APPENDIX E

Biological Resources Plan

BIOLOGICAL RESOURCES PLAN

FOR

CONSTRUCTION, OPERATION, AND MAINTENANCE OF TACTICAL INFRASTRUCTURE FOR RIO GRANDE VALLEY SECTOR, TEXAS

U.S. DEPARTMENT OF HOMELAND SECURITY
U.S. CUSTOMS AND BORDER PROTECTION
U.S. BORDER PATROL RIO GRANDE VALLEY SECTOR

Prepared by

JULY 2008

ABBREVIATIONS AND ACRONYMS

BMP	Best Management Practice
BRP	Biological Resources Plan
CBP	U.S. Customs and Border Protection
DHS	U.S. Department of Homeland Security
ESA	Endangered Species Act
ESP	Environmental Stewardship Plan
FM	Farm-to-Market road
FR	Federal Register
GIS	Geographic Information System
GPS	Global Positioning System
IIRIRA	Illegal Immigration Reform and Immigrant Responsibility Act
LRGVNWR	Lower Rio Grande Valley National Wildlife Refuge
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
mph	miles per hour
NLCD	National Land Cover Data
OBP	Office of Border Patrol
PCE	Primary constituent element
POE	Ports of Entry
ROW	right of way
SWPPP	Storm Water Pollution Prevention Plan
TPWD	Texas Parks and Wildlife Department
TxDOT	Texas Department of Transportation
USACE	U.S. Army Corps of Engineers
USBP	U.S. Border Patrol
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USIBWC	U.S. International Boundary and Water Commission
WMA	Wildlife Management Area
WOUS	Waters of the United States

EXECUTIVE SUMMARY

The U.S. Department of Homeland Security (DHS), Customs and Border Protection (CBP), U.S. Border Patrol (USBP) plans to construct, operate, and maintain approximately 70 miles of tactical infrastructure in 21 sections in the USBP Rio Grande Valley Sector. Customs and Border Protection plans to install and operate tactical infrastructure consisting of primary pedestrian fence (including picket, bollard, floating, and concrete flood protection structure/concrete fence), concrete retaining wall, and access and patrol roads along the U.S./Mexico international border in Starr, Hidalgo, and Cameron counties, Texas. There are 17 federally listed species that are known to occur, or that could occur, within or adjacent to the project area (see **Tables ES-1**, **ES–2**, and **ES-3**). Additionally, two of the listed species have designated critical habitat in the project area. The species and habitats listed in **Tables ES–1**, **ES–2**, and **ES-3** are known to occur within 25 miles of the border in Starr, Hidalgo, and Cameron counties.

Table ES-1. Federally Listed Species and Critical Habitats Within Starr County and the Determination of Effects Resulting from the Project

Species	Listing/Critical Habitat Designated	Determination of Effect
Ocelot, *Leopardus pardalis*	Endangered	Likely to adversely affect
Gulf Coast jaguarundi, *Herpailurus yagouaroundi cacomitli*	Endangered	Likely to adversely affect
Least tern, *Sterna antillarum*	Endangered	No effect
Piping plover, *Charadrius melodus*	Endangered	No effect
Piping plover, critical habitat	Designated	No effect
Ashy dogweed, *Thymophylla tephroleuca*	Endangered	No effect
Johnston's frankenia, *Frankenia johnstonii*	Endangered	Not likely to adversely affect
Star cactus, *Astrophytum asterias*	Endangered	Not likely to adversely affect
Walker's manioc, Manihot walkerae	Endangered	Not likely to adversely affect
Zapata bladderpod, *Lesquerella thamnophila*	Endangered	Likely to adversely affect
Zapata bladderpod, critical habitat	Designated	Likely to adversely affect

Table ES-2. Federally Listed Species and Critical Habitats Within Hidalgo County and the Determination of Effects Resulting from the Project

Species	Listing Status	Determination
Ocelot, *Leopardus pardalis*	Endangered	Likely to adversely affect
Gulf Coast jaguarundi, Herpailurus yagouaroundi cacomitli	Endangered	Likely to adversely affect
Northern aplomado falcon, *Falco femoralis septentrionalis*	Endangered	No effect
Star cactus, *Astrophytum asterias*	Endangered	No effect
Piping plover, *Charadrius melodus*	Endangered	No effect
Piping plover, critical habitat	Designated	No effect
Texas ayenia, *Ayenia limitaris*	Endangered	Not likely to adversely affect
Walker's manioc, *Manihot walkerae*	Endangered	Not likely to adversely affect

Table ES-3. Federally Listed Species and Critical Habitats Within Cameron County and the Determination of Effects Resulting from the Project

Species	Listing Status	Determination
Ocelot, *Leopardus pardalis*	Endangered	Likely to adversely affect
Gulf Coast jaguarundi, *Herpailurus yagouaroundi cacomitli*	Endangered	Likely to adversely affect
Brown pelican, *Pelecanus occidentalis*	Endangered	No effect
Northern aplomado falcon, *Falco femoralis septentrionalis*	Endangered	No effect
Hawksbill sea turtle, *Eretmochelys imbricata*	Endangered	No effect
Kemp's Ridley sea turtle, *Lepidochelys kempii*	Endangered	No effect
Leatherback sea turtle, *Dermochelys coriacea*	Endangered	No effect
South Texas ambrosia, *Ambrosia cheiranthifolia*	Endangered	Not likely to adversely affect
Texas ayenia, *Ayenia limitaris*	Endangered	Not likely to adversely affect
Piping plover, *Charadrius melodus*	Threatened	No effect
Piping plover critical habitat	Designated	No effect
Green sea turtle, *Chelonia mydas*	Threatened	No effect
Loggerhead sea turtle, *Caretta caretta*	Threatened	No effect

Based upon the information provided regarding the tactical infrastructure sections, no effects are anticipated for the least tern, the piping plover, piping plover critical habitat, and the ashy dogweed in Starr County; the star cactus, the Northern aplomado falcon, the piping plover, and piping plover critical habitat in Hidalgo County; and the brown pelican, the Northern aplomado falcon, the hawksbill sea turtle, the Kemp's ridley sea turtle, the leatherback sea turtle, the piping plover, piping plover critical habitat, the green sea turtle, and the loggerhead sea turtle in Cameron County. Therefore, those species and habitats are not discussed in detail in this Biological Resources Plan (BRP).

On April 1, 2008, the Secretary of DHS, pursuant to his authority under Section 102(c) of the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA), exercised his authority to waive certain environmental and other laws in order to ensure expeditious construction of tactical infrastructure along the U.S./Mexico international border. Although the Secretary's waiver means that CBP no longer has any specific legal obligations under these laws, the Secretary committed the Department to responsible environmental stewardship of our valuable natural and cultural resources. CBP strongly supports this objective and remains committed to being a good steward of the environment. To that end, CBP has prepared the following BRP, which analyzes the potential impacts on threatened and endangered species associated with construction of tactical infrastructure in the USBP's Rio Grande Valley Sector. The BRP also discusses CBP's plans as to how potential impacts on threatened and endangered species can be mitigated. The BRP will help to guide CBP's efforts going forward.

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BIOLOGICAL RESOURCES PLAN
RIO GRANDE VALLEY SECTOR

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1. PROJECT DESCRIPTION

The U.S. Department of Homeland Security (DHS), Customs and Border Protection (CBP), U.S. Border Patrol (USBP) will construct, operate, and maintain 225 miles of pedestrian and vehicle fence along the U.S./Mexico international border, with construction expected to be completed by December 31, 2008.

On April 1, 2008, the Secretary of DHS, pursuant to his authority under Section 102(c) of the Illegal Immigration Reform and Immigrant Responsibility Act (IIRIRA), exercised his authority to waive certain environmental and other laws in order to ensure expeditious construction of tactical infrastructure along the U.S./Mexico international border. Although the Secretary's waiver means that CBP no longer has any specific legal obligations for laws that are included in the waiver, including the Endangered Species Act, the Secretary committed DHS to continue responsible environmental stewardship of our valuable natural and cultural resources. CBP has worked with resource agencies to consider alternative designs and locations that would minimize environmental impacts. To that end, CBP has prepared the following BRP, which analyzes the potential impacts on threatened and endangered species associated with construction of tactical infrastructure in the USBP's Rio Grande Valley Sector. The BRP also discusses CBP's plans as to how potential impacts on threatened and endangered species can be mitigated. The BRP will help to guide CBP's efforts going forward.

1.1 LOCATION

CBP, USBP plans to install and operate tactical infrastructure consisting of primary pedestrian fence (including picket, bollard, floating, and concrete flood protection structure/concrete fence), concrete retaining wall, and access and patrol roads along approximately 70 miles of the U.S./Mexico international border in 21 discrete sections (designated as Sections O-1 to O-21) within Starr, Hidalgo, and Cameron counties, Texas, within the USBP Rio Grande Valley Sector (see **Figures 1-1,**. **1-2**, and **1-3**). Each tactical infrastructure section will be an individual project and could proceed to completion independent of the other sections. **Table 1-1** presents detailed information for each of the 21 sections.

The primary pedestrian fence alignment generally follows the Rio Grande in Sections O-1 through O-3. There is currently an existing patrol road within the footprint of Sections O-1 through O-3. The fence alignment follows the U.S. International Boundary and Water Commission (USIBWC) levee system associated with the Rio Grande along Sections O-4 through O-21. In Section O-19, the fence alignment will follow the Public Utilities Board of Brownsville levee to the approximate midpoint, where it will meet up with the USIBWC levee. For Sections O-4 through O-10, the fence alignment and patrol road will be within the current USIBWC levee Right of Way (ROW) on the south side of the levee. For Sections O-11 through O-21, the fence alignment will typically be placed

approximately 30 feet from the toe of the north side of the levee (i.e., the lowest point at the base of the structure facing away from the Rio Grande). These configurations will allow the infrastructure to be placed in an existing levee ROW without disturbing current USIBWC operations or USBP patrol roads. The tactical infrastructure within several of the 21 sections will also encroach on multiple privately owned land parcels. Some fence sections will also encroach upon portions of the Lower Rio Grande Valley National Wildlife Refuge (LRGVNWR), Texas Parks and Wildlife Department (TPWD), Wildlife Management Areas (WMAs), and The Nature Conservancy lands in the Rio Grande Valley.

1.2 CONSTRUCTION, OPERATION, AND MAINTENANCE

The Project will impact a total of 461 acres and consists of the following components: (1) installing, operating, and maintaining a primary pedestrian fence and patrol road; (2) improving existing roads to improve access for construction and maintenance; and (3) developing temporary construction staging areas (see **Table 1-2**). Construction of the tactical infrastructure will begin in Spring 2008 and continue through December 2008.

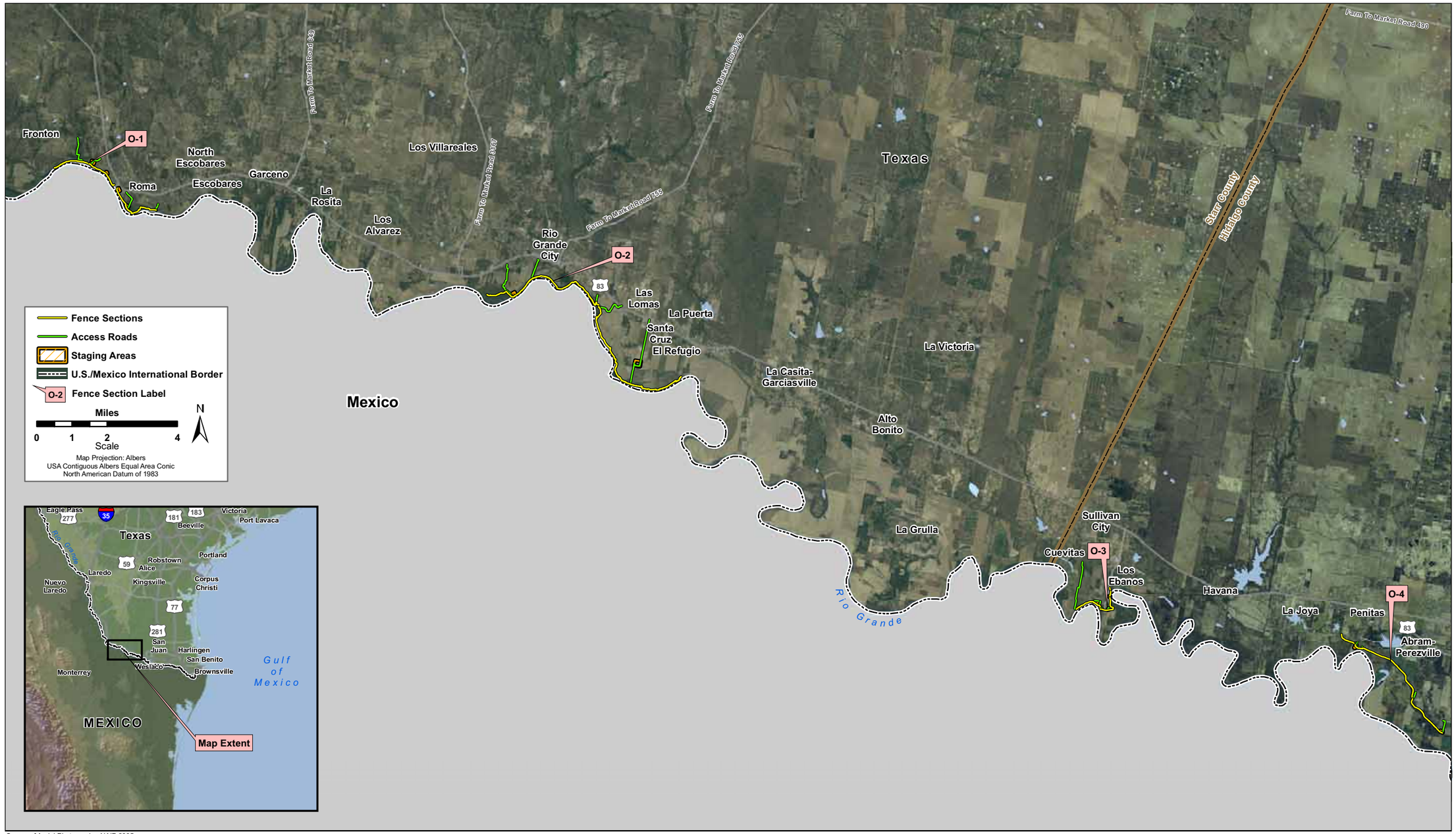
Project Footprint, Sections O-1 through O-3 and O-11 through O-21. The project footprint will directly impact an approximately 60-foot-wide corridor (see **Figure 1-4**). This corridor will include fences and patrol roads. Vegetation will be cleared, and grading will occur where needed. The area permanently impacted by the construction of tactical infrastructure will total approximately 362 acres.

Project Footprint, Sections O-4 through O-10. The project footprint for the concrete flood protection structures/concrete fence will impact a corridor between 24 and 40 feet wide on the river side of the levee. This construction corridor consists of approximately 24 feet of existing levee on the Rio Grande side of the levee that will be removed (see **Figure 1-5**). Up to 16 additional feet within the USIBWC ROW will be temporarily impacted by construction.

The total area permanently impacted by construction of the concrete flood protection structure/concrete fence will be approximately 99 acres. Wherever possible, existing roads and previously disturbed areas will be used for construction access and staging areas.

