, policies, and standards for conserving the environment and environmental resources such as water and air quality, endangered plants and animals, and cultural resources.

Areas that may be affected by the alternatives are primarily previously farmed acres, areas affected by wildfires or floods, and other areas impacted by human disturbance. No adverse impacts to wetlands, floodplains, endangered species, or cultural resources are expected. Therefore, there will be no need for Clean Water Act 404 permits or cultural resources clearances.

1.8 Scoping/Public Involvement and Issues Identified

Scoping was initiated on July 1, 2010. The STRC distributed a news release to 24 local media outlets including three radio stations, four television stations and 17 newspapers. The STRC simultaneously posted a public notice that established a 30-day scoping period with a scheduled culmination date of August 1, 2010. The public notice was posted in the SANWR visitor center with extra copies available at the visitor information desk. The Service determined that additional time was necessary to involve the many interested parties in the EA process, and the public scoping period was extended through August 31, 2010. Public notices were reposted to reflect this change.

The Service also developed a scoping letter describing all of the farming programs on national wildlife refuges in the Southwest Region. On July 29, 2010, this letter was distributed to 263 potentially interested parties including federal, state, and local agencies; nearby irrigation districts; soil and water conservation districts; cooperative extensions; volunteer groups; private landowners; local chambers of commerce; county commissioners; members of Congress; and U.S. Representatives. The letter solicited comments and included a brief description of all of the farming programs throughout the region, including the program on the South Texas Refuge Complex.

During the scoping period, which lasted until August 31, 2010, the Service received one response letter with comments from the local community. The letter was from Texas Parks and Wildlife Department (TPWD), who commented in support of keeping farm land in agricultural production until fields are planted with native vegetation. TPWD also recommended a long-term strategy of keeping a portion of agricultural lands in production and increasing public hunting opportunities on this land. The comment in regard to public hunting is outside of the scope of this EA and would be addressed in the Refuge's Hunt Plan; however, this EA does consider keeping agricultural lands in production.

Two additional letters were received in response to the regional scoping letter and were considered in development of the South Texas Refuge Complex Farming EA. One comment recommended that all farming on national wildlife refuges should be conducted organically; no genetically modified crops should be used; focus should be on removal of invasive species such as Johnsongrass, buffelgrass, salt cedar, etc.; and that our first concern should be the health of wildlife. Another letter was received that supported the No Action alternative, and also recommended that some agricultural lands remain in permanent agricultural production to support public hunting programs.

Internal scoping of refuge and regional office staff was also conducted to identify issues, concerns, and management opportunities. Based on internal and external scoping, the following issues were identified and considered in the development of the alternatives in Chapter 2 of this EA:

Use of Genetically Modified Crops

In accordance with the FWS Biological Integrity Policy (Service Manual, Amendment 1, 601 FW 3, Delegation of Authority for Genetically Modified Crops), the use of genetically modified crops (GMCs) is allowed on national wildlife refuges if their use is deemed essential to meet the purpose of the Refuge. One member of the public stated that no GMCs should be used on any refuge, and the Center for Food Safety has requested that each Refuge issue a moratorium on all genetically engineered crop cultivation on the Refuge. Although GMCs have been used on LRGVNR in the past, new farming agreements for the 2011 season (that are effective from September 2010 through August 2011) specifically exclude use of GMCs on the Refuges of the Complex. None of the alternatives evaluated in this EA propose to allow GMC use on the Refuge, and the Refuge has no intention of proposing their use in the future.

Use of Chemicals to Control Pests and/or Invasive Species

Chemicals are routinely used on refuges to assist with the management of invasive species as part of Integrated Pest Management. There is concern that these chemicals could have adverse effects on the physical, biological, or human environment. Refuges only use chemicals that have been approved through the Pesticide Use Proposal process, and this EA will evaluate impacts of the chemicals used on this Refuge.

Management Consideration/Alternatives

It is important to determine the management scheme that will best meet the biological needs of wildlife on a particular refuge. Therefore, the STRC will evaluate whether current management is the most biologically efficient way to achieve management goals and objectives, as well as Refuge purposes, and consider an appropriate range of alternatives including reducing and/or eliminating the farming program if other management tools will more effectively meet the purpose of the STRC.

Water Rights

Any change in proposed management must consider the impacts on water rights. The STRC needs to review water rights permits; if there is going to be a change in management that affects these water rights, then, the Service will need to work with the State to make a change to the permit. On LRGVNR, water rights are not tied to farming and are also used for maintaining wetlands and for in-stream flows. The STRC must consider what implications any changes in farming management may have on their water rights.

2.0 ALTERNATIVES

Alternatives are different approaches designed to meet the purpose and need for the proposed action. NEPA requires federal agencies to consider a reasonable range of alternatives that meet the purpose and need for the proposed action. Based on the issues, concerns, and opportunities heard during the scoping period, the following alternatives were identified. Two management scenarios that could meet the purpose and need of the proposed action were identified and are analyzed in detail in the EA. These alternatives represent feasible approaches to accomplishing habitat restoration goals on the STRC. Two other scenarios/alternatives were also considered but were found to be infeasible (do not meet the stated purpose and need); therefore, they were eliminated from detailed analysis for the reasons listed in Section 2.4.

Alternative A -- No Action (Proposed Action) - Continue Cooperative Farming and Habitat Restoration Program in its Current Form

Alternative B -- Elimination of Cooperative Farming Program and Restore Native Communities Using Refuge Resources.

2.1 Alternative A -- No Action – Continue Cooperative Farming and Habitat Restoration Program in its Current Form (Proposed Action)

Under the no action alternative, the Cooperative Farming/Habitat Restoration Program would remain unchanged. Cooperating farmers would continue to farm those areas of the STRC available to them, and would continue to restore native plant communities by taking farmland out of production and planting native species as part of their annual agreements. Other in-kind services, such as invasive species control, would continue in former restoration areas to promote recruitment of native plants and as site preparation for future restoration efforts. Refuge cropland would be planted to native habitat each year, based on annual priorities set by the Complex and the availability of native plant materials, until all current and former cropland has been restored to native habitat.

In its present form, the cooperative farming program allows cooperating farmers to keep all crops produced in exchange for habitat restoration activities they complete on the cropland they are assigned and on other Refuge lands in the vicinity. These activities include: providing native tree and shrub seedlings, soil preparation such as disking and bedding, planting seedling trees and shrubs according to the site planting plan, pre- and post-planting irrigation, and pre-and post-planting invasive species control.

Each year, the STRC staff collectively decides on the habitat restoration sites for the following year. Sites that need restoration or enhancement to support endangered species recovery efforts are of the highest priority. Secondary priority is assigned to sites that, once restored, will fill in between prior restorations or will provide connectivity to other brushland sites. Tertiary priority is assigned to actively farmed lands or lands that were revegetated but had poor survival. Lowest priority is currently assigned to lands that were abandoned farmlands prior to acquisition, were left to undergo natural succession, or are not adjacent to other tracts to provide connectivity. Once the sites are selected, a list of plant species, relative proportions of each species, and desired planting density is determined for each site based on examination of adjacent natural areas. These lists are used to determine how many of each species of trees and shrubs are needed for the following year.

Cooperative farming agreements are then drawn up that specify the lands that will be restored, farmed, or prepared for restoration in subsequent years. A rental value is assigned to each distinct field based on whether the field is irrigable from the Rio Grande, if it is within an irrigation district that provides the water, or if it is a dryland field. The cooperator pays a portion of the total rental value (25-30%) to a non-profit partner for the purchase of native tree and shrub seedlings from the lists generated for each site to be used for restoration. The balance of the rental value (70-75%) is then allocated as in-kind services, based on a list of services. The STRC determines the services needed to prepare fields for restoration planting, site preparation, invasive species control, irrigation, erosion control, or other actions in support of the restoration program.

While cooperative agreements provide some of the funding needed for restoration seedlings, they do not cover all of the plant material needed each year. Therefore, LRGVNWR has established a native plant nursery that produces 100-120,000 native tree and shrub seedlings each year. The Refuge nursery attempts to produce those seedlings that the cooperator's suppliers are not willing or capable of producing. Plants provided by local growers are produced under a set of standards developed specifically for the STRC. Seeds used to grow the native plants used in restoration are collected from STRC refuges or from private lands. Native plant nurseries may be issued a special use permit to collect seeds from within the Refuges for use in producing plants for STRC restoration. The amount of seed collected during any year by all parties is small compared to the amount produced across the entire STRC. The LRGVNWR staff oversees the assembly of the species needed for each site, coordinates with the cooperators to ensure proper site preparation has been completed, determines the proper spacing of plants to achieve the desired density, transports the plants to the field, and supervises the cooperator in planting each field.

Of the 92,740 acres in LRGVNWR and 97,007 acres at Laguna Atascosa NWR (total of 189,747 acres), only 7,995 acres (4.2%) were available for farming in FY2010. During the Fall 2009

through Summer 2010 farming season, 7,995 acres were available for farming although only 7,401 acres (3.9% of the Complex) were actually farmed. Of the total acres available, the main crops grown were sorghum (7,069 acres = 88.4%) and corn (roundup-ready) (316 acres = 3.9%). The remaining acres were in fallow fields (381 acres=4.8%), vegetables such as onions and watermelons (16 acres = 0.2%), and 213 acres (2.7%) of cropland were removed from production and planted back to native brush communities. In addition, approximately 164 acres of old, abandoned farm fields were enhanced by addition of more trees and shrubs to those already scattered in the fields.

The STRC would continue current restrictions on the types of crops grown and agricultural chemicals used. The cooperative farmers would be allowed to utilize only herbicides that have been approved through the Service's Pesticide Use Proposal and Intra-service Section 7 processes (i.e., internal review and approval processes). Approved herbicides would be used in certain fields planted to native communities to assist in suppressing competition from exotic grasses, annual weeds, and other invasive species. It is anticipated that use of agricultural chemicals would not be necessary after native plant communities have been successfully established.

The STRC has approximately 19,837 acre-feet of authorized water rights. The majority of these water rights are used as in-stream flow. The cooperative farming and habitat restoration programs utilize water from the Rio Grande to irrigate crops and restoration sites with an average use of about 2,100 acre-feet per year. The amount used per year varies depending on local rainfall and types of crops grown. Most of the crops are grown without irrigation because the irrigation systems are either absent or were in such a state of disrepair at the time of acquisition that repairs to those systems were not economically viable for the Refuge or the cooperators.

Under this alternative, all cropland would be planted to native habitat as plant materials become available. It is estimated that if no additional cropland is acquired, all cropland would be planted to native habitat in 18 to 25 years. Few, if any, acres of cropland would simply be retired and allowed to go through complete, natural succession since sources of native seeds are lacking in adjacent areas. Lack of adjacent seed sources and competition from non-native, invasive grasses would prevent sites from reverting back to diverse native plant communities sufficient to support native wildlife assemblages or threatened and endangered species. This alternative does not require the immediate, significant increase in annual funding and personnel and does not require the significant acquisition of farm equipment for the STRC.

2.2 Alternative B – Eliminate Cooperative Farming Program and Restore Native Communities Using Refuge Resources

The STRC would terminate all cooperative farming agreements at the end of their current term, and agreements would not be renewed for succeeding years. Farming agreements would not be initiated on cropland tracts acquired by the Refuge in future years. The STRC would continue an active habitat restoration program using only refuge resources. Site selection criteria, seed collection and native plant production techniques would be accomplished as stated in Alternative A. Areas currently being farmed would be maintained as fallow fields using standard farming practices such as disking and herbicide application in order to prevent establishment of invasive species. Crops would not be planted. This program would be accomplished by refuge personnel, volunteers, or through contracts and would not rely on inputs from cooperating farmers. Refuge personnel and equipment would be used to collect native tree and shrub seeds, grow seedlings, prepare the soil, plant seedlings, cultivate and irrigate newly planted areas, control erosion, and provide invasive species control. Pending availability of sufficient funding, contracts could be issued to accomplish any or all of these tasks.

Under this alternative, the STRC would be responsible for keeping land relatively free of undesirable annual weeds, annual and perennial grasses, and non-native woody species until such time as that land could be planted to native species. This would require disking all areas 3-4 times each year or herbicide application 1-2 times per year, or a combination of the two. On some lands, this might require continued maintenance of the land in this state for 18-25 years until it could be planted with native species. In order to make future use of existing irrigation systems, these systems would have to be tested and maintained at least annually, a service currently provided by the cooperators in order to produce crops on irrigable lands. This time period does not include any new lands acquired for the Refuges. This alternative would impose an additional significant expense for the STRC, an expense that would otherwise not be incurred under the previous alternative.

This alternative would provide the STRC with the most direct control of all aspects of the revegetation program, since all phases of the program would be completed by STRC personnel or through contracts. The administrative responsibilities of the farming aspect of the proposed alternative would be redirected to supervising and managing new and existing staff to conduct the needed operations. The implementation of this alternative would require an immediate, significant increase in annual funding and personnel. In addition, a significant amount of equipment would need to be acquired. However, recognizing Service budget and personnel restrictions, this is not the preferred alternative.

2.3 Table 1: Summary of Issues Related to the Alternatives Considered

Issue	<u>Alternative A</u> Continue Cooperative Farming and Habitat Restoration Program in its Current Farm (Proposed Action)	<u>Alternative B</u> Eliminate Cooperative Farming Program and Restore Native Communities Using Refuge Resources
Use of Genetically Modified Crops	No GMCs would be used.	Same as Alternative A.
Use of Chemicals to Control Pests and/or Invasive Species	Only chemicals approved through the Pesticide Use Proposal process would be used minimally during farming operations and to control non-native grass and annual weeds and as site preparation. Cooperators would pay for chemicals and application. Chemical use would cease after native vegetation is successfully established.	Same as Alternative A except the Refuge would pay for all chemicals and application.
Management Considerations	Cooperative farming would continue on nearly 7,500 acres; cooperators would prepare the ground and conduct planting of native vegetation, as directed in their agreements which would occur on 400-500 acres annually.	Refuge would maintain nearly 7,500 acres in a disturbed state using farming techniques (mechanical and chemical ground preparation) but no crop would be planted. The Refuge would conduct habitat restoration on 400-500 acres annually using only Refuge resources.
Water Rights	Use of water rights would gradually diminish as croplands are restored.	Use of water rights decrease immediately to a lower level then would gradually diminish as croplands are restored.

Funding & Personnel	Some additional funding would be needed for personnel to continue the program.	Additional funding would be needed for farm equipment and herbicides to maintain lands in their current condition. Many additional personnel would be needed to operate equipment, grow native plants, and accomplish planting and maintenance; or, funding would be needed to contract the needed services.
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2.4 Alternatives Considered But Dismissed From Detailed Analysis

Elimination of the cooperative farming program and allowing natural succession to prevail was considered, but it was determined that this alternative would not meet habitat goals of the STRC. Once lands are left fallow/undisturbed for more than one year, they are rapidly invaded by non-native grasses and few native species, turning the site into a savannah. Agricultural lands left fallow do not readily revert to native vegetation communities due to lack of an adequate seed bank and rapid invasion by non-native, invasive grasses that curtail or prevent establishment of native species. Therefore, simply abandoning cropland and allowing natural succession to occur will not achieve habitat goals. Fires of natural or human-caused origins would remove any native trees and shrubs that do become established, thus favoring further establishment of non-native grasses and maintaining these areas as savannah rather than as dense, native brushland that is preferred habitat for most native wildlife and threatened and endangered species.

Elimination of the cooperative farming program and conducting habitat restoration without maintaining the cropland in a disturbed state was also considered but determined to be infeasible. This alternative is similar to Alternative B, although Alternative B involves keeping the land disturbed using farming techniques until restoration efforts could commence. Once lands are left fallow/undisturbed for more than one year, they are rapidly invaded by non-native grasses and few native species, turning the site into a savannah. Sites left in that condition for a decade or more would require additional resources to prepare for planting. To successfully restore these savannahs to a dense, native brushland, the grasses would have to be removed through several years of chemical application and mechanical tillage to prepare the sites for planting. Tree species likely to colonize the sites would be of low value and would complicate the restoration process because they would have to be removed or avoided.

3.0 AFFECTED ENVIRONMENT

Biologically, Blair (1950) placed the area of the Lower Rio Grande Valley of Texas wholly within the Matamorán District of the larger “Tamaulipan Biotic Province,” occurring within the Rio Grande Plains or the South Texas Plains vegetational area (Jahrsdoerfer and Leslie 1988 *after* Gould 1975). The combination of climate, geology, topography, vegetation, and wildlife within this biotic district creates a highly varied biological diversity found nowhere else in Texas or the United States. Thorny brush is the predominant native vegetation type here (Jahrsdoerfer and Leslie 1988). However, approximately 95% of the original native vegetation in the LRGV area has been cleared or altered for agriculture and urban development (Jahrsdoerfer and Leslie 1988) and more than 99% of the riparian vegetation on the U.S. side of the Rio Grande has been cleared. Construction of Falcon Dam, Retamal Dam, and Anzalduas Dam for flood control, irrigation, and municipal uses, has eliminated regular periodic flooding of the delta woodlands and wetlands and has also facilitated degradation or loss of native plant communities. In addition, urban and industrial development has contributed to the loss of native brushland as well as wetland degradation and elimination, and is likely to continue as the human population on both sides of the lower reaches of the Rio Grande increases.

3.1 Physical Environment

The STRC occurs within a four county area (Cameron, Hidalgo, Starr, and Willacy counties) in deep South Texas or within the Lower Rio Grande Valley of Texas. The LRGV is not actually a "valley", but a delta gently sloping away from the Rio Grande. The delta begins approximately 85 miles above the mouth of the river, and fans out symmetrically to include approximately 100 miles of the Gulf Coast. The delta tributaries and their floodplains are mainly in Cameron, Hidalgo, and Willacy Counties, and in the municipalities of Matamoros, Valle Hermoso, Rio Bravo, and Reynosa, in the State of Tamaulipas, Mexico.