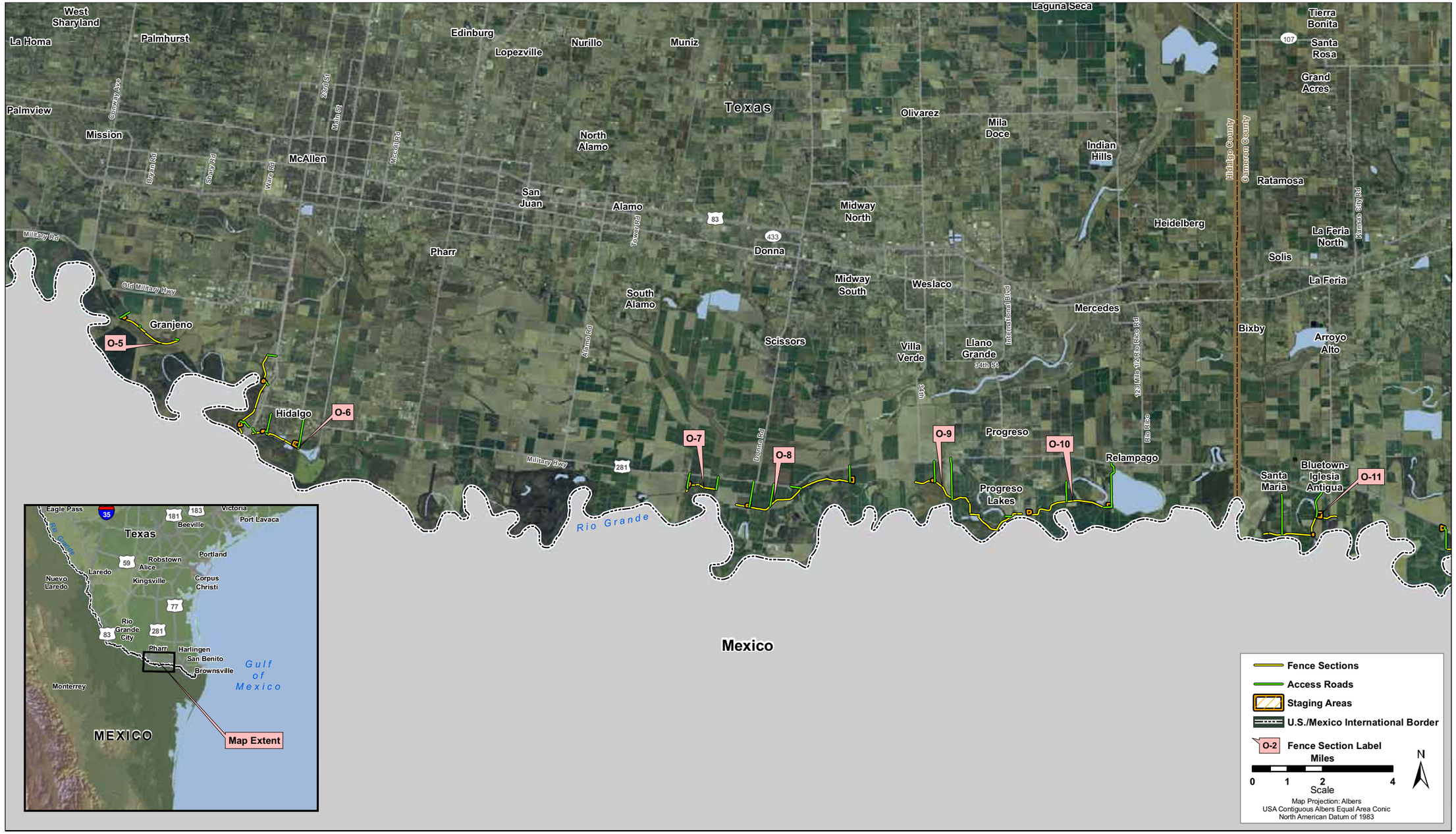
1.2.1 Fence Installation

The five fence types that will be constructed for the USBP Rio Grande Valley Sector include two styles of primary pedestrian fence, floating primary pedestrian fence, concrete retaining wall, and concrete flood protection structures/concrete fence. The two styles of primary pedestrian fence consist of steel bollards or pickets and bollards anchored into concrete footings (see **Figure 1-6**). Floating primary pedestrian fence consist of prefabricated floating fence panels placed on



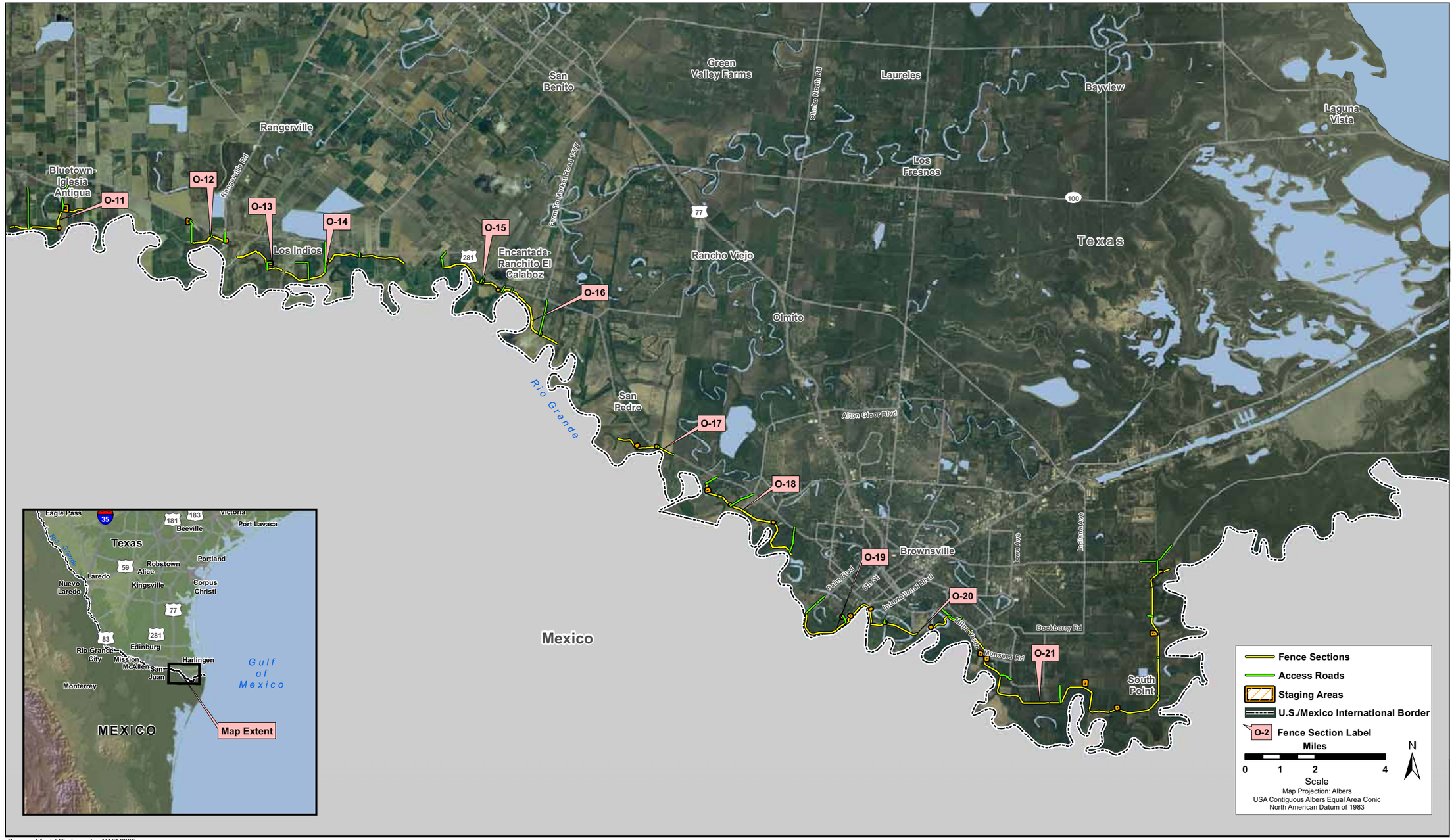
Source of Aerial Photography: NAIP 2005

Figure 1-1. Location of the Project in Starr, Cameron, and Hidalgo Counties (Map 1 of 3)



Source of Aerial Photography: NAIP 2005

Figure 1-2. Location of the Project in Starr, Cameron, and Hidalgo Counties (Map 2 of 3)



Source of Aerial Photography: NAIP 2005

Figure 1-3. Location of the Project in Starr, Cameron, and Hidalgo Counties (Map 3 of 3)

Table 1-1. Primary Pedestrian Fence Sections

Section	USBP Station	Approximate Location	Length (miles)
O-1	Rio Grande City	Near Roma POE	3.76
O-2	Rio Grande City	Near Rio Grande City POE	8.75
O-3	McAllen	Los Ebanos POE	1.85
O-4	McAllen	From Peñitas to Abram	4.35
O-5	McAllen	Future Anzalduas POE	1.73
O-6	McAllen	Hidalgo POE	3.86
O-7	Weslaco	Proposed Donna POE	0.90
O-8	Weslaco	Retamal Dam	3.25
O-9	Weslaco	West Progreso POE	3.87
O-10	Weslaco	East Progreso POE	2.33
O-11	Harlingen	Unnamed Border Patrol Road 1—Nemo Road	2.33
O-12	Harlingen	Weaver's Mountain	0.96
O-13	Harlingen	West Los Indios POE	1.59
O-14	Harlingen	East Los Indios POE	3.59
O-15	Harlingen	Triangle—La Paloma	1.93
O-16	Harlingen	Unnamed Border Patrol Road 2—Estero	2.45
O-17	Brownsville	Proposed Carmen Road Freight Train Bridge	1.63
O-18	Brownsville	Proposed Flor De Mayo POE to Garden Park	3.58
O-19	Brownsville	Brownsville/Matamoros (B&M) POE to Los Tomates	3.37
O-20	Brownsville	Los Tomates to Veterans International Bridge	0.93
O-21	Fort Brown	Veterans International Bridge to Sea Shell Inn	12.99
Total			**70.00**

Notes:

[a] Primary pedestrian fence includes picket, bollard, floating, and concrete flood protection structure/concrete fences.

POE = port of entry.

Table 1-2. Fence Properties and Species' BMPs to be Implemented by Section

Tactical Infrastructures Section	Length (miles)	Pile Driving	Access Roads (numbers)	Staging Area (number/ acres)	Species' BMPs[a,b]	Wildlife Openings
O-1	3.76	Yes	3	4/15.88	Ocelot, Jaguarundi, Johnston's Frankenia, Star Cactus, Zapata Bladderpod	20
O-2	8.75	No	5	2/23.91	Ocelot, Jaguarundi, Star Cactus, Walker's Manioc	34
O-3	1.85	No	6	3/2.68	Ocelot, Jaguarundi, Texas ayenia, Walker's Manioc	21
O-4	4.35	Yes	3	4/4.29	Ocelot, Jaguarundi	0
O-5	1.73	Yes	3	1/2.1	Ocelot, Jaguarundi, Walker's Manioc	0
O-6	3.86	Yes	7	5/28.9	Ocelot, Jaguarundi	0
O-7	0.90	Yes	3	1/3.43	Ocelot, Jaguarundi	0
O-8	3.25	Yes	4	2/10.1	Ocelot, Jaguarundi	0
O-9	3.87	Yes	3	2/8.23	Ocelot, Jaguarundi, Texas ayenia	0
O-10	2.33	Yes	2	2/11.03	Ocelot and Jaguarundi	0
O-11	2.33	No	2	3/28.8	Ocelot, Jaguarundi	35
O-12	0.96	Yes	2	2/3.75	Ocelot, Jaguarundi	35

Tactical Infrastructures Section	Length (miles)	Pile Driving	Access Roads (numbers)	Staging Area (number/ acres)	Species' BMPs[a,b]	Wildlife Openings
O-13	1.59	No	1	1/4.6	Ocelot, Jaguarundi	35
O-14	3.59	Yes	4	4/2.19	Ocelot, Jaguarundi, Texas ayenia	13
O-15	1.93	No	3	2/5.26	Ocelot, Jaguarundi, Texas ayenia	37
O-16	2.45	No	3	1/1.11	Ocelot, Jaguarundi, South Texas Ambrosia	19
O-17	1.63	No	2	2/3.58	General, Ocelot, Jaguarundi	27
O-18	3.58	No	4	4/6.55	Ocelot and Jaguarundi, Texas ayenia	28
O-19	3.37	No	4	2/6.17	Ocelot, Jaguarundi, Texas ayenia	21
O-20	0.93	No	1	2/2.37	Ocelot, Jaguarundi	11
O-21	12.99	Yes	14	6/26.4	Ocelot, Jaguarundi, South Texas Ambrosia, Texas ayenia	102

Notes:

[a] Respective species' BMPs will be implemented in each section to the extent possible.

[b] General BMPs and BMPs for temporary impacts will be implemented in all sections to the extent possible.

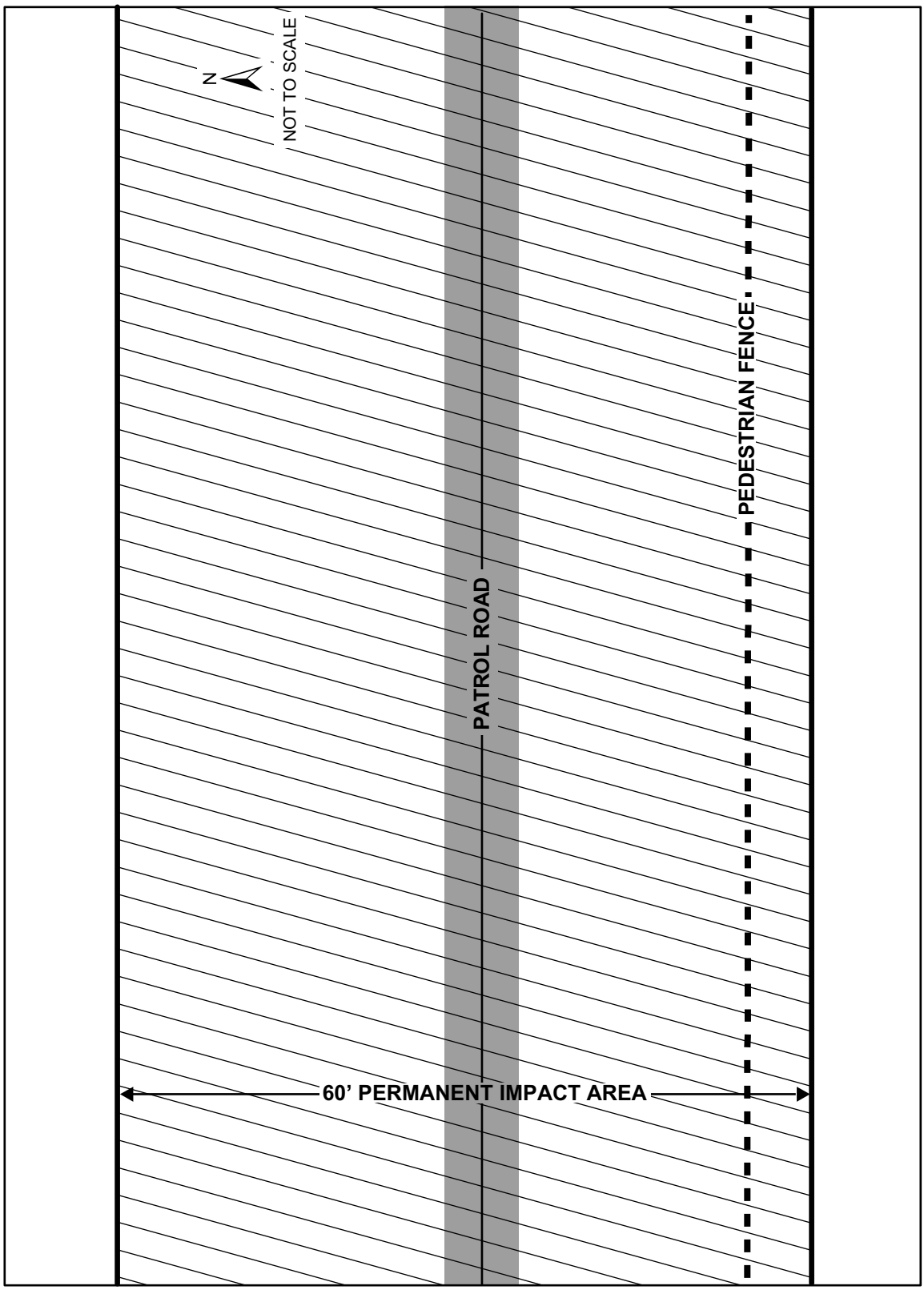


Figure 1-4. Schematic of Typical Project Footprint for Sections O-1 and O-3 and O-11 through O-21