3.1.1 Air Quality

Air quality of the LRGV is considered good to excellent throughout the year, except when periods of high winds lead to blowing dust from all of the agricultural lands in the area. The primary concerns related to air quality which may be affected by implementation of the different alternatives centers around wind driven soil erosion and events of wildfire, prescribed fires, or fire-related farming practices. Wind driven soil erosion is generally not a great concern in the Valley since most soils are not considered highly erodible. When it occurs, wind driven soil erosion is most common on lands that have recently been tilled, such as croplands that are in a fallow state or lands being prepared for crop or tree planting. Fires related to farming practices are generally restricted to the burning of sugar cane on lands adjacent to refuge tracts.

Prescribed fires are used on the STRC to influence vegetation communities by favoring native grasses or by removing non-native grasses as a site preparation tool for habitat restoration.

3.1.2 Soils / Geology

Beginning at sea level along the Gulf coast, the Rio Grande Delta rises at an average rate of approximately 5-inches per mile. The coast is protected by a barrier island (South Padre Island) and is separated from the mainland by the Laguna Madre. The coastal area (including marshland, salt flats, and dunes); the Rio Grande Delta (consisting of riverine sediment); and a sand belt consisting of windblown dunes) form the Rio Grande plain. All of Cameron, Willacy, and a small portion of Hidalgo and Starr counties are included in the Rio Grande plain.

The greater part of Hidalgo and Starr counties is included in the Hebronville Plain. The Hebronville Plain extends from the sand belt and the Rio Grande Delta to a spectacular topographic feature in western Starr County known as the Bordas Scarp (Clover 1937). The west face of this escarpment averages 60 to 70 feet in height and is composed of Oakville sandstone and Frio Clay. Starr County is more hilly than other areas of the LRGV. Here, soils range from deep alluvial soils along the river to formations exposed on the Bordas Scarp such as the Jemez-Quemado (caliche-gravel), Randado-Cuevitas (reddish sandy loam), and the Maverick Series (saline gypsum deposits). These soil types support several rare plant communities (Thompson *et al.* 1972). This area also contains the oldest geological formation in the LRGV, the Cockfield, which is found in the western portion of Starr County and is of the Eocene Epoch, occurring between 34-55 million years ago. Farming operations are limited on this soil type.

The formations are progressively younger geologically to the east (toward the coast) and south (toward the Rio Grande). In Hidalgo County, many of the soils occur as sediments deposited by the Rio Grande. These sediments are mostly clay and sand; there are some silt deposits near the river. Further east in Cameron County, topography is level to gently sloping, and soils are moderately permeable to very slowly permeable, saline, clay, and loamy. In the northern portion of the LRGV, including portions of northern Hidalgo and Willacy County, there is a split between the aeolian sand plain in the northwest, saline clays in the Coastal Plain, and deep delta soils which make up much of the remaining lands. Hypersaline lakes such as La Sal Vieja and La Sal del Rey were the most important geographical spots in this part of the LRGV for centuries. Native Americans and early settlers came to these lake beds to gather salt for their diets, for tanning animal hides, and for trading.

3.1.3 Water Resources and Quality

Water development in the LRGV has centered on flood control, providing drinking water for urban growth, and providing irrigation water for agriculture. Since the turn of the century,

extensive farming and irrigation development have occurred in the rich, fertile delta of the Rio Grande. Several irrigation and/or drainage districts have been established in the LRGV to provide either drainage or irrigation service to the agriculture industry and municipalities (Ramirez 1986). Throughout Hidalgo, Cameron, and Willacy Counties can be found hundreds of miles of canals (both earthen and lined), borrow ditches for building up larger-capacity canals, drainage ditches (for draining floodwaters more efficiently), and other small ditches. There are also dozens of reservoirs and settling basins for storing water for municipal, agricultural, and industrial uses but very few occur as natural wetland areas in the STRC. Current STRC tracts are within at least thirteen different irrigation districts and the Complex pays about \$111,000 annually in water district tax assessments.

Historically, the Rio Grande overflowed 23 times between 1900 and 1939 in Cameron and Hidalgo Counties. These counties constructed flood control levees in the most flood-prone areas to protect farmlands and urban development. In 1944, a Water Treaty was signed between the United States and Mexico, distributing between the two countries the waters of the Rio Grande. The U.S. Section of the International Boundary and Water Commission (IBWC) took over the county maintained flood levees in the United States and with the Mexican Section of the IBWC established the Lower Rio Grande Valley Flood Control Project or LRGVFCP. The 1944 Water Treaty included the development, construction and operation by the IBWC of a number of water use and control projects on behalf of the two countries, including the construction of off-river interior floodways within both countries, the building of levees along both sides of the Rio Grande and the Arroyo Colorado to form a river floodway, and the construction of two diversion dams (Anzalduas and Retamal) to permit diversion of Rio Grande floodwaters into the interior floodways.

As part of the LRGVFCP, Anzalduas Diversion Dam was constructed from 1956 to 1960 on the Rio Grande to assure the necessary diversion of the United States share of river flood waters into the United States interior floodway system. The dam also enables Mexico to divert its share of the normal flows into Mexico's main irrigation canal. Similarly, Retamal Diversion Dam was constructed between 1971 and 1975 on the Rio Grande. Its serves the two-fold flood control purpose of enabling Mexico to divert its share of river flood waters into the Mexican floodway system and to limit flood flows at Brownsville and Matamoros to the safe capacity of the Rio Grande. Anzalduas and Retamal Diversion Dams are thus operated jointly by the United States and Mexico for flood control.

The Treaty of 1944 also provided for the construction of major flood control structures on the Rio Grande. The lowermost of the major dams, Falcon Dam, is located between Laredo and Roma in Starr County about 275 river miles upstream of the mouth of the Rio Grande. Construction began in 1950 and the dam was completed in 1954. The IBWC maintains the Rio Grande as the international boundary between the United States and Mexico by protecting the

river bank from erosion and preventing the shifting of the river from its present channel. The IBWC, on behalf of the U.S. and Mexico, may take a number of measures to preserve the Rio Grande channel as the international boundary. These measures include vegetation clearing, channel excavation, bank protection and channel rectification. Furthermore, the IBWC may approve or disapprove the construction of works in the river channel or adjacent lands.

The Arroyo Colorado, originally a distributary of the Rio Grande, which extends 90 miles from Mission, Texas, to the Laguna Madre, passes through the Laguna Atascosa Unit as the Harlingen Ship Channel. It is navigable to barges through parts of its dredged channel from the Gulf Intracoastal Waterway to the port of Harlingen. From that point to near its headwaters it is navigable only to small boats. It receives much of the municipal, agricultural, and industrial wastes of the Valley (Jahrsdoerfer and Leslie 1988). Its upper drainage area includes rich farm and citrus land and the cities of Harlingen and Rio Hondo. The lower arroyo course runs through an area of farms, ranches, and coastal playas. Typical bankside vegetation consists of reeds overhung by huisache, mesquite, and Texas ebony. The final reaches of Arroyo Colorado pass through LANWR, where its banks and adjoining thorn forests and marshes shelter ocelots, jaguarundis, indigo snakes, and other rare and endangered animals.

3.2 Biological Environment

The Mississippi and the Central Flyways converge north of the STRC funneling millions of migratory birds each spring and fall into this area bounded by the Gulf of Mexico to the east and drier more desert-like habitats to the west. The protected lands of the Refuge support perhaps some of the richest and rarest biodiversity in the continental United States. The remarkable biodiversity found in the subtropical STRC is owed in part to its proximity to the tropical climate and ecosystems of Mexico.

3.2.1 Vegetative Communities

The STRC can be found within the southern extensions of three ecosystems recognized by the Service (USFWS 2000): the Lower Rio Grande, Texas Gulf Coast, and Edwards Plateau. Blair (1950) placed the area of the STRC wholly within the Matamorran District of the larger Tamaulipan Biotic Province. Presently, 776 plant species have been documented on the STRC, but an estimate of the total number of plant species occurring in the acquisition boundary is placed at 1,200 species.

Native Plant Communities

The primary communities that are being restored through the farming program are discussed below. These communities actually occur as a continuum across the landscape and grade from

one into another depending primarily on topography, soils and hydrology. Many species of trees and shrubs found on the STRC can occur in some or all of the communities.

Tamaulipan calcareous thornscrub generally occurs on thin-soiled calcareous substrates on upland sites, including on caliche of the Goliad formation and calcareous gravels. It is found from Starr County north to the vicinity of Goliad County and westward in a band along the Rio Grande to the northwest. Cenizo, guajillo, blackbrush, Texas kidney wood, amargosa, whitebrush, and guayacan may dominate this community.

Tamaulipan mixed thorn woodlands and shrublands is found in Cameron and Hidalgo Counties on the delta of the Rio Grande. It occurs on upland sites deposited through alluvial processes associated with the Rio Grande and on uplands away from the delta on deeper soils. Fire does play a role in this system, occurring in situations adjacent to grasslands during dry conditions when fire may jump to the canopy and carry during wind events. This community tends to be a woodland with mesquite as an emergent canopy over a tall shrubland with some shrubs reaching to 4 meter but dense at 2 meter in height. The shrub layer is composed of a diverse array of shrub species, including colima, granjeno, lotebush, coyotillo, Texas prickly pear, coma, and brasil.

South Texas Depressional Wetland Systems. These systems can be found south of Corpus Christi Bay along the western shorelines of the Laguna Madre system. Coastal ponds are dynamic systems due to alternating wet and dry climatic cycles. Many ponds are quite shallow. The presence, depth, and physiochemical characteristics of surface water determine species cover and composition. Following significant rainfall, ponds fill with fresh water and either reduce existing water salinities or provide a new freshwater resource. Ultimately, pond water evaporates, increasing soil salinities and changing vegetation community composition. Soils on the mainland range from highly permeable sands to poorly drained clays.

The West Gulf Coastal Plain Small Stream Riparian Systems includes both mesic stream bottoms, wet-mesic stream bottoms, and ephemeral stream drainages (less than 150 meters wide). Characteristically, they form deep, well-developed stream channels and narrow flood plains in the upper reaches. In the lower areas they form broader flood plains along the southeastern coast. Floods would have irregularly inundated the lower areas. These sites serve as the transition from the mesic and semi-arid uplands to the seasonally flooded river floodplains. Riparian corridors are generally characterized by mesic tree and shrub species that increase in productivity as a result of higher water availability. Predominant species adjacent to the river include cedar elm, hackberry, and black willow, with stands of ash along wider floodplain areas. In early successional stages in the mid and lower areas, Tamaulipan shrub/scrub species including brasil, lime pricklyash, and woolybucket bumelia may increase in relative importance.

Tamaulipan savanna grasslands occur on the coastal plain of southern Texas on the edge of the sand sheet and other areas of sandy or sandy loam soils and less commonly on other soil types. The best-developed representatives occur on moderately deep sands such as on the edge of the sand sheet of Kenedy, southern Kleberg, northern Willacy and Brooks counties, Texas. Some historical accounts suggest that the habitat was an open grassland with scattered clumps of mesquite and associated shrubs. The scattered clumps within the edge of the sand sheet have mesquite forming a nursery for the development of clumps of other shrub species which may grow in areal extent and coalesce into more continuous areas of shrub cover. Shrub species associated with this type include granjeno, brasil, colima, lotebush, Texas persimmon, Texas prickly pear, snake-eyes, coyotillo and various acacias.

Invasive Species

The majority of the non-urban landscape of the LRGV is covered with non-native, invasive grasses that rapidly invade lands after cessation of disturbance and create savannahs by preventing establishment of native species. Guineagrass, buffelgrass and Kleberg bluestem are the three most abundant invasive grasses on the STRC, and the three greatest sources of fuel for wildfire. The primary invasive species that require action to control for restoration purposes are discussed below.

Guineagrass (*Panicum maximum*) is native to Africa and has been established as a forage grass throughout the humid subtropics. Though highly valued for livestock forage, it is considered an invasive species in Florida, Hawaii and elsewhere. The guineagrass population began to explode, apparently during the 1970s; it has now reached Victoria and Three Rivers, Texas, and Monterrey, Nuevo León, Mexico. There are two varieties of Guineagrass present in the Rio Grande delta. A very robust form is restricted to the Brownsville and Southmost areas; this type of Guineagrass requires full sun and relatively moist soil. The typical variety in the Rio Grande Delta and south Texas is shade tolerant, and less robust. This form of guineagrass has invaded pastures, farmland, lawns, disturbed soils and wildlife habitat throughout the Rio Grande Delta and beyond. It is adapted to a wide range of soil types, but is most prevalent in poorly drained, relatively moist soils. However, guineagrass establishes best in disturbed soils. Although guineagrass may be present, it does not dominate sites where the native grass/forb understory is intact. Guineagrass also spreads by rhizomes and stoloniferous stems.

Guineagrass is a serious threat to forest and shrubland restoration on the Refuge, especially due to its shade tolerance. Guineagrass frequently invades revegetation sites a few years after the planting of trees and shrubs, despite thorough site preparations and grass control. Once the tree canopy provides some shade, it completely dominates the herbaceous understory. The stems grow through small trees and shrubs. During dry weather, the abundance of dry stalks provides ladder fuels that carry wildfire into the tree canopy. Competition from guineagrass is a direct threat to all the known Texas populations of *Ayenia limitaris*, a federally-listed endangered

species. Fortunately, due to the large leaf area and extremely rapid growth, guineagrass is one of the easiest grasses to kill with herbicides such as glyphosate (due to rapid absorption of the herbicide).

Buffelgrass (*Pennisetum ciliare*) is native to the African continent, and possibly the middle East and India. The variety that was successfully introduced in south Texas and northeast Mexico, is known as the Common Variety. Buffelgrass was widely promoted beginning in the 1950s for cattle forage. Buffelgrass reproduces readily by wind-dispersed seeds and is adapted to a wide variety of soils. In south Texas, it is most prevalent in well-drained upland soils. Buffelgrass establishes most readily in disturbed soils where the native grass/forb vegetation is absent.

The vigorous growth and allelopathic ability of buffelgrass allow it to suppress or kill native vegetation and form self-perpetuating monocultural stands. Buffelgrass produces abundant fuel for wildfire and is very well adapted to fire. Buffelgrass invasion is a significant threat to several listed endangered plant species, including Walker's manioc and Zapata bladderpod. Buffelgrass has spread spontaneously in intact native shrubland and has invaded hundreds of acres of revegetated cropland from upwind seed sources.

Kleberg Bluestem (*Dicanthium annulatum*) is native to tropical and subtropical regions of Africa and Asia and has been introduced in Texas and the southeastern U.S. for cattle forage and soil erosion control; however, it was subsequently observed that this grass is not highly palatable to cattle, particularly once it has begun to flower, and increases dramatically under grazing pressure. This very aggressive grass spreads from wind-dispersed seeds, and from stolons. Kleberg bluestem spreads invasively along highways, canals, levees, ditches and other rights-of-way, from which the wind-blown seeds readily invade adjacent land. Kleberg bluestem has spread from upwind sources to invade many revegetated sites on the STRC where it was originally not present. Kleberg bluestem is also a potential threat to the federally endangered *Ayenia limitaris*.

Bermudagrass (*Cynodon dactylon*) commonly exists as a weed in agricultural fields. Bermudagrass spreads by water-dispersed seeds, rhizomes and stolons. Irrigation from canals lined with bermudagrass can disperse seeds over wide areas. Farm machinery effectively spreads the rhizomes from adjacent farm roads, canals, and ditches. Pieces of rhizome can remain dormant in the soil for weeks or months before sprouting new stems and roots, during which time glyphosate treatment is not effective. It is often not possible to see that freshly disked or bedded fields are heavily infested with bermudagrass rhizomes, so it is important to observe revegetation sites prior to mechanical treatments. When the rhizomes are released from dormancy, bermudagrass very quickly establishes a dense sod that effectively prevents establishment of native plants, including transplanted tree and shrub seedlings. Patches of

bermudagrass that have established on retired cropland on the STRC have persisted for at least 10 years.

The primary impact of bermudagrass on the STRC is invasion of cropland. Once established in cropland, it is difficult to eradicate. Subsequent revegetation efforts are virtually guaranteed to fail, unless both the actively-growing plants and dormant rhizomes have been thoroughly eradicated. Several hundred acres of revegetated fields at LRGVNR's Rudman and Teniente tracts were completely colonized by bermudagrass, resulting in very high seedling mortality. However, no-till farming on adjacent fields at both tracts has resulted in effective control of bermudagrass, and subsequent revegetation efforts were much more successful. If not previously established in cropland, bermudagrass is not a threat to colonize revegetation sites in subsequent years.

Johnsongrass (*Sorghum halapense*) is a very robust bunch grass that spreads by seeds and rhizomes. The rhizomes are very effectively disseminated by agricultural equipment; once established, it is very difficult to eradicate. For these reasons, johnsongrass is one of the most harmful invasive cropland weeds in the eastern United States. In the Rio Grande Delta, johnsongrass is most prevalent in Cameron, Willacy and eastern Hidalgo counties, in relatively moist, clayey soils. It is an especially common weed following sorghum cultivation, as grass-specific herbicides cannot be applied in sorghum fields.

Tree and shrub seedling mortality has been nearly 100% in sites that were heavily infested with johnsongrass. However, acceptable seedling growth and survival has resulted when heavily infested fields were treated with glyphosate before planting, and with clethodim or fluazifop at 2- to 3-month intervals after planting. Although a percentage of johnsongrass rhizomes were still viable after these treatments, the seedlings were sufficiently well established to compete with the reduced grass density. Johnsongrass is not shade-tolerant, and will not persist under tree canopies.