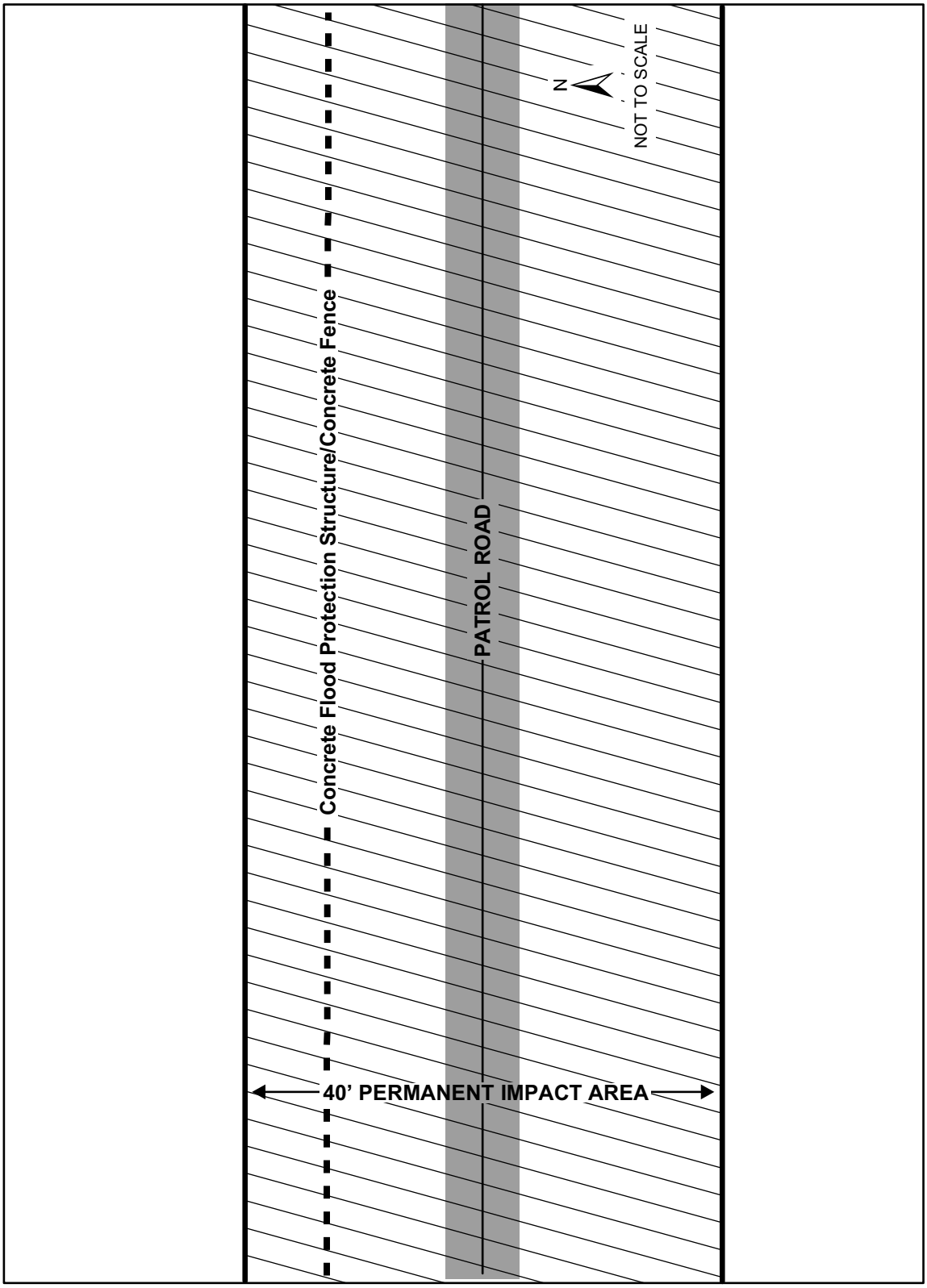


Figure 1-5. Schematic of Typical Project Footprint for Sections O-4 through O-10

Figure 1-6. Photograph of a Typical Primary Pedestrian Fence (Representing Fence Types P-1 and P-2)

the levee (see **Figure 1-7**). Floating fences are generally concrete barriers with pickets anchored on top. Concrete retaining walls consist of prefabricated concrete wall panels sheet-piled into an existing embankment. The concrete flood protection structures/concrete fence consists of a concrete retaining wall built on the south side of the levee and includes a road within the current footprint of the levee ROW (see **Figure 1-8**). Wildlife openings cannot be placed into floating fence, concrete retaining walls, or concrete flood protection structures/concrete fence.

Additional details on each fence design and construction sequencing are presented below. Construction of the proposed tactical infrastructure will begin in Spring 2008 and continue through December 2008. Because each discrete tactical infrastructure section represents an individual project that could proceed independently, multiple sections will be under construction simultaneously.

All equipment and materials (e.g., steel bollards, pickets, prefabricated fence and wall panels) will be transported to the site using heavy diesel trucks such as tractor trailers and dump trucks using the designated construction access roads. The storing and staging of equipment will occur in the staging areas. Construction access areas and staging areas will be temporarily used for the duration of construction for each section. Existing roads will be used for

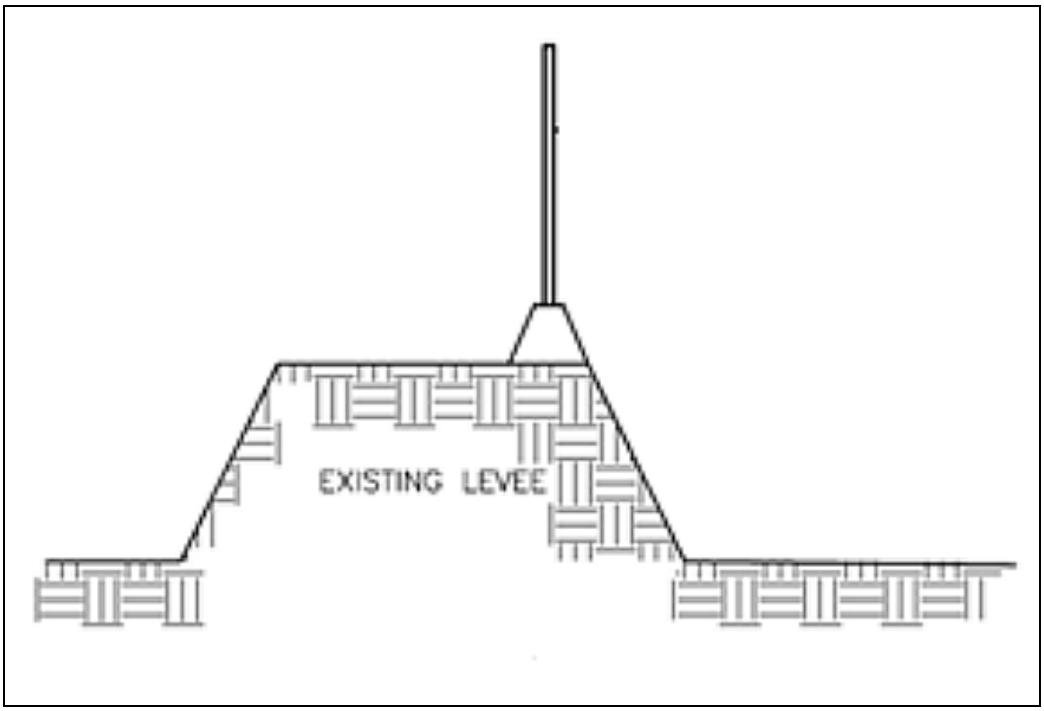


Figure 1-7. Cross Section of Typical Floating Primary Pedestrian Fence (Fence Type P-3B-15)

construction access, but vegetation removal and disturbance will be required. Staging areas were planned for disturbed areas to the maximum extent practicable; however, vegetated areas will also be used for staging areas.

For all fence types, construction will begin with site preparation, which includes necessary grading, contouring, and vegetation removal. It is anticipated that grading and contouring will be minimal for primary pedestrian fence and floating primary pedestrian fences. Site preparation will be more involved for flood protection structures/concrete fence (as described below). Early phases of construction will be accomplished using heavier diesel earthmoving equipment. Later phases of construction projects involve tasks such as welding, cutting, and applying surface coatings. These will be accomplished using generally lighter, gasoline powered equipment.

It is assumed that noise generation will last only for the duration of construction activities. Noise attenuates over distance; a gradual decrease in noise levels occur the farther a receptor is away from the source of noise. Typical construction noise levels will decrease as the distance increases from the source. It is estimated that at around 50 feet from certain construction activities the noise level will be approximately 85 dBA, at around 300 feet the noise level will be approximately 70 dBA, and at around 5,280 feet (1 mile) the noise level will be approximately 45 dBA (which would be less than expected ambient noise levels). Additionally, pile driving will be used for construction within Sections O-1, O-4 through O-10, O-12, O-14, and O-21. However, when pile driving occurs,

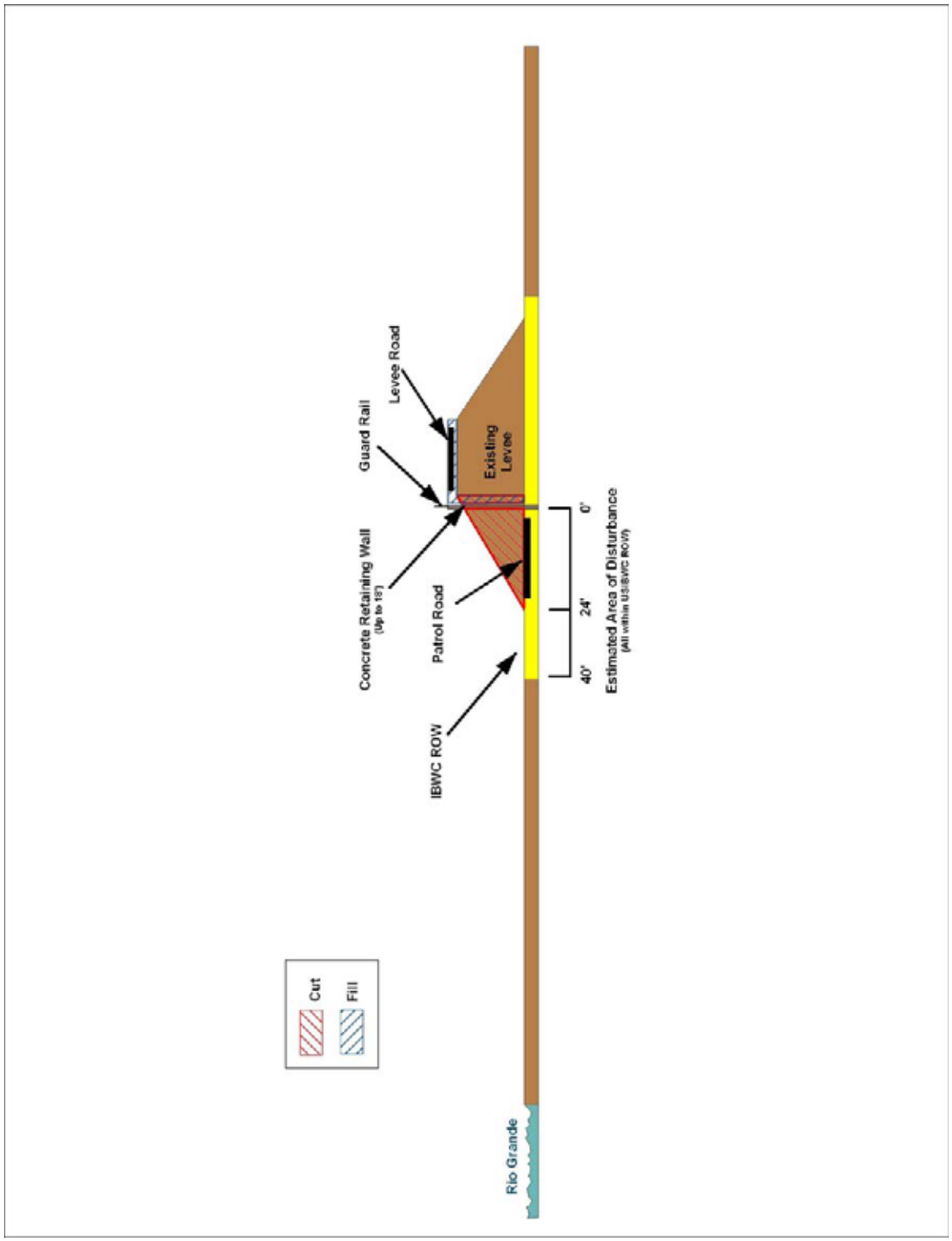


Figure 1-8. Illustration of Typical Flood Protection Structure/Concrete Fence

noise levels will be 101 dBA at 50 feet and will attenuate to 70 dBA at around 1,800 feet. It is assumed that no pile driving will occur at night. Noise will not affect the entire corridor at one time, but will move along the corridor with construction. An additional temporary source of noise will be associated with construction vehicle traffic along temporary construction access roads. Existing roads will be used as construction access roads.

Primary Pedestrian Fence Fence (Sections O-1 through O-3 and O-11 through O-21). To primary pedestrian fences, trenches will be dug and filled with concrete. The steel bollards and/or pickets will be placed into the concrete-filled trenches. Bollards will then be filled with additional concrete. Pickets (Fence Type P–1) and bollards (Fence Type P-2) will be spaced approximately 3 to 4 inches apart. Bollards and pickets will be 15 to 18 feet high. Wildlife openings (8.5 by 11 inches) will be placed in the fence at ground level. Primary pedestrian fences will require very little site preparation (grading and contouring).

Floating Primary Pedestrian Fence (Sections O-1, O-2, O-3, O-14, O-17, O–19, O-21). Sections of prefabricated floating primary pedestrian fence (Fence Type P-3B-15) will be placed on the levee using heavy diesel equipment. Floating fence is removable prefabricated floating fence sections constructed with 15-foot bollards anchored into the concrete barrier. Bollards will be spaced 6 inches apart and will then be filled with additional concrete. Prefabricated floating sections will require very little site preparation (grading and contouring).

Concrete Retaining Wall (Fence Type M-1) (Section O-1). The concrete retaining wall will be constructed by driving prefabricated concrete retaining wall panels (sheet pile) into or against existing embankments. Site preparation will include cutting, filling, and grading of existing embankment. Heavy diesel equipment will be used both for site preparation and placement of prefabricated wall panels.

Concrete Flood Protection Structure/Concrete Fence (Southern Toe of Levee), O-4 through O-10. The concrete flood protection structure/concrete fence will range from 15 to 18 feet high (based on USIBWC requirements to not impact floodwaters in Mexico, in accordance with international treaty obligations).

A guard rail or bollard fence will be constructed on top of the concrete flood protection structure/concrete fence for the safety of drivers on the patrol road atop the levee. A patrol road will be built on the river side of and adjacent to the bottom of the concrete flood protection structure/concrete fence (see **Figure 1-8**). Gates and ramps will be constructed to provide access to landowners, where determined to be applicable during site visits. Additionally, intermittent metal fencing will be constructed where necessary. Construction of additional tactical infrastructure might be required in the future, as mission and operational requirements are continually reassessed.

The concrete flood protection structure/concrete fence will be constructed within the footprint of the USIBWC levee ROW, and the patrol roads and all

construction activities will be contained within the USIBWC ROW. Construction contractors will be restricted to disturbing a maximum of 500-foot sections of levee fence construction, in case the levee has to be restored in preparation for a hurricane or flood. Construction of the concrete flood protection structure/concrete fence will consist of the following:

1. Removing and stockpiling levee soils. Levee cut and fill requirements are estimated to be 978,592 cubic yards. Temporary stockpiling of soils will occur within the USIBWC ROW or on approved construction staging areas.
2. Installing temporary sheet piles or concrete forms where the levee soils have been removed. This step will require pile driving.
3. Placing preformed concrete panels or pouring concrete to form the concrete flood protection structure/concrete fence. The estimated quantity of concrete required for the concrete flood protection structure/concrete fence is 230,778 cubic yards.
4. Replacing levee soils behind the concrete flood protection structure/concrete fence and repairing the 16- to 24-foot-wide patrol road on top of the USIBWC levee.
5. Building a USBP patrol road adjacent to and on the river side of the concrete flood protection structure/concrete fence.

It is estimated that 23 construction crews will work simultaneously on the concrete flood protection structure/concrete fence. In addition to the laborers, these crews will use standard construction equipment such as dump trucks, excavators, and concrete pump trucks. If approved, construction of the concrete flood protection structure/concrete fence will begin around June 2008 and continue through December 2008.