Natalgrass (*Melinis repens*) is a southern African native that has been widely introduced in tropical and subtropical regions. It is adapted to a variety of soils, but requires good drainage. In our region, it is usually found on loose sandy soil. Natalgrass is highly invasive, because the seeds disseminate very long distances in the wind and establish readily. However, it does not appear to be allelopathic or to form monocultural stands that eliminate native species.

Rhodesgrass (*Chloris gayana*) frequently invades and spreads along highways, railways, powerlines and pipelines, from which it readily spreads to adjacent pastures and farmland. The seeds are dispersed by wind. In the Rio Grande delta, it is more prevalent in Cameron, Willacy and eastern Hidalgo counties, in clayey soils. Once established it is very aggressive and may be difficult to eradicate.

Russian Thistle (*Salsola australis*), locally known as “tumbleweed,” is an annual member of the goosefoot family and is native to southeastern Russia and western Siberia. It is drought resistant, and well adapted to saline and alkaline soils. It is listed as a noxious weed by the Federal government, and by many states. Russian thistle is primarily invasive in disturbed soils that contain little or no native grass cover. Each plant can produce up to 250,000 seeds, which are dispersed in the fall and winter as the dead, rounded plants blow across the landscape. Once Russian thistle has colonized a site, it forms dense, self-perpetuating stands that virtually exclude all other species. Dried stands of Russian thistle can spread wildfire extremely rapidly, as the burning bushes blow at the speed of the wind. Russian thistle can be controlled in agricultural fields with herbicides.

Russian thistle has severely impacted some revegetation efforts. Infestations began when small numbers of source plants along field roads and fence lines were allowed to mature and blow across revegetation sites. Where Russian thistle has colonized before tree and shrub seedlings were well-established, seedling mortality has been extremely high, and the infestation easily perpetuates and expands. In this case, the only viable option may be to disk or plow the entire field and start over. However, where trees and shrubs have already established for one or two years, Russian thistle is less able to invade, and does not persist.

3.2.2 Wildlife

The STRC has documented 429 species of birds, 44 species of mammals, 115 species of reptiles and amphibians, 31 species of fish, 300 species of butterflies and 76 species of dragonflies and damselflies. Non-endangered game or fur-bearing mammals inhabiting Refuge properties include Virginia opossum, eastern cottontail, black-tailed jackrabbit, fox squirrel (an introduced species), beaver, nutria (an exotic species), coyote, gray fox, ringtail, raccoon, long-tailed weasel, badger, eastern spotted skunk, striped skunk, mountain lion, bobcat, feral hog (an exotic species), collared peccary, white-tailed deer and nilgai (an exotic species).

There are numerous species of birds and butterflies found in Mexico and Central America whose ranges reach their northernmost limit in the LRGV. Included among these are species such as the brown jay, ringed kingfisher, red-billed pigeon, plain chachalaca, speckled racer, and Mexican tree frog. Practically all the species present on the STRC could occur in and around or utilize farm fields. Farm fields and other restoration sites are present along the entire continuum of elevational and moisture gradients from Laguna Atascosa NWR to the western end of the LRGVNWR.

3.2.3 Threatened, Endangered and Special Status Species

The STRC manages habitats supporting 18 federally threatened and endangered species (T&E) and 57 state protected species. All lands that potentially could be affected by implementation of the alternatives are currently active or abandoned farmland. None of these lands, in their present form, are likely to provide habitat for any of the T&E species.

Ocelot and Gulf Coast Jaguarundi

The ocelot (*Leopardus pardalis*) is a medium-sized spotted cat that ranges from southern Texas to northern Argentina occurring in humid tropical and subtropical forests, coastal mangroves, swampy savannas, and semi-arid thornscrub (USFWS 1990b). The ocelot was listed as endangered (without critical habitat) in 1972 due primarily to over-collection for the fur trade and habitat loss (37 FR 2589). These primarily nocturnal cats usually feed on small mammals and birds and require large home ranges. The ocelot prefers dense thornscrub or brush occurring along riparian areas, drainages, lomas, and other uplands, but it has also been found in other dense habitats such as live oak forest with brushy understory. Optimal habitat consists of dense thornscrub with 95% or more canopy cover (USFWS 1990b),

The Gulf Coast jaguarundi (*Herpailurus yagouaroundi cacomitli*) is a small, exceedingly rare wildcat in the United States weighing between 8 and 16 pounds, with a relatively long tail and short legs. Coloration is widely variable ranging from blackish to brownish-gray or reddish-yellow to chestnut (Hall, 1981). The last known record of a jaguarundi in the United States was along State Highway 4, just east of Brownsville, Texas, when one was found road-killed in 1986 near an old resaca or river channel crossing. There have been several reported sightings of jaguarundis in the LRGV in recent years but despite recent efforts to document the existence of these cats, researchers have so far been unable to photograph or trap one. It is now estimated that less than 15 cats may possibly exist in South Texas (Klepper 2005). Just like the ocelot, brush clearing activities in the LRGV have eliminated much of their habitat leading to their endangered status. Efforts aimed at preserving and restoring native brush are necessary in order to support any remaining cats, particularly in eastern Cameron and Willacy counties.

Since the 1920s, more than 95% of the original native brushland in the LRGV has been converted to agricultural or urban use (Jahrsdoerfer and Leslie, 1988). The remaining native habitat and narrow connecting corridors or brushlines are therefore extremely important for the continued existence of species such as the ocelot and jaguarundi. Ocelots and jaguarundis are area-sensitive species which occur in dense shrubland habitat, but will move between adjacent brush tracts using brush-lined canals, drainages, brushy fencelines, or other areas containing native vegetation as protected corridors of travel. Jaguarundis also occur in dense grasslands associated near dense brush (Caso 1994).

Currently, road kills are the primary cause of direct mortality to the remaining ocelot population as urbanization, road construction, and other development in the LRGV area continues to increase. Habitat loss and fragmentation was and still is a major reason for their endangered status. Long-term survival of this species depends not only on the protection of large densely-vegetated brushlands or other suitable habitats and safe wildlife corridors between them, but also on addressing the small population sizes, population isolation, and loss of genetic diversity.

Northern Aplomado Falcon

The aplomado falcon (*Falco femoralis*) is a rare, non-migratory, medium-sized neotropical falcon of the open grasslands ranging from the southwestern U.S. and Mexico through Central and South America. The aplomado falcon is approximately 12-15 inches in length and has a wingspan of about 3-feet. In South Texas, aplomado falcons typically occur in coastal prairie or savanna grasslands containing scattered, but prominent woody vegetation such as yuccas or mesquites. Aplomado falcons may also hunt or nest near or within agricultural areas such as fallow farm fields. Aplomado falcons have been documented in the Lower Rio Grande Valley (LRGV) and specifically within the area of Laguna Atascosa National Wildlife Refuge (NWR) and on the easternmost tracts of the Lower Rio Grande Valley NWR. The species feeds primarily on small birds, but a variety of insects, crustaceans, small reptiles and mammals are also prey items (C. Perez, Pers. obs. 1993-1994).

The northern aplomado falcon (*F. f. septentrionalis*) was listed as endangered in 1986 due to its extirpation in the U.S. and evidence of pesticide contamination and population declines in eastern Mexico (51 FR: 6686-6690). Hector (1987) states that this subspecies of aplomado may have begun its decline in the U.S. as early as 1905 but became exceedingly rare after 1930. The majority of aplomado falcon egg and skin collections in the U.S. between 1890 and 1910 were from South Texas (USFWS 1990). Egg collection cards and other historical records (Oberholser 1974) indicate that the species was apparently concentrated in the "salt prairie" between Brownsville and Port Isabel, as this is where major collecting activities were occurring in the late 1800s-early 1900s. It is therefore plausible that the original decline of the aplomado falcon in the LRGV was most likely due to over-collection than from habitat degradation that occurred in other parts of its U.S. range (Chihuahuan desert grasslands of W. Texas, southern New Mexico and southeastern Arizona).

The Aplomado Falcon Recovery Plan (USFWS 1990) states that "...suitable habitat in the United States and Mexico should be identified and protected, especially in areas close to reintroduction sites." It goes on to stress that, "Particular attention should be directed toward suitable habitat on public lands." Other elements of the recovery plan emphasize a reintroduction program to establish populations in the U.S. The criteria for downlisting the aplomado to threatened is when a "...minimum self-sustaining population of 60 breeding pairs has been established in the United States." In South Texas, the aplomado falcon has made a comeback due to an aggressive

recovery program involving captive breeding and re-introduction efforts. In partnership with the Peregrine Fund, a non-profit conservation group based in Boise, Idaho, over 900 aplomado falcons have been released in the LRGV since 2004. Currently, about 16-20 nesting territories are known in the LRGV each year based on surveys. In order to support the downlisting criteria of 60 breeding pairs, current recovery goals are to establish approximately 30-35 breeding pairs in South Texas alone.