Gates and Ramps. Gates and ramps will be constructed to allow USBP personnel, USIBWC, and landowners to have access to land, the Rio Grande and other water resources, and infrastructure. The Project will include the construction of approximately 90 secure access gates. Gates will be wide enough to allow access for necessary farming or firefighting equipment. In other cases, gates will be situated to provide access to existing recreational amenities; water resources, including pump houses and related infrastructure; grazing areas; existing parks; and other areas.

1.2.2 Roads

Patrol roads will be constructed on the north side of the primary pedestrian fence in Sections O-1 through O-3, O-11 through O-16, and O-21; and on the south side in Sections O-4 through O-10 and O-17 through O-20, within the current footprint of the levee ROW. Patrol roads will be constructed primarily by grading and contouring with heavy diesel earthmoving equipment. The patrol roads will be surfaced with caliche or other similar local material, if necessary for

construction, which will be transported to the project site with heavy diesel equipment, such as dump trucks.

1.2.3 Operations and Maintenance

There will be no significant change in USBP Rio Grande Valley Sector operations based on the Project. Operational activities (for example, patrols and apprehensions) will move from existing patrol roads to the new patrol roads that are being built along the north side of the primary pedestrian fence (Sections O-1 through O-3, Sections O-11 through O-16, and Section O-21) or the south side of the levees (Sections O-4 through O-10 and Sections O-17 through O-20), but no significant change in the number of patrols is expected. The USBP Rio Grande Valley Sector operations routinely adapt to evolving operational requirements, and will continue to do so under the Project. The USBP Rio Grande Valley Sector will retain its current flexibility to use the most effective methods to provide a law enforcement resolution to illegal cross-border activity.

Maintenance of the primary pedestrian fence will include removal of debris and vegetation, and provide fence and wall repairs, when necessary, in addition to other maintenance activities. The fences will be made from non-reflective steel. No painting will be required. Fence maintenance will include removing any accumulated debris on the fence after a rain event to avoid potential future flooding. Soil/sand that builds up against the fence and brush will also be removed as needed. Vegetation will be maintained as needed, under a fence maintenance contract. Vegetation removal could include mowing, removal of small trees, and the application of herbicides if needed within the 60-foot project corridor on the north side of the levee for Sections O-1 through O-3 and O-11 through O-21, and in the 40-foot project corridor on the south side of the levee for Sections O-4 through O-10. CBP will continue to coordinate with USIBWC regarding requirements for USIBWC mowing operations. During normal patrols, Sector personnel will observe the condition of the fence. Any damage or breaches of the fence will be repaired, as needed, by a contractor.

Fence maintenance will initially be performed by USBP Sector personnel but will eventually be contractor-performed. A Memorandum of Agreement (MOA) between CBP and USIBWC will be developed to address each agency's responsibilities for maintaining the concrete flood protection structure/concrete fence, patrol roads, and access roads.

1.3 BEST MANAGEMENT PRACTICES

1.3.1 Pre-Construction

Pre-Construction Surveys

Prior to the Secretary's waiver and in order to meet the schedule requirements associated with the Project and avoid impacts on ocelot, jaguarundi, federally listed plants (including Walker's manioc, Texas ayenia, and Zapata bladderpod)

and their habitats, and Zapata bladderpod critical habitat, the U.S. Army Corps of Engineers (USACE) requested emergency consultation for pre-project surveys to assess environmental concerns in support of the Environmental Stewardship Plan (ESP). These surveys included the following:

- Visual inspections
- Natural resource surveys
- Cultural resource surveys
- Ground control and aerial fly-overs
- Geotechnical surveys
- Wetland delineations
- Environmental due diligence assessments.

For biological resources, the U.S. Fish and Wildlife Service (USFWS) concurred with the request for emergency consultation. Based on the emergency consultation, CBP, USACE, and their consultants coordinated their activities with the USFWS to plan project implementation in a manner designed to avoid and minimize impacts to threatened and endangered species to the extent practicable. A biological monitor accompanied all pre-construction surveys. To date, impacts to federally listed species have not occurred during pre-project surveys. If impacts do occur during these surveys, they will be documented. The following best management practices (BMPs) are being implemented during pre-construction surveys to avoid or minimize impacts:

1. Pre-construction surveys will identify any ocelot habitat in or adjacent to the project area, and the presence of the ocelot at the habitat area will be assumed.
2. Pre-construction surveys will identify any jaguarundi habitat in or adjacent to the project area, and the presence of the jaguarundi at the habitat area will be assumed.
3. Pre-construction surveys will be conducted on all intact Texas ayenia habitat within the impact corridor in Cameron, Hidalgo, and Starr counties prior to initiation of activities that may affect individual plants or habitat.

1.3.2 Construction BMPs

The following BMPs should be implemented to avoid or minimize impacts associated with the Project during construction. All general BMPs and BMPs for temporary impacts will be implemented in each tactical infrastructure section, to the extent possible. Species-specific BMPs will only be implemented in sections where the Project may affect a federally listed species. The species-specific BMPs that will be implemented in each tactical infrastructure section, to the extent possible, are listed in **Table 1-2**. These represent project objectives for implementation to the extent possible and will be incorporated into construction and monitoring contracts.

General BMPs

1. Where, based on species location maps and/or results of surveys, individuals of a federally listed species could be present on or near the project site, a designated biological monitor will be present during the activity to protect individuals of the species from harm. Duties of the designated biological monitor will include ensuring that activities stay within designated project areas, evaluating the response of individuals that come near the project site, and implementing the appropriate BMPs. The designated biological monitor will notify the construction manager of any activities that may harm or harass an individual of a federally listed species. Upon such notification, the construction manager shall temporarily suspend all subject activities and notify the Contracting Officer, the Administrative Contracting Officer, and the Contracting Officer's Representative of the suspense so that the key USACE personnel may be notified, apprised of the situation, and the potential conflict resolved.
2. All construction and maintenance projects in federally listed habitats should have a designated biological monitor on site during the work. The biological monitor should document implementation of construction-related BMPs as designed for the project to reduce the potential for adverse effects to the species or their habitats. Reports from the biological monitor should be used for developing the Project Report.
3. If an individual of a federally listed species is found in the designated project area, work will cease in the area of the species until either a qualified biological monitor can safely remove the individual, or it moves away on its own, to the extent possible, construction schedule permitting.
4. During construction activities in or within 500 feet of ocelot habitat (or such distance that noise, light, or other effects reach the habitat), the designated biological monitor will be present on site to advise the construction manager to temporarily suspend construction whenever the appropriate BMPs agreed to are not being properly implemented.
5. During construction activities in or within 500 feet of jaguarundi habitat (or such distance that noise, light, or other effects reach the habitat), a biological monitor will be present on site to advise the construction manager to temporarily suspend construction whenever the appropriate BMPs agreed to are not being properly implemented.
6. CBP will develop (in coordination with the USFWS) a training plan regarding Trust Resources for CBP and construction personnel. At a minimum, the program will include the following topics: occurrence of the listed and sensitive species in the area, their general ecology, sensitivity of the species to human activities, project features designed to reduce the impacts to these species and promote continued successful occupation of the project area environments by the species.

Included in this program will be color photos of the listed species, which will be shown to the employees. Following the education program, the photos will be posted in the contractor and resident engineer office, where they will remain throughout the duration of the project. The selected construction manager will be responsible for ensuring that employees are aware of the listed species. This BMP does not apply to border patrol operations.

7. Project Reports. For fence construction, within 3 months of project completion, a Project Report will be developed that details the BMPs that were implemented, identifies how well the BMPs worked, discusses ways that BMPs could be improved for either protection of species and habitats or implementation efficiency, and reports on any federally listed species observed at or near the project site. If site restoration is included as part of the project, the implementation of that restoration and any follow-up monitoring will be included. Annual reports may be required for some longer term projects. The Project Report and any annual reports will be made available to the USFWS.
8. Relocation of individuals of federally listed plants found in the project area is generally not a suitable activity. Relocation of aquatic species is not appropriate. Relocation of small cacti has not been very successful, and is not recommended. Survival rates of translocated plants are usually very low; however, translocation may be considered where there are no other alternatives. For particular actions, the USFWS will advise CBP regarding relocation of plants.
9. Particular importance is given to proper design and locating roads such that the potential for roadbed erosion into federally listed species habitat will be avoided or minimized.
10. Particular importance is given to proper design and locating roads such that the potential for entrapment of surface flows within the roadbed due to grading should be avoided or minimized. Depth of any pits created will be minimized so animals do not become trapped.
11. Particular importance is given to proper design and locating roads such that the widening of existing or created roadbed beyond the design parameters due to improper maintenance and use will be avoided or minimized.
12. Where, practicable, Particular importance is given to proper design and locating roads such that stream crossings should not be located near or at bends or meanders but rather at straight stream reaches where channel stability is enhanced.
13. Particular importance is given to proper design and locating roads such that excessive use of unimproved roads that results in their deterioration and affects the surrounding federally listed species habitat areas will be minimized. Road construction and road use for construction will be monitored and documented in the Project Report.

14. Particular importance is given to proper design and locating roads such that the fewest roads needed for the projects will be constructed and they are maintained to proper standards. Roads no longer needed by the government will be closed and restored to natural surface and topography using appropriate techniques. The GPS coordinates of roads that are thus closed will be recorded and integrated into the Office of Border Protection (OBP) GIS database. A record of acreage or miles of roads taken out of use, restored, and revegetated, will be maintained.
15. The width of all roads that are created or maintained by CBP will be measured and recorded using GPS coordinates and integrated into the OBP GIS database. Maintenance actions will not increase the width of the roadbed or the amount of disturbed area beyond the roadbed.
16. The perimeter of all areas to be disturbed during construction or maintenance activities will be clearly demarcated using flagging or temporary construction fence, and no disturbance outside that perimeter will be authorized.
17. Materials such as gravel or topsoil will be obtained from existing developed or previously used sources, not from undisturbed areas adjacent to the project area.
18. All access routes into and out of the project disturbance area will be flagged, and no construction travel outside those boundaries will be authorized.
19. If new access is needed or existing access requires improvements to be usable for the project, related road construction and maintenance BMPs will be incorporated into the access design and implementation.
20. When available, areas already disturbed by past activities or those that will be used later in the construction period will be used for staging, parking, and equipment storage.
21. Within the designated disturbance area, grading or topsoil removal will be limited to areas where this activity is needed to provide the ground conditions needed for construction or maintenance activities. Minimizing disturbance to soils will enhance the ability to restore the disturbed area after the project is complete.
22. Removal of trees and brush in habitats of federally listed species will be limited to the smallest amount needed to meet the objectives of the project. This would likely be a permanent impact on habitat.
23. Water for construction use shall be from wells or irrigation water sources at the discretion of the landowner (depending on water rights). If local groundwater pumping is an adverse effect to aquatic, marsh, or riparian dwelling federally listed species, treated water from outside the immediate area will be utilized.
24. Surface water from aquatic or marsh habitats will not be used if that site supports aquatic federally listed species or if it contains non-native

invasive species or disease vectors and there is any opportunity to contaminate a federally listed species habitat through use of the water at the project site.

25. Wells or irrigation water sources will be used when within 1 mile of aquatic habitat for federally listed aquatic species. This is to prevent the transfer of invasive animals or disease pathogens between habitats, if water on the construction site were to reach the federally listed species habitats.
26. Storage tanks containing untreated water will be of a size that if rainfall was to occur, the tank (assuming open), would not be overtopped and cause a release of water into the adjacent drainages. Water storage on the project area will be in on-ground containers located on upland areas, not in washes.
27. Pumps, hoses, tanks, and other water storage devices will be cleaned and disinfected with a 10 percent bleach solution at an appropriate facility before use at another site (this water is not to enter any surface water area). If a new water source is used that is not from a treated or groundwater source, the equipment will require additional cleaning. This is important to kill any residual disease organisms or early life stages of invasive species that may affect local populations of federally listed species.
28. CBP will develop and implement storm water management plans for every project.
29. All construction shall follow DHS management directive 5100 for waste management.
30. A CBP-approved spill protection plan will be developed and implemented at construction and maintenance sites to ensure that any toxic substances are properly handled and that escape into the environment is prevented. Agency standard protocols will be used. Drip pans underneath equipment, containment zones used when refueling vehicles or equipment, and other measures are to be included.
31. Nonhazardous waste materials and other discarded materials, such as construction waste, will be contained until removed from the construction site. This will assist in keeping the project area and surroundings free of litter and reduce the amount of disturbed area needed for waste storage.
32. To eliminate attracting predators of protected animals, all food-related trash items such as wrappers, cans, bottles, and food scraps will be disposed of in closed containers and removed daily from the project site.
33. Waste water is water used for project purposes that is contaminated with construction materials or from cleaning equipment and thus carries oils or other toxic materials or other contaminants as defined in state regulations. Waste water will be stored in closed containers on site until removed for disposal. Concrete wash water will not be dumped on the

ground, but is to be collected and moved offsite for disposal. This wash water is toxic to aquatic life.

34. Waste management may be of special concern at staging areas, work camps, bivouacs, and camp details. Provision will be made for proper waste disposal at these sites, and implementation of waste management protocols will be made the responsibility of the appropriate project officers.
35. Construction speed limits will not exceed 35 mph on major unpaved roads (graded with ditches on both sides) and 25 mph on all other unpaved roads. Night time travel speeds will not exceed 25 mph, and may be less based on visibility and other safety considerations. Construction at night will be minimized.
36. If construction or maintenance activities continue at night, all lights will be shielded to direct light only onto the work site and the area necessary to ensure the safety of the workers. The minimum foot candles needed will be used and the number of lights will be minimized.
37. Noise levels for day or night construction and maintenance will be minimized. All generators will be in baffle boxes (a sound-resistant box that is placed over or around a generator), have an attached muffler, or use other noise-abatement methods in accordance with industry standards.
38. Transmission of disease vectors and invasive non-native aquatic species can occur if vehicles cross infected or infested streams or other waters, and water or mud remains on the vehicle. If these vehicles subsequently cross or enter uninfected or noninfested waters, the disease or invasive species may be introduced to the new area. To prevent this, crossing of streams or marsh areas with flowing or standing water will be avoided, and if not avoidable, the vehicle will be sprayed with a 10 percent bleach solution.
39. Materials used for on-site erosion control in uninfested native habitats will be free of non-native plant seeds and other plant parts to limit potential for infestation. Since natural materials cannot be certified as completely weed-free, if such materials are used, there will be follow-up monitoring to document establishment of non-native plants, and appropriate control measures will be implemented for a period of time to be determined in the site restoration plan.
40. Fences and walls will provide for passage of wildlife species. Impermeable fences and walls will not be constructed in key wildlife movement corridors, to the extent practicable. The type of passage needed will vary with the location of the barrier and the species that occur in that area. Specific designs and locations will be coordinated with the USFWS, TPWD, and the landowner/manager.
41. For purposes of construction, infrastructure sites will be accessed using only designated roads. Parking will be in designated areas. This will limit

the development of multiple trails to such sites and reduce the effects to federally listed habitats in the vicinity.

42. Appropriate techniques to restore the original grade, replace soils, and restore proper drainage will be implemented.
43. During follow-up monitoring and during maintenance activities, invasive plants found on the site will be removed. Removal will be done in ways that eliminate the entire plant and remove all plant parts to a disposal area. All chemical applications on refuges must be used in coordination with the refuge manager to ensure accurate reporting. Herbicides can be used according to label directions. The monitoring period will be defined in the site restoration plan. Training to identify non-native invasive plants will be provided for CBP contractor personnel or contractors, as necessary.
44. To prevent entrapment of wildlife species when emplacing vertical posts/bollards, all vertical fence posts/bollards that are hollow (i.e., those that will be filled with a reinforcing material such as concrete), shall be covered so as to prevent wildlife from entrapment. Covers will be deployed from the time the posts or hollow bollards are erected to the time they are filled with reinforcing material.

BMPs for Temporary Impacts

The following apply as offsetting conservation measures for temporary impacts.