Texas Ayenia

Texas ayenia (*Ayenia limitaris*) is a thornless shrub about 2 to 5 feet tall with teardrop (chordate) leaves with small green, pink, or cream colored flowers and prickly 5-celled globose fruits. The species was known from a single population in Hidalgo County when it was listed as endangered in 1994. Texas ayenia has now been documented at five sites in Hidalgo, Cameron, and Willacy counties, as well as a separate meta-population in the Municipio of Soto la Marina, Tamaulipas, Mexico. The known populations occur in a range of sandy to clayey alluvial soils in association with native trees and shrubs; however, the species appears to reproduce effectively where it is not completely shaded.

Walker's Manioc

Walker's manioc (*Manihot walkerae*) is a perennial, many-branched, reclining to erect herb from the Spurge family, reaching up to 5 feet in height. The leaves are alternate, 5-lobed, and deeply incised. Separate male and female flowers occur on the same plant. Walker's manioc, which grows from a carrot-like root, flowers from April to September following rains but above-ground vegetation can disappear during drought.

Walker's manioc was listed as endangered in 1991 and was known from one location in Hidalgo County. Today, it has been documented at nine locations in Hidalgo and Starr counties, including three LRGV tracts; however, threats to the species primarily include habitat loss from developments such as road building, oil and gas pad site development, caliche mining, or other habitat destruction within western Hidalgo and Starr counties, as well as competition from buffelgrass. Herbicide use in areas where the species occurs may also pose a threat. Photographic evidence has shown that javelina will dig up and eat the roots, particularly during drought.

3.3 Human Environment

3.3.1 Cultural Resources

All land which potentially would be farmed and/or actively restored to native habitat in the STRC has been actively farmed for at least 30 years while in private ownership. None of the

alternatives being considered involve plowing or disking land at depths or areal extent greater than the existing plow zone. Thus, since these lands have been plowed and disked for at least 30 years prior to acquisition by the Service, and because the ongoing farming and revegetation program will not exceed the existing plow zone, the Service has determined that further efforts to survey the farm tracts for historic properties and artifacts is not necessary. However, other types of undertakings, such as roads, construction activities, land leveling, wetlands development, etc., may require field evaluation for impacts to historic properties and artifacts as provided under 36 CFR 800.

Three National Register properties are listed on, or are within close proximity to, Service lands that are part of the ongoing farming and revegetation program. These are the Palo Alto Battlefield, Palmito Hill Battlefield, and the El Sal del Rey Archeological District. Because of the national significance and public visibility of these properties, special consideration has been given in the formulation of the farming and revegetation program.

Generally speaking, these three properties have been subject to the same degree or extent of prior farming activity as the other tracts in the project area. The only property on which farming still occurs is within the Sal del Rey tract. The Service now takes into consideration the possible adverse effects of continued farming as provided under 36 CFR 800. This would result in the reduction or elimination of farming in some, but not all, portions of the National Register properties. In no cases would farming or field preparation for native planting be extended or enlarged beyond existing plow zones.

The Palo Alto Battlefield site, which is managed by the National Park Service, is located north of Brownsville. At the present time, no Service lands occur on any part of the battlefield site. Therefore, the farming/revegetation program on the Refuge will have no effect, direct or indirect, on this nationally significant site.

At the Palmito Hill Battlefield location, all farming operations have ceased on existing refuge tracts in the area. If additional tracts are acquired in the area, no new farming operations will be initiated and any farming occurring at the time of acquisition would be phased out as soon as practicable. Seedling trees would be planted, and no mechanical operation on this land would occur afterward. The reforestation would restore the area to its original character.

The El Sal del Rey Archeological District, located west of Raymondville, has undergone more extensive farming than the other National Register properties. However, the sections immediately adjacent to the large salt lakes have never been actively farmed, and this is where the remaining, intact cultural resources are located. The STRC has no plans to initiate farming on these heretofore undisturbed sections of the El Sal del Rey Archeological District. Within the El Sal del Rey Archeological District, farmed areas are located away from the salt lakes on

generally higher ground. These areas have been farmed since the 1930s. Under both Alternatives, some mechanical operations would continue to occur for a limited period of time, until all land is either retired or planted to native habitat. However, no operations would be allowed at depths greater than the existing plow depth, and the areal extent of plowing would also not be increased. Undisturbed portions of sites 41 HG 22, 41 HG 52, and 41 HG 45 (El Sal del Rey site), or other unrecorded sites within the 1,630-acre National Register district, will therefore not be impacted by continued farming and revegetation activities.

3.3.2 Socioeconomic Resources

The LRGV is characterized by agricultural and urban development, scattered small farming communities, and the seasonal influx of summer visitors and winter residents (i.e., *Winter Texans*). There are three major metropolitan areas in the LRGV. The City of Brownsville, with a population of 139,722, is located about 20 miles west of the Gulf coast, along the Rio Grande. Harlingen, located about 25 miles northwest of Brownsville, has a population of 57,564. The third major metropolitan area is McAllen, located about 33 miles west of Harlingen, with a population of 106,414 (*Source: 2000 Census*).

Overall, the population of the LRGV, that is comprised of Cameron, Hidalgo, Starr, and Willacy counties, has grown from 701,888 in 1990 to 978,369 in 2000, a 39.4% increase (Sethi and Arriola 2002). The U.S. Census Bureau currently estimates that the total LRGV population in 2009 will be up to 1.2 million; an approximate 25% increase over 2000 population levels. Cameron and Hidalgo counties show the highest growth rates with the least populated county being Willacy. According to Sethi and Arriola (2002), the LRGV metropolitan area is one of the top 30 fastest growing regions in the nation. The population in the LRGV is expected to continue to grow at a rate of about 4% per year in the coming years. Yet, despite this growth, the LRGV ranks as one of the highest unemployment areas in the United States along with high poverty rates (Mathis and Matisoff 2004). Over 85% of the population in the LRGV is Hispanic and over 30% of LRGV families live below the poverty level (*Source: 2000 Census*).

Agriculture has always been the staple of the LRGV economy. The LRGV produces more than 40 crops, primarily cotton, citrus, grain sorghum, sugar cane, vegetables, and melons (*Source: Rio Grande Valley Chamber of Commerce*). The longer growing season and subtropical climate has long attracted farmers to the area, as they can produce two crops each year on the same land. Today, farms and ranches in the LRGV produce cash receipts of \$500 million per year on average (*Source: Rio Grande Valley Chamber of Commerce*). Aside from agriculture, some of the largest employers in the LRGV include public schools, hospitals, health care agencies, restaurants, food stores, and social service agencies. The service industry represents 36% of the total LRGV economy, followed by local government (20%) and trade (17%) (Sethi and Arriola 2002). One of the largest and fastest growing industries is tourism, particularly nature-based or

ecotourism (Mathis and Matisoff 2004). Ecotourism here generates between \$100 million and \$170 million annually, and creates several thousand jobs (Mathis and Matisoff 2004, *after* Chapa 2004). During the winter months, retired people (estimated to be from 125,000 to 150,000) leave their northern homes to spend the winter in the more favorable climate of the Valley. Winter Texans are an important economic factor in the LRGV since they provide a substantial source of revenue for the local economy.

The STRC, and specifically the cooperative farming and revegetation program, provides significant benefits to the local economy as well. For example, the cooperative farming program currently has ten cooperators in three counties who employ local workers to run their farming operations in addition to supporting farm implement companies and seed, fertilizer, and herbicide suppliers. Cooperators also support five native plant nurseries that grow plants used in the habitat restoration program at \$60-70,000 per year. These cooperators also provide about \$180,000 per year of in-kind services to the STRC for habitat restoration activities and invasive species control. Tax assessments of about \$111,000 are paid to thirteen local water districts each year.

3.3.3 Visitor Services/Activities

The majority of the Refuge tracts within the STRC where cooperative farming occurs are not designated for public use. Of those portions that are open for public use, wildlife observation, photography, and hunting are the predominant uses. While farmland on public use tracts may provide some limited wildlife viewing and hunting opportunities, native habitats hold significantly more abundant and diverse wildlife assemblages that would provide higher quality wildlife viewing and hunting opportunities. Both alternatives will improve vistas of native vegetation in areas currently fallow or under cultivation, however it is not expected to significantly increase public viewing or hunting opportunities unless additional areas of the STRC refuges are opened to public use.

3.3.4 Aesthetic and Visual Resources

Given the flat to gently rolling terrain of the Valley, there are few vistas available. Remnant patches of native habitat, along with restored refuge tracts, provide some aesthetic enjoyment. Wildlife viewing, primarily bird watching, in restored areas provides opportunities for thousands of seasonal visitors to the area.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes and discusses the potential environmental effects or consequences that can be reasonably expected by the implementation of the alternatives described in Chapter 2.0 of this EA. An analysis of the effects of management actions has been conducted on the physical environment (air quality, water quality, and soils); biological environment (vegetation, wildlife, and threatened and endangered species); and socioeconomic environment (socioeconomic features including local economy, public use/recreation, and visual and aesthetic resource). It has been determined that the alternatives will not have impacts on climate, hydrology, geology, mineral resources, public use/recreation and cultural resources; therefore, there will be no further discussion of these resources in the analysis. Potential impacts to all other resources are addressed below.

The direct, indirect, and cumulative impacts of each alternative are considered in the Environmental Assessment.

- **Direct effects** are the impacts that would be caused by the alternative at the same time and place as the action.
- **Indirect effects** are impacts that occur later in time or distance from the triggering action.
- **Cumulative effects** are incremental impacts resulting from other past, present, and reasonably foreseeable future actions, including those taken by federal and non-federal agencies, as well as undertaken by private individuals. Cumulative impacts may result from singularly minor but collectively significant actions taking place over a period of time.
- The STRC also considered various types of impacts during the Environmental Assessment. These include beneficial and adverse impacts. **Beneficial impacts** are those resulting from management actions that maintain or enhance the quality and/or quantity of identified refuge resources or recreational opportunities.
- **Adverse impacts** are those resulting from management actions that degrade the quality and/or quantity of identified refuge resources and recreational opportunities.

The Environmental Assessment also evaluates the reasonably expected duration of each impacts, whether short-term or long-term.

- **Short-term impacts** affect identified refuge resources or recreational opportunities and occur during implementation of the project but last no longer.
- **Long-term impacts** affect identified refuge resources or recreation opportunities and occur during implementation of the management action and are expected to persist in the 1-5 years following implementation.

The STRC considered the intensity of impact when evaluating the alternatives presented in the Environmental Assessment.

- **Minor impacts** result from a specified management action that can be reasonably expected to have detectable though limited effect on identified refuge resources or recreation opportunities at the identified scale.
- **Moderate impacts** result from a specified management action that can be reasonably expected to have apparent and detectable effects on identified refuge resources or recreation opportunities at the identified scale.
- **Major impacts** result from a specified management action that can be reasonably expected to have readily apparent and substantial effects on identified refuge resources and recreation opportunities at the identified scale.

4.1 Physical Environment

4.1.1 Impacts on Air Quality

Alternative A – No Action (Current Management)

Short-term, minor, negative impacts to air quality resulting from dust and emissions generated by farming operations as well as fossil fuels used by farm equipment and other farming related practices would occur under Alternative A. Dust from wind driven soil erosion would be likely under Alternative A, but the impacts would be eliminated after native vegetation is planted and tillage and farming activities are phased out.

Alternative B – Refuge Revegetation

Under Alternative B, there would be greater short-term and long-term negative impacts to air quality resulting from increased dust and wind erosion than Alternative A. Under this alternative, the STRC would have fallow fields that do not have any crops to hold the soil or break the wind. Therefore, increased wind erosion and dust would be expected.

4.1.2 Impacts on Water Quality and Quantity

Alternative A – No Action (Current Management)

Under Alternative A, cooperating farmers would continue to make use of an average of 2,000 acre-feet of water annually for irrigation until the irrigable lands are converted back to native habitats. As lands are restored the water use would be converted from irrigation to in-stream flows thus increasing water available in the river. Regular tillage of farm fields would allow for run-off water from rain or irrigation to be turbid from suspended sediments which may end up in the Rio Grande. As lands are converted to native habitats, the input of sediments would decrease. Short-term, minor, localized adverse impacts on water quality from runoff of

fertilizers or herbicides would continue on a site-specific basis since fertilizers are used infrequently and Service-approved herbicides are non-persistent and are applied during dry weather when the risk of runoff is low.

Alternative B – Refuge Revegetation

Under Alternative B, use of refuge water for irrigation would be discontinued until the irrigable lands are converted back to native habitats, thus reducing overall water use and increasing the in-stream flow. There may be additional costs to irrigate restoration sites because irrigation systems (primarily concrete pipes and concrete-lined canals) that are not constantly maintained rapidly degrade. Tillage of farm fields would allow for run-off water from rain or irrigation to be turbid from suspended sediments. It is expected that more sediments would enter the river than with Alternative A since there would be no crops to hold the soil. The potential for impacts on water quality due to fertilizer runoff would be eliminated since no fertilizers would be used. However, the potential for impacts on water quality from herbicide use would be greater under Alternative B since herbicides would have to be used more frequently to maintain land in a fallow state for an extended period of time. Use of water rights would be less than Alternative A since no crops would be grown that require irrigation.

4.1.2 Impacts on Soils

Alternative A – No Action (Current Management)

Under Alternative A, regular tillage of refuge land would continue to have some short-term, minor negative effects on soils due to loss of topsoil from wind and water erosion. Once lands are planted back to native vegetation communities, erosion potential would decrease due to the presence of vegetation that would hold soil. Soils would also be enriched over time by the addition of organic matter from the native vegetation or crop residue disked into the soil.

Alternative B – Refuge Revegetation

It is expected that under Alternative B loss of topsoil from wind and water erosion would be greater and more long-term than with Alternative A since land would remain tilled and there would be no crops to hold the soil.

4.2 Biological Environment

4.2.1 Impacts on Habitat

Even with sufficient resources, all suitable lands currently under farming agreements could not be successfully planted to native habitat in a shorter time period than is being accomplished under Alternative A. Current suppliers of native plants that are paid through the cooperative

farming program, along with those produced by the Refuge staff, can only provide enough plants to restore limited amounts of habitat during any given year (400-500 acres). This limitation is influenced by the biologically-based planting densities that are being used. Under Alternative B, habitat restoration would take the same amount of time as in Alternative A, but additional refuge resources would be required to conduct site preparation spraying, disking, bedding, planting, grass and weed control, and irrigation.

Alternative A – No Action (Current Management)

Under the current management, farmland would be converted back to native plant communities that would remain in perpetuity. Beneficial long-term impacts to habitats would result across the area occupied by the STRC refuges from habitat restoration activities. Under Alternative A, farmland would continue to be used to produce crops and would be subject to tillage and/or herbicide treatment several times each year to prevent establishment of non-native invasive grasses and annual weeds. Cooperators would continue to provide native plants used for restoration, provide equipment and labor for preparing and planting the sites, and provide invasive grass control after planting. Other services such as irrigation and invasive species control would continue to assist with habitat improvement.

Alternative B – Refuge Revegetation

Under Alternative B, farmland would not be used to produce crops but would still be subject to tillage and/or herbicide treatment several times each year to prevent establishment of non-native invasive grasses and annual weeds. Refuge staff and/or contractors would provide native plants used for restoration funded from the Refuge budget. Refuge staff and/or contractors would provide equipment and labor for preparing and planting the sites, and providing invasive grass control after planting. Without additional staff or funding for contracts and equipment to conduct tillage several times each year, farmland would become infested with non-native grasses, annual weeds and other undesirable vegetation that would require several years of disking and herbicide application to prepare each site for restoration planting. If the funding required, to continue the current pace of restoration, is reduced, the scale of restoration during any given year would be affected. Restoration of refuge lands would therefore take longer to complete than under Alternative A.

4.2.2 Impacts on Wildlife

Alternative A – No Action (Current Management)

Under the current management, farmland would be converted back to native plant communities that would provide wildlife habitat in perpetuity once established. Wildlife populations would be limited by a scarcity of suitable habitat until refuge lands are restored. Even cropland, seasonally provides both habitat and food for some wildlife species, e.g., sorghum fields are used by dove and other seed-eating birds for both foraging and loafing habitat. Rodents, raptors, and white-

tailed deer use croplands as forage areas. All growing croplands provide cover for wildlife and flowering crops provide food for pollinators and other insects. Even cropland monocultures are wildlife habitat ... not native habitat, but vegetation is always habitat for some wildlife species. Under both alternatives, habitat would be restored allowing wildlife populations to expand as restoration sites mature. Once all refuge lands are restored, wildlife populations would reach a point where they can no longer expand. Under Alternative A, farmland would continue to be removed from production each year and immediately planted to an appropriate mix of native plants. Cooperators would continue to provide invasive grass control that helps newly-established restoration plantings by removing competition and by reducing the potential for wildfire to destroy the vegetation. This allows sites to mature more rapidly and provides habitat and structure for wildlife. Beneficial long-term impacts to habitats would result across the area occupied by the STRC refuges from habitat restoration activities which would provide habitat to support wildlife populations.

Alternative B – Refuge Revegetation

Under Alternative B, habitat would still be restored, however funding for plant materials, site preparation, planting, maintenance and invasive species control would come from the STRC budget. Since crops would not be planted there would be less available food and cover for some wildlife species that would otherwise make seasonal use of crop fields. If adequate funding and staffing increases are not provided, the number of seedling plants would be reduced and the number of acres of habitat that could be restored in a given year would be reduced, thus reducing the rate of restoration. Wildlife habitat would take longer to establish.

4.2.3 Impacts on Threatened, Endangered and Special Status Species

The implementation of the different alternatives may have immediate, positive effects for some T&E species. Walker's manioc (*Manihot walkerae*), and Texas ayenia (*Ayenia limitaris*) could be planted as part of the site restoration plan for appropriate sites, which would immediately increase populations of these species. Restored habitat would provide potential habitat for ocelot (*Leopardus pardalis*) and Gulf Coast jaguarundi (*Herpailurus yagouaroundi cacomitli*). For example, observations have been made of at least one ocelot using a site that was replanted two years previously.