45. Site restoration for staging areas and construction access routes will be monitored (see **General BMP, Number 2**), as appropriate.
46. During follow-up monitoring of any restoration areas, invasive plants that appear on the site will be removed. Mechanical removal will be done in ways that eliminate the entire plant and remove all plant parts to a disposal area. All chemical applications on refuges must be used in coordination with the refuge manager to ensure accurate reporting. Herbicides can be used according to label directions. The monitoring period will be defined in the site restoration plan. Training to identify non–native invasive plants will be provided for CBP contractor personnel or contractors, as necessary.

Ocelot

1. Pre-construction surveys will identify any ocelot habitat in or adjacent to the project area, and the presence of the ocelot at the habitat area will be assumed.
2. During construction activities in or within 500 feet of ocelot habitat (or such distance that noise, light, or other effects reach the habitat), a biological monitor will be present on site to advise the construction manager to temporarily suspend construction whenever the appropriate BMPs agreed to are not being properly implemented.

3. In planning for roads, fences, and other facilities that require land clearing, include avoidance of wetlands, dense thorn scrub, and riparian vegetation as a consideration for facility location.
4. Removal of wetland habitat, dense thorn scrub, or riparian vegetation will be avoided or minimized.
5. Removal of dense thorn scrub or riparian vegetation within the conservation easements established by the USIBWC for the Rio Grande will be avoided to the extent practicable.
6. To the extent practicable, impermeable fences/barriers will not be constructed that bisect or fragment ocelot dispersal corridors.
7. If freshwater sources are limited, impermeable barriers will not be constructed that prevent ocelot access to freshwater sources, to the extent practicable.
8. Where artificial lighting must be used during construction, directed (shielded) lighting will be used and directed away from ocelot (thorn scrub and riparian) habitat. The number and wattage of lights will be limited to the minimum needed to ensure construction worker safety and productivity.
9. Documentation of ocelots in project and activity areas will be reported to USFWS.
10. Construction and maintenance activities will be conducted during daylight hours only to avoid noise and lighting issues during the night. If construction or maintenance work activities continue at night, all lights will be shielded to direct light only onto the work site or as required for worker safety and productivity; the minimum wattage needed will be used, and the number of lights will be minimized.

Jaguarundi

1. Pre-construction surveys will identify any jaguarundi habitat in or adjacent to the project area, and the presence of the jaguarundi at the habitat area will be assumed.
2. During construction activities in or within 500 feet of jaguarundi habitat (or such distance that noise, light, or other effects reach the habitat), a biological monitor will be present on site to advise the construction manager to temporarily suspend construction whenever the appropriate BMPs agreed to are not being properly implemented.
3. In planning for roads, fences, and other facilities that require land clearing, the avoidance of wetlands, dense thorn scrub, and riparian vegetation as a consideration for facility location will be included.
4. Removal of wetland habitat, dense thorn scrub, or riparian vegetation will be avoided or minimized.

5. To the extent practicable, removal of dense thorn scrub or riparian vegetation within the conservation easements for the cat corridor established by the USIBWC along the Rio Grande will be avoided.
6. To the extent practicable, impermeable fences/barriers will not be constructed that bisect or fragment jaguarundi dispersal corridors.
7. If freshwater sources are limited, impermeable barriers will not be constructed that prevent jaguarundi access to freshwater sources, to the extent practicable.

Texas Ayenia

1. Surveys will be conducted on all intact Texas ayenia habitat within the impact corridor in Cameron, Hidalgo, and Starr counties before beginning activities that may affect individual plants or habitat.
2. Prevent or control guinea grass and other invasive plants from colonizing uninfested native habitat following CBP disturbance.
3. Minimize permanent impacts to individual populations and habitats.
4. Reduce the duration of impacts to populations and habitats.
5. Where it is necessary to temporarily remove vegetation, cut plants above ground level rather than clearing with bulldozers, root plows, or other implements that cut into the soil.
    a. Above-ground cutting only in demonstrably high-quality Texas ayenia habitat.
    b. Above-ground height not to exceed 2 inches.

Star Cactus

1. Disturbance to star cactus populations and occupied habitat, including land clearing, introduction and spread of invasive plants, herbivory, trampling, and exposure to toxic substances, should be avoided. Surveys should be conducted on all intact star cactus habitat and potential habitat in the impact corridor in western Hidalgo and Starr counties before beginning activities that may affect individual plants or habitat. In cases where project activities cannot completely avoid star cactus populations and occupied habitat, the impacts to the populations and habitat should be minimized as much as possible. Minimization may be accomplished by, but is not limited to, the following methods:
    - Prevent or control buffelgrass and other invasive plants from colonizing sites following disturbance.
    - Minimize permanent impacts to individual populations and habitats.
    - Reduce the duration of impacts to populations and habitats.
    - Where it is necessary to temporarily remove vegetation, cut plants

above ground level rather than clearing with bulldozers, root plows, or other implements that cut into the soil.

Johnston's frankenia

1. Disturbance to Johnston's frankenia populations and occupied habitat, including land clearing, introduction and spread of invasive plants, herbivory, trampling, and exposure to toxic substances, should be avoided. Surveys should be conducted on all intact Johnston's frankenia habitat and potential habitat in the impact corridor in Starr County before beginning activities that may affect individual plants or habitat. In cases where project activities cannot completely avoid Johnston's frankenia populations and occupied habitat, the impacts to the populations and habitat should be minimized as much as possible. Minimization may be accomplished by, but is not limited to, the following methods:
   - Prevent or control buffelgrass and other invasive plants from colonizing sites following disturbance.
   - Minimize permanent impacts to individual populations and habitats.
   - Reduce the duration of impacts to populations and habitats.
   - Where it is necessary to temporarily remove vegetation, cut plants above ground level rather than clearing with bulldozers, root plows, or other implements that cut into the soil.

Walker's Manioc

1. Surveys will be conducted in the impact corridor on all intact Walker's manioc habitat in Starr and Hidalgo counties before beginning activities that may affect individual plants or habitat.
2. Prevent or control invasive plants from colonizing uninfested native habitat following disturbance.
3. Minimize permanent impacts to individual populations and habitats.
4. Reduce the duration of impacts to populations and habitats.
5. Where it is necessary to temporarily remove vegetation, cut plants above ground level rather than clearing with bulldozers, root plows, or other implements that cut into the soil.
   a. Above-ground cutting only in suitable Walker's manioc habitat.
   b. Above ground height not to exceed 2 inches.

Zapata Bladderpod

1. Because loss of habitat is a significant risk to the Zapata bladderpod, no roads, fences, structures, or other on-ground facilities will be placed on areas containing the substrates that support the Zapata bladderpod. If

these areas cannot be avoided, minimization and compensation will be included in the project design.

2. Pre-construction surveys are not required as long as projects are located outside suitable habitat areas. Projects within suitable habitat will require site-specific surveys of the project area.
3. Materials such as gravel will be obtained from existing developed or previously used sources, not from habitat areas that could support the Zapata bladderpod.
4. The need for and extent of site restoration will be coordinated with the landowner/manager.
5. Directed research, surveys, or restoration activities included in the Recovery Plan may be implemented, by USFWS, if areas of Zapata bladderpod habitat are adversely affected. The scope of compensation will depend on the amount of area disturbed or degree of effect on the Zapata bladderpod.

South Texas Ambrosia

1. Disturbance to south Texas ambrosia populations and occupied habitat, including land clearing, introduction and spread of invasive plants, herbivory, trampling, and exposure to toxic substances, should be avoided. Surveys should be conducted on all intact south Texas ambrosia habitat and potential habitat in the impact corridor in the coastal grassland of Cameron County before beginning activities that may affect individual plants or habitat. In cases where project activities cannot completely avoid south Texas ambrosia populations and occupied habitat, the impacts to the populations and habitat should be minimized as much as possible. Minimization may be accomplished by, but is not limited to, the following methods:
   - Prevent or control buffelgrass, Kleberg bluestem, and other invasive plants from colonizing sites following disturbance.
   - Minimize permanent impacts to individual populations and habitats.
   - Reduce the duration of impacts to populations and habitats.
   - Where it is necessary to temporarily remove vegetation, cut plants above ground level rather than clearing with bulldozers, root plows, or other implements that cut into the soil.

1.3.3 Compensation

The following apply as offsetting compensation for impacts associated with the project (based on GIS data, dated 6 May 2008). Actual impacts to habitats will be documented during construction by the environmental monitors and included in the Project Report which will be made available to USFWS.

1. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for any vegetation removal or disturbance for all staging areas by acquiring like land in the ratio of 3:1 for shrubland, woodland, and forest habitat types (for every 1 acre removed or disturbed, 3 acres will be acquired), and 1:1 for grasslands (see **Table 1–3**). Open water and wetland habitats may be compensated for as appropriate for waters of the United States. See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
2. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for any vegetation removal or disturbance for all access roads by acquiring like land in the ratio of 3:1 for shrubland, woodland, and forest habitat types, and 1:1 for grasslands (see **Table 1–3**). Open water and wetland habitats may be compensated for as appropriate for waters of the United States. See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
3. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for any vegetation removal or disturbance resulting from all other activities not mentioned above, including loss of connectivity and for the footprint of the project in Section O-4 to O-10, by acquiring 1,700 acres of land with habitat value south of the concrete flood protection wall (concrete fence). See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
4. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for all activities and for the footprint of the project that abuts or enters National Wildlife Refuge or Refuge-managed property in Section O-1 to O-3 and O-11 to O-21 by acquiring like land in the amount of 73 acres/mile of impact area. See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
5. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for any vegetation removal or disturbance in the footprint of the project in Section O-1 to O-3 and O-11 to O-21 by acquiring like land in the ratio of 3:1 for shrubland, woodland, and forest habitat types, and 1:1 for grasslands (see **Table 1-3**). Open water and wetland habitats may be compensated for as appropriate for waters of the United States. See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.

Table 1-3. Acres of Vegetation Impacts in the Project Footprint

Project Component	Vegetation Impacts*						
	Grassland (acres)	Shrubland (acres)	Woodland (acres)	Open Water (acres)	Riparian Wetlands	Other Land Use (acres)	Total (acres)
60-foot impact corridor, north of Sections O-1 through O-3 and O–11 through O-21	183.834	17.255	63.249	0.705	0	97.298	362.339
40-foot impact corridor, south of Sections O-4 through O-10	52.020	0	1.126	0	5.646	39.846	98.638
Staging areas	57.072	1.993	21.586	0	0	72.159	152.810
Construction access Roads[a]	94.229	16.173	101.922	16.734	0	331.008	560.065
Total Impacts	**387.2**	**35.4**	**187.9**	**17.4**	**5.6**	**540.3**	**1173.9**
Mitigation Ratio	**1:1**	**3:1**	**3:1**	**WOUS[b]**	**WOUS[b]**	**0**	**—**
Acreage of Habitat to Offset	**387.2**	**106.3**	**563.6**	**—**	**—**	**0.0**	**1057.1**

*Based on GIS data, dated 6 May 2008

Notes:

[a] Impacts associated with construction access roads are assumed to be 75 feet from the centerline of the road.

[b] Will be compensated for as appropriate as waters of the United States (WOUS).

6. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for the temporary disturbance impacts of lights in Section O–1 to O-3 and O-11 to O-21 by acquiring 0.25:1 acre of land for the 150-foot corridor around the footprint of the project for those portions of sections which are in potential ocelot and jaguarundi habitat (those that contain suitable native shrub or herbaceous cover which could provide a movement corridor, not agricultural fields or other open, disturbed areas). See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
7. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for the temporary disturbance impacts of noise by acquiring 0.025:1 acre of land for the 300-foot zone of disturbance in sections O-2, O-3, O-11, O-13, and O-15 to O-20; and for the 1,800-foot zone of disturbance in those portions of sections O-1, O-12, O-14, and O-21 that require pile driving. See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
8. Using funds contributed to the mitigation fund by CBP, the USFWS may compensate for reduction or loss of connectivity in Section O-1 to O-3 and O-11 to O-21, in areas with wildlife-friendly fence openings, by acquiring 21.6 acres of land/mile of fence; and in areas where floating fence is used, by acquiring 43.2 acres of land/mile. See **Table 1-4** for a summary of the acreage of habitat to offset impacts, by tactical infrastructure section. Land acquired will be conserved in perpetuity by an appropriate legal instrument.
9. Using funds contributed to the mitigation fund by CBP, the USFWS may develop permanent freshwater sources north of the fence (for example, a water tank powered by a windmill) in Section O-1, O-2, O-8, O–11, and O-21 upon coordination with the natural resource agencies.
10. Surveys were not conducted during the peak season for detecting the presence of federally listed plants. If federally listed plants are found during construction monitoring, CBP will coordinate with the USFWS to implement BMPs and initiate compensation measures.
11. Using funds contributed to the mitigation fund by CBP, the USFWS may fund and/or pursue appropriate conservation measures or recovery objectives in compensation for unavoidable impacts to star cactus populations and habitat. Compensation may be accomplished by, but is not limited to, the following methods:
    - Star cactus habitat that has been destroyed may be replaced by acquiring a similar quantity and quality of habitat which will be conserved in perpetuity by an appropriate legal instrument.

Table 1-4. Compensation Acreage for Habitat Impacts

Tactical Infrastructure Section	Compensation (acres)[a]															
	Access Roads Impacts			Staging Areas Impacts			Project Footprint Impacts , O–4 through O–10	Impacts in National Wildlife Refuges	Project Footprint Impacts, O-1 through O-3 and O-11 through O-21			Impacts from Lights	Impacts from Noise	Impacts from Floating Fence	Impacts from Picket or Bollard Fence	Section Total
	Grassland	Shrubland	Woodland	Grassland	Shrubland	Woodland			Grassland	Shrubland	Woodland					
O-1	7.6	29.6	26.4	8.9	0.03	9.0	—	25.6	3.2	26.6	37.6	17.3	23.4	9.9	61.3	286.43
O-2	10.2	6.7	75.7	9.7	0	0.5	—	93.7	11.9	0	69.1	39.6	7.9	13.0	182.5	520.5
O-3	7.3	0	20.7	0.6	0	3.2	—	49.4	5.2	0.5	9.5	8.9	1.8	5.2	38.4	150.7
O-4	4.2	0	17.4	2.0	0	5.9		—	—	—	—	—	—	—	—	29.5[b]
O-5	1.6	0	6.5	0	0	6.3		—	—	—	—	—	—	—	—	14.4[b]
O-6	5.7	0	12.0	17.7	0	3.1		—	—	—	—	—	—	—	—	38.5[b]
O-7	6.9	0.7	2.2	0	0	0	1700	—	—	—	—	—	—	—	—	9.8[b]
O-8	4.6	0	18.1	0.1	0	0		—	—	—	—	—	—	—	—	22.8[b]
O-9	2.5	0	0.7	1.8	0	0		—	—	—	—	—	—	—	—	5[b]
O-10	10.1	0	2.2	6.0	0	0		—	—	—	—	—	—	—	—	18.3[b]
O-11	1.0	4.8	10.1	0.05	0	2.6	—	—	8.7	0	9.6	10.8	2.2	—	50.3	100.15
O-12	3.4	0	11.0	1.5	0	0	—	—	3.7	0	7.1	4.4	8.6	—	20.1	59.8
O-13	1.7	4.0	0	0.5	4.4	0	—	7.2	5.2	5.2	0	7.5	1.5	—	34.3	71.5
O-14	1.5	0	5.9	0.3	0	0.2	—	—	13.5	0	9.7	16.6	22.7	103.7	25.9	200
O-15	1.7	0	6.9	0.7	0	2.9	—	—	11.2	0	0	8.7	2.1	—	47.7	81.9
O-16	0.6	0.8	23.8	0.03	0	0	—	—	6.7	0.3	4.7	9.8	1.9	—	44.5	93.13
O-17	0.5	0	0	0	0	0.1	—	—	6.9	0	7.0	7.5	1.6	19.0	25.5	68.1
O-18	4.4	1.7	42.5	0.4	0	10.5	—	85.3	20.6	1.5	0.5	16.5	3.3	—	77.5	264.7
O-19	6.0	0.2	2.4	4.2	0	0	—	—	14.4	2.8	5.8	15.4	3.1	47.1	49.2	150.6
O-20	0.5	0.03	1.0	0.6	1.5	0.3	—	—	5.9	0.7	0.3	4.3	0.9	—	20.1	36.13
O-21	12.3	0	20.3	2.0	0	20.0	—	43.9	66.7	14.1	28.9	57.5	71.8	121.0	219.7	678.2
Total	**94.3**	**48.5**	**305.8**	**57.1**	**5.9**	**64.6**	**1700**	**305.1**	**183.8**	**51.7**	**189.8**	**224.8**	**152.8**	**318.9**	**897.0**	4600.1

[a]Based on GIS data, dated 6 May 2008

[b]Includes an additional 1700 acres (total) for Section O-4 through O-10.