Alternative A – No Action (Current Management)

Under the current management, restoration and enhancement of habitat for threatened and endangered (T&E) species would remain a high priority for the STRC. Under Alternative A, cooperators would provide plant materials and services to improve habitats for T&E species, even on lands not currently being farmed. Restoration of habitat could provide immediate population increases for Texas ayenia through planting of seedlings in appropriate areas. Habitat restoration and enhancement activities may provide suitable foraging and travel corridors for

ocelots within two years, depending on site characteristics. Because restoration sites are primarily outside the historic range of the Aplomado falcon, are currently being farmed, and/or were historically brushlands that were not suitable for this species, restoration activities associated with the cooperative farming and revegetation program are not likely to adversely affect this species. Beneficial long-term impacts to habitats would result across the area occupied by the STRC refuges from habitat restoration activities which would provide habitat to support T&E wildlife populations.

Alternative B – Refuge Revegetation

Under Alternative B, habitat improvements would ultimately have the same effects on threatened and endangered species as Alternative A. However, if additional personnel, equipment and funding are not provided at equivalent levels to the current contributions of the ten cooperative farmers, habitat restoration would take longer and may negatively affect recovery efforts for threatened and endangered species such as the ocelot and jaguarundi.

4.3 Human Environment

4.3.1 Impacts on Socioeconomics

Alternative A – No Action (Current Management)

Under Alternative A, the economic and social condition of the area would remain the same. The STRC would continue to be one of the area's main natural attractions. As farmland is converted to native habitats, additional wildlife-dependent recreational opportunities would be created, thus contributing to growth of the ecotourism industry of the area. The presence and operation of the STRC provides economic benefits to the surrounding communities in several ways. The STRC refuges attract local, national, and international visitors, and by attracting visitors to the area the STRC generates revenue for the local economy. Much of the STRC's annual budget is recycled into local businesses through refuge staff expenditures, purchases of equipment and supplies, as well as contracts for local labor to accomplish STRC projects. The farming and revegetation programs provide part of the annual income for the current farming cooperators and native plant nurseries and their employees. Crops harvested from the Refuges are sold through local grain elevators and packing houses, providing employment for many others in the local area. Cooperating farmers provide funding for purchase of seedling trees and shrubs from at least five native plant nurseries in the LRGV area. Five full-time Service employees that currently work primarily with the farming and revegetation programs live in nearby communities.

Alternative B – Refuge Revegetation

Long-term, moderate, adverse impacts on those private persons directly or indirectly involved with the farming and restoration programs would occur under Alternative B. Ten cooperating

farmers would not be able to farm STRC lands and would not employ local workers. Five native plant nurseries may go out of business if additional appropriations are not made by the STRC to purchase plants for restoration. If these nurseries go out of business, then all plant materials used for restoration would have to be produced by STRC staff or by special contractors. Increased staffing to produce the native plants, run farm equipment and maintain lands prior to restoration, conduct spraying of noxious weeds and grasses, maintain and conduct irrigation, and other associated tasks would be recycled into local businesses through STRC staff, purchases of equipment and supplies, as well as contracts for local labor to accomplish STRC projects. If all native plant production becomes STRC responsibility, the existing nursery capacity would have to be increased and additional area would need to be developed to produce the needed plants, or the rate of restoration would be reduced by as much as 2/3 of the current rate.

4.3.2 Impacts on Aesthetic and Visual Resources

Alternative A – No Action (Current Management)

Implementing the current management would have short-term minor adverse impacts on visual resources on the STRC. Minor visual effects could occur from farming equipment, dust, and the maintenance of open ground. In the long-term, visitors may experience improved visual quality of the site and its surroundings consistent with reestablishment of natural vegetation. As lands are converted from farmland to native vegetation communities there would be an increase in native habitats which would provide additional aesthetic enjoyment. Reestablished native vegetation communities would also provide for increased wildlife viewing opportunities on those tracts that are open to public use.

Alternative B – Refuge Revegetation

The effects of Alternative B would be the same as those under Alternative A. However, if additional personnel, equipment and funding are not provided at equivalent levels to the current contributions of the cooperative farmers, invasive species would take over areas that should have native habitat and aesthetic and visual resources would be less appealing to visitors.

4.4 Assessment of Cumulative Impacts

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

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

The Refuge is not aware of any past, present or future planned actions that would result in a significant cumulative impact when added to the Refuge’s proposed action, as outlined in Alternative A. The direct and indirect adverse effects of the proposed action on air, water, soil, habitat, wildlife, and aesthetic/visual resources values are expected to be minor and short-term. The benefits to long-term ecosystem health that the habitat restoration component of the project will accomplish far outweigh any of the short-term adverse impacts of the farming component discussed in this document.

4.5 Environmental Justice

Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority and Low-Income Populations; February 11, 1994) was designed to focus the attention of Federal Agencies on the environmental and human health conditions of minority and low-income populations, with the goal of achieving environmental protection for all communities. The order directed federal agencies to develop environmental justice strategies to aid in identifying and addressing disproportionately high and adverse human health and environmental effects of their programs, policies, and activities on minority and low-income populations. The order is intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority and low income communities with access to public information and opportunities for participation in matters related to human health and the environment.

None of the alternatives described in this EA will disproportionately place any adverse environmental, economic, social, or health impacts on minority and low income populations. Implementation of the proposed action is anticipated to benefit the environment and people in the surrounding communities.

4.6 Indian Trust Assets

No Indian Trust Assets have been identified in the STRC area. There are no reservations or ceded lands present. Because resources are not believed to be present, no impacts are anticipated to result from implementation of either alternative described in the EA.

4.7 Unavoidable Adverse Effects

None of the alternatives described would result in unavoidable adverse impacts to STRC resources. Farming operations may result in some short-term disturbance to migratory and resident wildlife, but these impacts are expected to be negligible.

4.8 Irreversible and Irretrievable Commitment of Resources

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that this use could have on future generations. Irreversible effects primarily result from the use or destruction of specific resources that cannot be replaced within a reasonable time frame, such as energy or minerals. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, such as extinction of a threatened or endangered species or the disturbance of a cultural resource.

None of the alternatives would result in a large commitment of nonrenewable resources. Project implementation would require the irretrievable commitment of fossil fuels (e.g., diesel and gasoline), oils, and lubricants used by heavy equipment and vehicles. Since the Proposed Action is a continuation of an ongoing activity, no unavoidable harm or harassment to wildlife is expected. The Service would implement best management practices to minimize potential impacts.

4.9 Table 2 - Summary of Environmental Effects by Alternative:

Environmental Resource	Alternative A No Action Alternative	Alternative B:
Impacts to Air Quality	Short-term, minor, negative impacts to air quality	Long-term, minor, negative impacts to air quality from increased dust
Impacts to Water Quality and Quantity	Short-term, minor, negative impacts to water quality from sediments	Long-term, moderate, negative impacts to water quality from increased sediments
Impacts to Soils	Short-term, minor, negative impacts to soils from erosion	Long-term, moderate, negative impacts to soils from erosion
Impacts on Habitat	Short and Long-term beneficial impacts	Same as Alternative A
Impacts of Wildlife	Short and Long-term beneficial impacts	Same as Alternative A
Impacts on Threatened and Endangered Species	Short and Long-term beneficial impacts	Same as Alternative A
Impacts on Cultural Resources	No impacts	Same as Alternative A
Impacts on Socioeconomic Resources	Short and Long-term beneficial impacts	Short and Long-term adverse impacts
Impacts on Aesthetic and Visual Resources	Short and Long-term beneficial impacts	Same as Alternative A

5.0 CONSULTATION, COORDINATION AND DOCUMENT PREPARATION

Document prepared by Refuge Staff, Lower Rio Grande Valley National Wildlife Refuge, U.S. Fish and Wildlife Service, Alamo, Texas.

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5.1 Agencies and individuals consulted in the preparation of this document include

U.S. Fish and Wildlife Service, Alamo Ecological Service Sub-Office. Consultation #21410-2010-I-0533.

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Appendix A: Media Contacts for Scoping

98.5FM, 96.1FM & 1530AM	Radio
KGBT-TV 4 (CBS)	Television
KRGV-TV 5 (ABC)	Television
XHAB-TV 7	Television
KVEO 23 (NBC)	Television
Advance News Journal	Newspaper
Brownsville Herald	Newspaper
Edinburg Review	Newspaper
El Bravo	Newspaper
Island Breeze	Newspaper
La Frontera	Newspaper
Mid Valley Town Crier	Newspaper
Monitor	Newspaper
MyHarlingenNews.com	Newspaper
Progress Times	Newspaper
Winter Texans Times	Newspaper
Raymondville Chronicle News	Newspaper
Rio Grande Herald	Newspaper
South Padre Parade(Weekly)	Newspaper
Port Isabel Press(Mon & Thurs)	Newspaper
Starr County Town Crier	Newspaper
The South Texas Reporter	Newspaper
Valley Morning Star	Newspaper