- Star cactus habitat that is degraded through vegetation impacts, invasive plant colonization, or other deleterious changes shall be restored to a condition that is consistent with long-term survival and growth of the star cactus population.
- Individual star cactus plants that have been destroyed may be replaced through propagation and reintroduction of star cactus plants in suitable habitat managed by an approved conservation organization. If possible, seeds for propagation should be obtained from populations prior to impact. If this is not possible, propagation may be accomplished using seeds of this species that are available through several conservation seed banks. Successful propagation methods have been developed (Strong 2007). Compensation for destroyed individuals of star cactus shall consist of 10 or more propagated, reintroduced plants for each individual destroyed.

12. Using funds contributed to the mitigation fund by CBP, the USFWS may fund and/or pursue appropriate conservation measures or recovery objectives in compensation for unavoidable impacts to Johnston's frankenia populations and habitat. Compensation may be accomplished by, but is not limited to, the following methods:
    - Johnston's frankenia habitat that has been destroyed may be replaced by acquiring a similar quantity and quality of habitat which will be conserved in perpetuity by an appropriate legal instrument.
    - Johnston's frankenia habitat that is degraded through vegetation impacts, invasive plant colonization, or other deleterious changes shall be restored to a condition that is consistent with long-term survival and growth of the Johnston's frankenia population.
    - Individual Johnston's frankenia plants that have been destroyed may be replaced through propagation and reintroduction of Johnston's frankenia plants in suitable habitat managed by an approved conservation organization. If possible, seeds or cuttings for propagation should be obtained from populations prior to impact. If this is not possible, propagation may be accomplished using seeds or cuttings of this species that are available through several conservation seed banks. Successful propagation methods have been developed by the Agricultural Research Service at the U.S. Department of Agriculture (USDA). Compensation for destroyed individuals of star cactus shall consist of 10 or more propagated, reintroduced plants for each individual destroyed.
13. Using funds contributed to the mitigation fund by CBP, the USFWS may fund and/or pursue appropriate conservation measures or recovery objectives in compensation for unavoidable impacts to south Texas ambrosia populations and habitat. Compensation may be accomplished by, but is not limited to, the following methods:

- South Texas ambrosia habitat that has been destroyed may be replaced by acquiring a similar quantity and quality of habitat which will be conserved in perpetuity by an appropriate legal instrument.
- South Texas ambrosia habitat that is degraded through vegetation impacts, invasive plant colonization, or other deleterious changes shall be restored to a condition that is consistent with long-term survival and growth of the south Texas ambrosia population.
- Individual south Texas ambrosia plants that have been destroyed may be replaced through propagation and reintroduction of south Texas ambrosia plants in suitable habitat managed by an approved conservation organization. If possible, seeds or cuttings for propagation should be obtained from populations prior to impact. If this is not possible, propagation may be accomplished using seeds or cuttings of this species that are available through several conservation seed banks. Successful propagation methods have been developed. South Texas ambrosia has been successfully propagated by the San Antonio Botanical Gardens and the Kika de la Garza Plant Materials Center (USDA Natural Resources Conservation Service). Compensation for destroyed individuals of star cactus shall consist of 10 or more propagated, reintroduced plants for each individual destroyed.

14. Using funds contributed to the mitigation fund by CBP, the USFWS may fund and/or pursue appropriate conservation measures or recovery objectives in compensation for unavoidable impacts to Texas ayenia populations and habitat. Compensation may be accomplished by, but is not limited to, the following methods:

    - Suitable habitat (determined in coordination with the USFWS) of Texas ayenia that has been destroyed may be replaced by acquiring a similar quantity and quality of habitat which will be conserved in perpetuity by an appropriate legal instrument.
    - Individual Texas ayenia plants that have been destroyed may be replaced through propagation and reintroduction of Texas ayenia plants in suitable habitat managed by an approved conservation organization. If possible, seeds for propagation will be obtained from populations prior to impact. If this is not possible, propagation may be accomplished using seeds of this species that are available through several conservation seed banks. Successful propagation methods have been developed at LRGVNWR. Compensation for destroyed individuals of Texas ayenia shall consist of five or more propagated, reintroduced plants for each individual destroyed.

15. Using funds contributed to the mitigation fund by CBP, the USFWS may fund and/or pursue appropriate conservation measures or recovery objectives in compensation for unavoidable impacts to Walker's manioc

populations and habitat. Compensation may be accomplished by, but is not limited to, the following methods:

- Suitable Walker's manioc habitat (according to USFWS guidance) that has been destroyed may be replaced by acquiring a similar quantity and quality of habitat which will be conserved in perpetuity by an appropriate legal instrument.
- Individual Walker's manioc plants that have been destroyed may be replaced through propagation and reintroduction of Walker's manioc plants in suitable habitat managed by an approved conservation organization. If possible, seeds for propagation will be obtained from populations prior to impact. If this is not possible, propagation may be accomplished using seeds of this species that are available through several conservation seed banks. Compensation for destroyed individuals of Walker's manioc shall consist of five or more propagated, reintroduced plants for each individual destroyed.
- Transplantation of Walker's manioc to suitable locations may be possible.

2. DESCRIPTION OF SPECIES AND THEIR HABITAT

This section summarizes information regarding some of the key species and habitats addressed in this document. Some listed species are not included here because the implementation of the agreed upon BMPs and conservation measures are anticipated to provide conditions that avoid adverse effect. For more complete information and supporting citations regarding species' descriptions, distribution and abundance, habitat needs, life history, and population ecology, the local USFWS office can be contacted.

2.1 OCELOT

In 1982, the ocelot (*Leopardus pardalis*) was designated as an endangered species under the Endangered Species Act (ESA) of 1973, as amended, a status that extended U.S. protections to the species throughout its range in 22 countries, including Mexico and Central and South American countries. Critical habitat has not been designated for the ocelot. Ocelot populations gained greater protections in 1989, when the species was upgraded to Appendix I of the Convention on International Trade in Endangered Species of Flora and Fauna (CITES); a protection that prohibits CITES signatories from permitting any trade in the species or its parts. Two subspecies occur in the United States: the Texas ocelot (*L.p. albescens*) and the Sonoran ocelot (*L.p. sonoriensis*). The Texas ocelot is isolated from the Sonoran ocelot by the Sierra Madre highlands (Tewes and Schmidly 1987, USFWS 1990).

2.1.1 Species Description

The ocelot is a medium-sized cat, measuring up to 3 feet (0.91 meters) in body length and weighing twice as much as a large domestic cat. It is slender and covered with attractive, irregular-shaped rosettes and spots that run the length of its body. The ocelot's background coloration can range from light yellow to reddish gray, to gold, and to a grayish gold color. It has a white underside. The head has spots, two black stripes on the cheeks, and four to five longitudinal black stripes on the neck, and their black ears have large white spots on the back. The tail has dark bars or incomplete rings. Though it resembles the margay (*Leopardus wiedii*), the ocelot is approximately twice the size of a margay, with a slightly shorter tail (Murray and Gardner 1997, de Oliveira 1998).

2.1.2 Distribution and Abundance

Historically, the ocelot occurred in Arkansas, Arizona, southern California, Texas, Mexico and southward through Central and South America to Peru, Uruguay, and northern Argentina (Navarro-Lopez 1985). Today it ranges from southern Texas and northern Sonora, Mexico, to Central America, Ecuador, and northern Argentina, but in reduced numbers (Tewes and Everett 1986; Emmons 1990; Murray and Gardner 1997).

Two U.S. populations of ocelot occur in southern Texas (Tewes and Everett 1986). One population occurs in Willacy and Kenedy counties, primarily on private lands (Navarro-Lopez 1985), and the other in Cameron County, primarily on the Laguna Atascosa National Wildlife Refuge (LANWR) (Laack 1991).

In Texas, over the past 20 years, individual ocelots have only been documented in Cameron, Hidalgo, Willacy, Kenedy, and Jim Wells counties (Tewes and Hughes 2001). Laack and Rappole (1986) documented ocelot sightings in Cameron County. Shinn (2002) used camera traps and hair snares on 25 widely scattered tracts managed by the South Texas Refuges Complex, and did not find evidence of ocelot west of Brownsville on the Rio Grande River. His studies did confirm the presence of the species in extreme southern Cameron County and in extreme western Willacy County.

In Hidalgo County, at the Santa Ana National Wildlife Refuge, at least one ocelot has been radio-tracked from the 1990s, and it is believed that they may still occur in the area (Mays 2007). Fischer (1998) trapped, radio-tracked, and tagged an adult female from 1992 through 1996 along the Rio Grande River in southeastern Hidalgo County. Out of 8,304 trap-nights he caught 21 bobcats, 300 non-target animals, and no other ocelots.

In 1982, Tewes (1986) trapped two ocelots on a private ranch in Willacy County. Five ocelots (three females, one male and one of unknown sex) were identified in Willacy County near Raymondville, Texas, in December 2002. Based on two photographs on October 11, 2003, one of the females was pregnant; therefore, a sixth resident ocelot may have been born (Sternberg and Chapa 2004). Between October and December 2003, camera traps photographed three cats on another private ranch in Willacy.

“Occupied habitat” occurring in Jim Wells, Nueces, Live Oak, and Kleberg counties, 50 miles north of the Willacy-Kenedy population, is shown in Figure 9 of the recovery plan (USFWS 1990). It is presumed that ocelots may still occur there because of documented roadkills on Highway 77 south, but no reproducing populations have been found. In 1997 and 1998, Tuovila (1999) did a trapping study in the southern half of Live Oak County and northernmost Jim Wells. He trapped 17 bobcats and 238 non-target animals, but no ocelots. No ocelots were documented at Choke Canyon Reservoir in Live Oak and McMullen counties, Texas, during trapping efforts, despite a 10-year increase in optimal ocelot cover (Grassman et al. 2006).

Tewes and Everett (1986) based a “crude estimate” of the total ocelot population size in south Texas of 80 to 120 individuals upon an aerial survey of brush habitat and knowledge gained from following the movements of radio-collared ocelots trapped in or near LANWR. Haines et al. (2005a) estimated the number of breeding individuals in the LANWR population was 19 ocelots, with a total population of 38 ocelots in Cameron County. He estimated the population by averaging ocelot home range sizes reported by Navarro-Lopez (1985), Tewes (1986), and Laack (1991) and extrapolating this estimate to the amount of

available dense thorn scrub habitat, and assumed that adults equaled half of the total population. Today, as few as 50 to 100 individuals may remain in south Texas and the United States. The Cameron County ocelot population is estimated at 25 to 35 individuals (Mays 2007).

A much larger population of the Texas ocelot occurs in Tamaulipas, Mexico, near San Fernando, approximately 100 miles south of the U.S./Mexico international border (Caso 1994). In forested South America alone, Emmons (1988) noted that even at the lowest density estimates (one animal per 5 km^2), there will be approximately 800,000 ocelots, and suggested that true numbers are probably 1.5 to 3 million.

2.1.3 Habitat

Tamaulipan brushland is a unique ecosystem found only in south Texas and northeastern Mexico. Characteristic vegetation of Tamaulipan brushland is dense and thorny. It is estimated that approximately 95 percent has been cleared for agriculture, urban development, road developments and expansions, and recreation (USFWS 1990, Jahrsdoerfer and Leslie 1988). Tewes and Everett (1986) found less than 1 percent of southern Texas supported the extremely dense thorn scrub used by ocelots.

Tewes and Everett (1986) classified ocelot habitat in Texas according to the amount of foliar canopy. Class A or optimal habitat was 95 percent canopy cover, Class B or suboptimal habitat was 75 percent to 95 percent canopy cover, and Class C, with 75 percent or less canopy cover, was considered inadequate. The most critical habitat component is probably dense cover near the ground (less than 3 feet in height) and that core areas of ocelot home ranges on LANWR contained more thorn scrub than peripheral areas of their home ranges. Jackson et al. (2005) suggest that the ocelot in Texas prefers closed canopy over land cover types, but that areas used by this species tend to consist of more patches with greater edge. The cat is reported to occur along watercourses, and will readily enter the water (Goodwyn 1970 as cited by USFWS 1990), but it is unclear whether this proximity to water is a habitat requisite or simply an indication of where dense cover is most likely to occur.

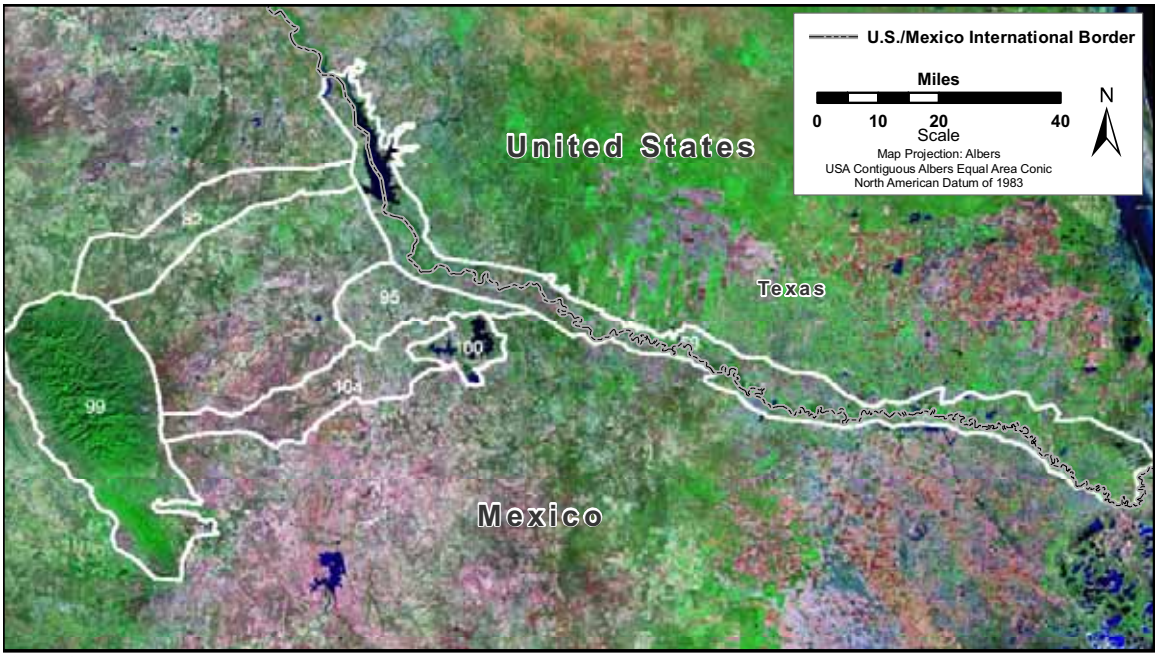
Species composition of shrubs used by ocelots was quantified in three plant communities, two in Texas and one in Mexico (Shindle and Tewes 1998, Caso 1994). At the Texas sites, 45 woody species were found at the LANWR in Cameron County and 28 woody species on a private ranch in Willacy County (Shindle and Tewes 1998). The dominant species were granjeno (*Celtis pallida*), crucita (*Eupatorium odoratum*), Berlandier fiddlewood (*Citharexylum berlandieri*), honey mesquite (*Prosopis glandulosa*), and desert olive (*Forestiera angustifolia*) at LANWR, and honey mesquite and snake-eyes (*Phaulothamnus spinescens*) in Willacy County.

In Mexico, ocelot habitat use was 97.6 percent mature forest (heavy rain forest to sparse tropical deciduous forest) and 2.4 percent pasture-grassland (Caso

1994). In Veracruz, Hall and Dalquest (1963) found that ocelots utilized the forests and jungles. Ocelots are known from the tropical forest of Belize, lowland rain forest of Peru, and semideciduous forest and seasonally flooded marshes of Brazil (Ludlow and Sunquist 1987).

2.1.4 Threats

Fragmentation of habitat and habitat loss due to brush clearing are primary reasons for ocelot decline. Ocelots rely upon thick vegetation along the Lower Rio Grande and the south Texas Tamaulipan brush community for foraging, resting, and establishing dens. They require corridors, such as rivers, shorelines, and natural drainages, to travel between optimal habitat areas. It is important to maintain connectivity with international wildlife corridors within Mexico in order to increase the genetic exchange of the South Texas ocelots with the ones found in Northern Mexico. The USFWS is currently coordinating with different government, and state and nongovernmental organizations in Mexico, to reconnect wildlife corridors north and south of the U.S./Mexico international border and along the Rio Grande River in Texas, generally this has focused on establishing conservation easement agreements with private landowners in Mexico. There are two priority wildlife corridors identified between Falcon Dam and Sierra Picachos Natural Protected Area in the State of Nuevo Leon. See **Figure 2-1** for an aerial photograph of Picachos Corridor. This corridor will connect to the Lower Rio Grande Valley NWR tracts in Starr County. The other international corridor is along the Laguna Madre coastal area that is intended to provide a corridor for ocelots between Laguna Atascosa NWR and Laguna Natural Protected Area in Mexico. This corridor also connects along the Rio Grande River.



Source: USFWS 2008

Figure 2-1. Aerial Photograph of Picachos Corridor

Destruction and fragmentation of optimal habitat and travel corridors increases threats to the ocelot, such as urban expansion and development, new roads and expansion, loss of agricultural lands to development, mortality from vehicles, incidental trapping, and competition from feral dogs and cats. In Mexico, particularly in the northeast, ocelots suffer from habitat loss due to charcoal production, agriculture, and livestock ranching. Human population increases and associated urban expansion in the lower Rio Grande Valley have resulted in brush clearing and increased pollution (USFWS 1986). Industrialization has degraded water quality (USFWS 1986). Brushland habitats have also been converted to rangeland with herbicides (Bontrager et al. 1979), root plowing, and fire (Hanselka 1980).

Pesticides can be incorporated into the food chain and are potentially harmful or fatal to terrestrial and aquatic organisms. Agriculture pesticides are used year-round in the Lower Rio Grande Valley (LRGV), and drift and overspray from aerial applications occur periodically on NWR lands. In the LRGV, runoff from cultivated fields may concentrate pesticides and herbicides in permanent bodies of water. Pesticide application rates have been extensive and heavy throughout the LRGV. As a result, pesticide accumulation in the biota remains a major concern in management of Tamaulipan brushland. Dichlorodiphenyldichloroethylene, polychlorinated biphenyls, and mercury have been detected in ocelot blood and hair samples at low concentrations but are not believed to be a problem at this time (Mora et al. 2000).

Although habitat loss in south Texas is mainly attributable to agricultural and urban expansion, other contributing factors include human modifications of the Rio Grande with dams and reservoirs for flood control and hydroelectric power; floodway systems that remove water from the stream channel during peak flows; water diversions for irrigation, municipal, and industrial usage; and channel restriction and canalization (CIMP 1995).

As a result of increasing economic integration between the United States and Mexico, there is increasing pressure for highways and bridge infrastructure. In addition, recently growing national security concerns have increased pressure for fences and lighting in the Texas/Mexico border region. There are nine existing and three proposed international bridges (Anzalduas, Donna, Brownsville Navigation District) along the Rio Grande between Falcon International Reservoir and the Gulf of Mexico. Local human population growth and rapid industrialization on the Mexican side of the border have raised USFWS concern regarding the placement of road and bridge infrastructure in the lower Rio Grande Valley. Increased construction of these bridges may impact certain parcels of the LRGVNWR, the Rio Grande floodplain, and the remaining riparian wildlife habitat, and disrupt the continuity of the wildlife corridor.

Importing and exporting skins of many spotted cats became illegal in the United States between 1967 and 1973, and the ocelot was added to Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora during 1989. Recommendations were made by Tewes and Everett (1986)

for selective methods of predator control and the education of hunters to avoid accidental shooting of ocelots. In 1997 the USFWS entered into a Section 7 consultation with the U.S. Department of Agriculture's Animal Damage Control for the use of leg-hold traps, snares, and M-44 explosive predator baits in south Texas and provided for the avoidance and minimization of impacts on federally–listed cats.

Data are limited regarding disease in the ocelot, but several diseases and parasites have been documented. Some include Notoedric mange (*Notoedres cati*) (Pence et al. 1995), Hepatozoon in the blood, Cytauxzoon in their red blood cells, fleas (*Pulex* sp.), dog ticks (*Dermacentor variabilis*), and Amblyomma ticks (Mercer et al. 1988). The tapeworm (*Taenia taeniaeformis*) (USFWS 1990) and helminthes (Pence et al. 2003) were also reported in ocelots.

Ocelot mortality has also been attributed to aggression and predation by other animals. Ocelots can be prey of domestic dogs, coyotes, snakes, alligators, and bobcats (USFWS 1990).

Vehicular collisions are the greatest known cause of ocelot mortality in south Texas, accounting for 45 percent of deaths of 80 radio-tagged ocelots monitored by Haines et al. (2005b) between 1983 and 2002. Underpasses and culverts have been or are to be installed in critical areas to be used as travel corridors for ocelots. The construction or modification of two roads that underwent formal Section 7 consultation, State Highway 48 and Farm-to-Market Road (FM) 106, made provisions for the careful placement, design, and maintenance of such culverts. It is anticipated that these culverts and underpasses will allow ocelots to disperse between patches of suitable habitat and reduce genetic isolation of the populations.

2.2 GULF COAST JAGUARUNDI

The jaguarundi was listed as endangered on June 14, 1976 (41 FR 24064). The jaguarundi is also listed in the CITES Appendix I of the convention which bans international commerce. CITES offers some protection over much of its range. Hunting is prohibited in Argentina, Belize, Bolivia, Colombia, Costa Rica, French Guiana, Guatemala, Honduras, Mexico, Panama, Paraguay, Surinam, Uruguay, the United States, and Venezuela. Hunting is regulated in Peru, while no legal protection is offered in Brazil, Nicaragua, Ecuador, El Salvador, and Guyana. No critical habitat is designated for this species.

2.2.1 Species Description

The jaguarundi has a long slender body, short legs, and sleek unpatterned fur, and looks more like a large weasel than a cat. It is roughly twice the size of a domestic cat, weighing about 7 to 22 lbs., standing 10 to 14 inches at the shoulder, and can be up to 4 feet long from nose to tail tip, with the tail taking up about a third of its length. It has a long and flat head instead of a round one. The

ears are short and rounded, and it is one of the few cat species that does not have a contrasting color on the backs of the ears. Its eyes are small and set closely together.

The jaguarundi has two distinct color phases, red and gray, although the latter phase has also been called blue. The phases are so distinct that at one time they were thought to be separate species, the red one being called *Felis eyra*. A third color phase, black, has also been reported, but apparently does not occur in Texas (Goodwyn 1970). These cats are not known to be closely related to the other small South American cats. Instead of having 36 chromosomes, like the South American cats, it has 38 like the cougar and puma (Tewes and Schmidly 1987).

2.2.2 Distribution and Abundance

The jaguarundi historically occurred in southeast Arizona, south Texas, Mexico, and Central and South America as far south as northern Argentina. Today this cat has a similar distribution, but in reduced numbers, although it probably no longer occurs in Arizona (Tewes and Schmidly 1987). It may also be extinct in Uruguay. It is reported to occur at Masaya National Park in Nicaragua, Soberania National Park in Panama, and El Imposible National Park in El Salvador (Nowell and Jackson 1996). The presence of jaguarundis in Florida is likely the result of human introduction (Nowak and Paradiso 1983).

In Texas, the jaguarundi has been known to occur in Cameron and Willacy counties. Tewes and Everett (1986) analyzed the records of a clearinghouse established in 1981 to coordinate reception and filing of reports of jaguarundi (and ocelots) in Texas. Many of the reports were solicited by sending out questionnaires to trappers. The jaguarundi was reported from central Texas and the upper Gulf Coast as well as from south Texas. However, due to a lack of any tangible evidence, such as road kills, most of the sightings in the first two areas are believed to have been of black feral house cats. Tewes and Everett (1986) could make no estimate of the jaguarundi population in south Texas, although its population is presumably smaller than that of the ocelot, because confirmed sightings are rare. Goodwyn (1970) reported from interviews he conducted in 1969 that jaguarundis were thought to occur in seven specific areas: Santa Ana National Wildlife Refuge; LANWR “Paso Real,” an area along the lower Arroyo Colorado on the border between Cameron and Willacy counties; the southern part of the El Sauz Ranch in northeast Willacy County; a small area west of Olmito in southern Cameron County; an area east of Villa Nueva; and an area near the Port Isabel airport in Cameron County.

Tewes (1987) and Tewes and Everett (1986) documented several other credible reports of jaguarundis in Cameron, Willacy, and Webb counties. The last confirmed sighting of a jaguarundi in Texas was at Laguna Atascosa NWR in November 2004 by an Ecological Service biologist and other Service staff during a 1-week period of time (Reyes 2008). While this was the last confirmed record

of a jaguarundi in Texas, unconfirmed jaguarundi sightings in Hidalgo County include Bentsen Rio Grande State Park, Santa Ana National Wildlife Refuge, LRGVNWR, LANWR, Cimarron Country Club, Wimberley Ranch, the Anacua Unit of the Texas Parks and Wildlife Department's Las Palomas Wildlife Management Area, and other areas (Prieto 1990, Tewes 1992, Benn 1997). Other unconfirmed sightings of a jaguarundi occurred at the Sabal Palm Grove Sanctuary in Cameron County in 1988 (Anonymous 1989) and at the Santa Ana National Wildlife Refuge in March 1998 (Santa Ana National Wildlife Refuge data). Based upon sighting reports, personnel of the Santa Ana National Wildlife Refuge suspect the presence of jaguarundi on the refuge (Benn 1997).

2.2.3 Habitat

Habitat requirements in Texas are similar to those for the ocelot: thick, dense thorny brushlands or chaparral. Approximately 1.6 percent of the land area in south Texas is this type of habitat (Tewes and Everett 1986). The thickets do not have to be continuous but may be interspersed with cleared areas. The jaguarundi possibly shows a preference for habitat near streams (Goodwyn 1970, Davis and Schmidly 1994) and may be more tolerant of open areas than the ocelot.

The jaguarundi uses mature forest (brush) and pasture-grassland (Caso 1994). Jaguarundi habitat use was 53.0 percent mature forest and 47 percent pasture–grassland. Jaguarundis use open areas for hunting and sometimes resting, but if threatened with a potential danger they will seek cover in brush areas.

In South America, habitat includes high mountain forests, tropical forests, swamp forests, savannahs, overgrown pastures, and thickets (USFWS 1980, Tewes and Schmidly 1987). In Venezuela, it has been most frequently found to occur in drier tropical forest relative to other habitat types. They are rarer and thinly distributed in moist forest types, especially deep rain forest. They have been reported to prefer forest edges and secondary brush communities, but this is where they are most frequently seen. In Belize's Cockscomb Basin Wildlife Sanctuary, jaguarundi are most frequently associated with water and old-field habitats. It appears to be the most flexible cat in its ability to occupy different habitats, and having access to dense ground vegetation appears to determine habitat suitability (Nowell and Jackson 1996).

The most common plants occurring in habitats in the lower Rio Grande Valley where the jaguarundi is known to occur are huisache (*Acacia farnesiana*), blackbrush acacia (*Acacia rigidula*), prairie baccharis (*Baccharis texana*), chilipiquin (*Capsicum annuum*), lotebush (*Ziziphus obtusifolia*), allthorn goatbush (*Castela texana*), Texas persimmon (*Diospyros texana*), coyotillo (*Karwinskia humboldtiana*), common lantana (*Lantana horrida*), berlandier wolfberry (*Lycium berlandier*), javelinabrush (*Microrhammus ericoides*), Texas pricklypear (*Opuntia lindheimeri*), retama (*Parkinsonia aculeata*), honey mesquite (*Prospis*

glandulosa), cedar elm (*Ulmus crassifolia*), and lime pricklyash (*Zanthoxylum fagara*) (Goodwyn 1970).

2.2.4 Threats

Loss of habitat is one of the main threats to the jaguarundi. Historically, dense mixed brush occurred along dry washes, arroyos, resacas, and the flood plains of the Rio Grande. A majority of shrubland has been converted to agriculture and urban development. Unfortunately for the jaguarundi, the best soil types used for agricultural crops also grow the thickest brush and thus produce the best habitat for the jaguarundi. Less than 5 percent of the original vegetation remains in the Rio Grande Valley.

2.3 SOUTH TEXAS AMBROSIA

The proposed rule to list south Texas ambrosia (*Ambrosia cheiranthifolia*) as endangered was published in the Federal Register on August 5, 1993 (58 FR 41696; USFWS 1993b). Final listing of the south Texas ambrosia as an endangered species under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) occurred on August 24, 1994 (USFWS 1994). Critical habitat was not designated.

2.3.1 Species Description

The first collection on record of south Texas ambrosia was taken by Luis Berlandier in 1835 in San Fernando, Tamaulipas, Mexico (USFWS 1994). In 1859, Asa Gray named the collection *Ambrosia cheiranthifolia* (Turner 1983). In 1932, the first collection of *Ambrosia cheiranthifolia* in the United States was taken from an area near Barreda (now Russelltown) in Cameron County, Texas, by Robert Runyon (Turner 1983).

South Texas ambrosia is an herbaceous ashy blue-gray rhizomatous perennial in the Asteraceae (sunflower) family. Erect stems are 3.9–23.8 inches tall. The number of plants present is difficult to count, as they usually form closely spaced colonies with rhizomatous growth habits inhibiting number counts. The leaves are usually opposite at the base, and alternate above. The leaves are mostly oblanceolate 0.8–2.8 inches long, with the blade narrowing gradually at the base. Leaves are mostly unlobed and entire, although the lower and larger leaves of juvenile plants may be undulate or shallowly pinnate. Leaves appear whitened due to a fine and short appressed pubescence, giving the leaf an ashy blue-gray color. The inflorescence is usually unbranched and composed of separate male and female flowers. The male flowers occur in a terminal raceme 2–4 inches long composed of 10–12 small, light yellow, saucer-shaped flowers that are about 0.16 inches wide and have 4-6 acute, triangular lobes. The female flowers are in small clusters in the axils of the leaves. The fruit is an achene, somewhat angled and long with a stout beak. The fruit has 4 to 5 blunt spines spread across the surface (Correll and Johnston 1970; Jones 1977). South Texas

ambrosia is distinguished from related species within its geographical range by its simple leaves and the ashy blue-gray color; however, this species is easily obscured by taller native and introduced grasses (Turner 1983).

2.3.2 Distribution and Abundance

The species is considered rare or infrequent in the coastal prairies of the Rio Grande Plains (Correll and Johnston 1970). South Texas ambrosia was known from 30 locations in Cameron, Jim Wells, Kleberg and Nueces counties, Texas, and one in Tamaulipas, Mexico. Three of these locations are historical occurrences that have not been relocated: one each in Jim Wells and Cameron counties and the Mexico location. Currently, south Texas ambrosia occurs in 27 sites within Kleberg and Nueces counties. Of these 27 current sites, 3 are on State land, 13 on Federal land (Kingsville Naval Air Station), and 11 on private land or in local jurisdictions in and around the communities of Bishop (Nueces County), Kingsville (Kleberg County), and Robstown (Nueces County), Texas. The species currently occurs primarily on private ranch lands that have not been subjected to continuous mowing, plowing, and/or herbicide use. Suitable habitat for the south Texas ambrosia probably exists in Kenedy and Willacy counties, based on the historical and current presence of the plants in Cameron and Nueces counties.

2.3.3 Habitat

South Texas ambrosia grows at low elevations (26–66 feet) in open prairies and savannas of south Texas, on soils varying from clay-loams to sandy-loams. It inhabits the Gulf Coastal grasslands in clay soils derived primarily from the Beaumont clay series (Turner 1983). This soil is typically clay-loam to sandy–loam, usually deep clay soils and occasionally on wind-blown clay dunes along streams. Two of the Bishop area populations occur on slightly alkaline soils, with an average pH of 7.4. Precipitation averages range from up to 15.7 inches per year but is variable. The average frost-free season is 250–310 days annually (Brown et al. 1976).

South Texas ambrosia is almost always associated with native grasses such as Texas grama (*Bouteloua rigidiseta*), buffalo grass (*Buchlöe dactyloides*), Texas spear grass (*Stipa leucotricha*), and curley mesquite (*Hilaria mutica*) (USFWS 1994). Some of the invading non-native grasses include such species as buffelgrass (*Pennisetum ciliaris*), King Ranch bluestem (*Bothriochloa ischaemum* var. *songarica*), Kleberg bluestem (*Dichanthium annulatum*), bermudagrass (*Cynodon dactylon*), and St. Augustine grass (*Stenotaphrum secundatum*). Native woody species scattered in the grassland include mesquite (*Prosopis glandulosa*), huisache (*Acacia smallii*), huisachillo (*Acacia schaffneri*), brasil (*Condalia hookeri*), granjeno (*Celtis pallida*), and lotebrush (*Ziziphus obtusifolia*) (USFWS 1994). Associated forb species include Western ragweed (*Ambrosia psilostachya*), plains gumweed (*Grindelia oolepis*), violet ruellia (*Ruellia nudiflora*), scarlet pea (*Indigofera miniata*), small-flowered verbena (*Glandularia*

bipinnatifida), painted tongue (*Bouchetia erecta*), false mallow (*Malvastrum coromandelianum*), false ragweed (*Parthenium hysterophorus*), old man's beard (*Clematis drummondii*), and cowpen daisy (*Verbesina microptera*).

At three locations in Nueces County, the endangered slender rush-pea (*Hoffmannseggia tenella*) occurs in association with the south Texas ambrosia. The endangered black lace cactus (*Echinocereus reichenbachii* var. *albertii*) occurs in close proximity to the ambrosia at a site in Kleberg County.

2.3.4 Threats

The USFWS (1994) described three major threats to the South Texas ambrosia that justified listing the species as endangered: (1) destruction or modification of range through agricultural practices, highway construction; and urbanization; (2) invasive exotic grasses; and (3) decreased genetic variability and viability through the loss and/or modification of habitat and fragmentation.

Habitat destruction is the primary threat to South Texas ambrosia. Past practices of converting parts of South Texas to agricultural fields, urbanized areas, and industrial parks has limited the amount of habitat available for colonization.

Results from various invasive grass studies indicate that there is shade and root competition between native plants and invasive grasses (Pressly 2002), as well as possible allelopathic effects (suppression of growth of one plant species by another due to release of toxic substances) by invasives on native forbs and grasses (Nurdin and Fulbright 1990 as cited by USDA 1998). When native plants must compete for light, moisture, and/or nutrients, energy is expended to produce vegetative growth for photosynthesis and survival. Seed production then decreases, restricting seedling recruitment and limiting range expansion of the species. Highly invasive species also create monotypic habitats quickly and bypass the important components of natural ecosystem processes. Other potential prairie habitat may be invaded by thorny shrub and tree species as a result of fire suppression or overgrazing. Along railway and roadway rights-of-way, where several of the South Texas ambrosia populations occur, herbicide application is used to discourage weedy growth that impairs the view of operators of motor vehicles and/or railway cars, but may also prevent ambrosia populations from expanding.

Separation of plant populations that rely on pollination for reproduction can lead to the loss of genetic diversity due to a lack of gene exchange, resulting in inbreeding of small groups of plants and amplifying the effects of deleterious alleles. With reduced numbers of individuals and populations of South Texas ambrosia, stochastic events can lead to the extinction of isolated local populations. Although the clonal habit of the species may alleviate deleterious allelic problems, it only perpetuates a small amount of isolated genetic material that may or may not be able to survive disease or extreme seasonal climatic changes. Species that evolved with small isolated populations have already adapted to such factors over geologic time, but widespread species like the

South Texas ambrosia should not be expected to change within a few decades to adjust to such conditions (Poole et al. 2007).

2.4 STAR CACTUS

In 1993, the star cactus (*Astrophytum asterias*) was designated as an endangered species under the Endangered Species Act of 1973, as amended (USFWS 1993c). Critical habitat has not been designated for this species. According to the recovery plan, in 1997, Texas Parks and Wildlife Executive Order No. 97-002 established the star cactus status as endangered by the State of Texas (USFWS 2003).

2.4.1 Species description

A member of the family Cactaceae, the star cactus is spineless, and dome or disk-shaped. It is up to 6 inches in diameter and divided into eight symmetrical triangular segments. Each segment has a central line of areoles containing tufts of white hairs. When soil moisture is available to the plants, the stems expand up to 2 inches above the ground, and the star cactus is usually a dull green color. During dry weather, the stems shrink into flat disks, the cacti turn dull brown, and often become concealed under gravel. Flowers of the star cactus are yellow with orange centers. Fruits are green to grayish red and can be hidden by the tufts of hairs (USFWS 2003).

2.4.2 Distribution and Abundance

In the United States, 13 small populations are currently known in Starr County, Texas, on Catahoula and Frio soils. Reliable historic records include similar habitat types in Zapata and Jim Hogg counties. Other reports of star cactus from Hidalgo and Cameron counties may be misleading; these anecdotal accounts do not indicate specific locations, nor were voucher specimens deposited in any herbaria (Best 2008a). Ten star cactus populations have also been documented from the Mexican states of Nuevo León and Tamaulipas.

2.4.3 Habitat

The star cactus occurs among sparse, low shrubs, grasses, and halophytic (salt-tolerant) plants on xeric upland sites. Soils are usually gravelly clays or loams, and typically contain high levels of gypsum, salt, or other alkaline minerals. Some Mexican populations occur on soils derived from caliche or limestone.

In the wild, the star cactus is restricted to xeric sites that usually have high levels of salt, gypsum, or other minerals. It is often grown in commercial nurseries in substrates that lack these high mineral levels. Therefore, it is believed that this species tolerates mineral levels that are toxic to most plants, but does not absolutely require them. Strong (2007) has measured diameter growth rates of 0.5 mm to 4.2 mm per year in the wild. Such slow growth renders star cactus

unable to compete with more aggressive grasses and herbaceous plants; rather, it has evaded competition through adaptation to harsh sites where most plants cannot live.

The star cactus may occur in full sun, or beneath the partial shade of low grasses and sub-shrubs, such as red grama (*Bouteloua trifida*), saladillo (*Varilla texana*) and calderona (*Krameria ramosissima*). However, it does not tolerate the dense shade of taller shrubs and trees.

2.4.4 Threats

The collection of wild star cactus plants has eliminated most of the wild populations and has greatly depleted many of the remaining ones. Wild star cactus plants are sold illegally to cactus collectors; however, star cactus can be legally propagated from captive seed and sold to collectors. Additionally, star cactus plants are often collected accidentally by licensed or illegal collectors of peyote (*Lophophora williamsii*). These two cactus species are similar in appearance and often occur in the same habitats (USFWS 2003).

Land clearing is the complete removal of native vegetation from a specific area, to create cropland and improved pasture, and to construct buildings, roads, utility rights of way, and other infrastructure. Clearing often includes complete restructuring of the soil profile and contour. Land clearing results in long-term or permanent loss of habitat and destruction of existing populations. Individual plants and populations of star cactus are also harmed when physically trampled by pedestrians, livestock, or vehicles (USFWS 2003).

Introduced invasive plants compete with star cactus for light, water, nutrients, and physical space. Buffelgrass (*Pennisetum ciliare*) is a highly invasive, drought-tolerant grass that displaces individual star cactus plants and populations, degrades habitats, and impedes reproduction throughout the species' range (USFWS 2003).

Habitat fragmentation may lead to genetic isolation and depletion of star cactus populations through the loss of gene flow (pollen transfer) between populations. Star cactus is an obligate out-crosser; populations lacking sufficient genetic diversity are not able to reproduce (Best 2008b).

Chemical contamination from oil well spills or other activities related to oil and gas exploration, as well as herbicides, is potentially harmful to individual plants, populations, and habitats (USFWS 2003).

2.5 TEXAS AYENIA

Texas ayenia (*Ayenia limitaris*) was listed on August 24, 1994, as an endangered species under the Endangered Species Act of 1973, as amended (USFWS 1994). It was first collected by C. G. Pringle in 1888 in Hidalgo County under the name *Nephropetalum pringlei*. It was also referred to as *A. berlandieri*, a more

southerly species. In 1960, Carmen Cristobal revised the genus *Ayenia* and at the same time described *Ayenia limitaris* as a new species (Cristobal 1960, as cited in Damude and Poole 1990). Critical habitat is not designated for this species.

2.5.1 Species Description

Texas ayenia is a perennial herb/shrub that reaches 2 to 5 feet tall. The juvenile stems are covered with short downy hair that gives it a silvery appearance. Mature stems are reddish brown, stippled with white lenticels (dots). The leaves are simple, alternate, and heart-shaped, and gradually narrow at the tip. Leaf margins are finely toothed, and the blades have three to five veins. The upper leaf surfaces have sparse, fine hairs, while the lower surfaces have a dense, silvery covering of hairs that appear star-shaped under magnification.

Clusters of two or three flowers are produced on short stems arising from the axils of the upper leaves. The flowers are usually greenish, cream-colored or light rosy pink in color. The individual flower stems are about 1/8 to 1/4 inch long. The five hooded petals have a slender claw that is more than 1-1/2 times as long as the expanded part of the petal.

The fruit is a five-celled, rounded capsule with short, curved, sharply pointed prickles with very short hairs covering it. When the capsule ripens, it splits violently into five one-seeded segments that eject and disperse the seeds. The seeds are dark grey to blackish in color and are ovoid, tapering to a point at one end, with the surface appearing variously warty or wrinkled.

2.5.2 Distribution and Abundance

Historical occurrences of Texas ayenia were found in the lower Rio Grande Valley in Hidalgo and Cameron counties, Texas, and in the states of Coahuila and Tamaulipas, Mexico.

In 1994, only two of the historic locations were verified, one in Hidalgo County, Texas, and one in the Municipio of Soto La Marina, in Tamaulipas, Mexico. Surveys of the Hidalgo County site in 1988 documented only six small plants. The following year, only one plant was found (Damude and Poole 1990), and in 1990 and 1991 none were observed. In 1992, one plant was located at this site (USFWS 1994), and in 1994, 20 additional plants were verified by Joe Ideker of the Native Plant Project. That same year several intensive searches were made at some sites where Texas ayenia had been reported (Olmito-Barreda area, three state parks, Audubon Sabal Palm Grove Sanctuary, Resaca del Rancho Viejo) but proved unsuccessful (Ideker 1994).

A 3-year project that included landowner outreach and rare plant surveys on private lands was conducted between May 1, 2002, and August 31, 2006, by Texas Parks and Wildlife and The Nature Conservancy. Its objective was to develop an umbrella candidate conservation agreement for rare plants of the

lower Rio Grande Valley under which sub-permittee conservation agreements with private landowners could be implemented (TPWD 2006).

Surveys were conducted in Willacy, Cameron, and Hidalgo counties, Texas. In Willacy County, surveys documented a population on a large ranch. No landowner agreement was signed; however, The Nature Conservancy is pursuing a conservation agreement. In Cameron County, a population of approximately 100 plants was located in Harlingen along the Arroyo Colorado. Another property was surveyed north of Rio Hondo, along the Arroyo Colorado, that had been reported to have Texas ayenia, but no plants were observed at the time of the survey. Agreements were signed with both Cameron County landowners (TPWD 2006). The population in Hidalgo County still exists; however, no agreement has been signed to protect this population.

To date there are six known Texas ayenia populations in the United States, four in Cameron County, one in Hidalgo County, and one in Willacy County.

In Mexico, a collaborative 3-year study with Pronatura, TPWD, The Nature Conservancy, and the USFWS was conducted to determine the status of individuals and/or populations and their distribution, and to identify and implement conservation strategies at private sites for the three species of rare plants in the Lower Rio Grande, including Texas ayenia (Pronatura Noreste 2005). During the surveys, between 2003 and 2005, Texas ayenia was observed at 13 sites near San Jose de Las Rusias, municipality of Soto La Marina, all in Tamaulipas. In March and April 2005, flowers and capsule formation were observed at eight locations. In August, the plant was observed at seven sites (Pronatura Noreste 2005). Prior to the Pronatura NE project, only two populations were known to occur in Mexico. After surveys were performed, there are now a total of 13 known populations.

2.5.3 Habitat

Texas ayenia occurs in subtropical woodland and savanna, in soils ranging from silty clays to fine sandy loams (Best 2007c). At one site in the lower Rio Grande Valley, the species grows in a plant community known as the Texas Ebony-Anacua series (Chloroleucon ebano-Ehretia anacua) (Diamond 1990). Past occurrences have been described in openings among brush, on the edges of thickets in chaparral (Correll and Johnston 1979). Recently discovered sites in Tamaulipas and Willacy County, Texas, are in partial sunlight at the edges of brush thickets. The sandy clay loam soil is derived from Holocene alluvial deposits and terraces on floodplains along the Rio Grande (Damude and Poole 1990).

Associated species of Texas ayenia include coma (*Sideroxylon celastriuma*), brasil (*Condalia hookeri*), mesquite (*Prosopis glandulosa*), lotebrush (*Ziziphus obtusifolia*), granjeno (*Celtis pallida*), colima (*Xanthoxylum fagara*), and snake eyes (*Phaulothamnus spinescens*) (Diamond and Poole 1990). The community at the Hidalgo site was once an extensive thicket that covered much of the Rio

Grande delta; however, less than 5 percent of the original acreage remains, mainly along fencerows, highway rights of way, canals, and ditch banks (Jahrsdoerfer and Leslie 1988).

Mexican habitat was low semi-deciduous tropical savanna with a mix of tall thorn scrub, grasses, and herbaceous plants. Soil was rich in organic material and had a great quantity of fine sands. Plants were flowering from August to May and had capsules with seeds. Associated flora was very diverse, with more than 120 species. Habitat is vulnerable to human pressure such as housing construction, illegal garbage dumps, fires, and agricultural practices (Pronatura Noreste 2005).

2.5.4 Threats

In both locations, the species is threatened by human impacts on thorn scrub due to agricultural, recreational, and urban development (Jahrsdoerfer and Leslie 1988). The species and its habitat are also threatened by the introduction of exotic grasses into the area. The low population numbers contribute to the decline of this species (Damude and Poole 1990).

Another major concern is the loss of its habitat, the riparian thorn woodland and savanna. Over 95 percent of this habitat has already been lost (Damude and Poole 1990). Habitat destruction mainly occurs through agricultural, recreational, and urban developments. At the U.S. Hidalgo site, agricultural practices such as brush clearing, pesticide uses, and irrigation threaten the existence of this habitat. In developing urban areas, clearing of the thorn scrub for flood control, dam construction, and other water development projects affects the flow patterns of the Rio Grande on which this riparian habitat depends (Jahrsdoerfer and Leslie 1988). Due to recent highway construction, this site is also located in the center of utility and highway rights-of-way, which was probably responsible for the loss of several individuals of this species.

2.6 WALKER'S MANIOC

Walker's manioc was federally listed as endangered on October 2, 1991. It is also listed as endangered by the state of Texas. At the time of listing there was only one known U.S. population, found in Hidalgo County, Texas, and it consisted of a single plant. No critical habitat is designated for this species.

2.6.1 Species Description

Walker's manioc, a member of the spurge family (Euphorbiacea), is a spindly, almost vine-like perennial herb that can reach up to 6 feet tall. It is found in semi-arid subtropical brush in extreme south Texas and neighboring Tamaulipas, Mexico.

The leaves have up to five lobes that may be shallowly or deeply indented. The narrow stems are smooth and grayish brown. The tuberous roots of the Walker's manioc measure up to 10 inches in length and 4 inches in width and resemble

carrots or turnips. When fresh, all plant parts have a strong cyanide odor. The five-lobed male and female flowers are separate, but on the same plant, and occur in racemes. Male flowers are about 0.5 inches long, white with light purple streaks, and are almost tubular in shape. The 0.375-inch long female flowers occur at the base of the male flower stalks. The fruit is a dry, globular capsule about 0.5 inches long, occurring on slightly downward curved stalks and containing three seeds. The seeds are round or slightly flattened and gray, with small irregular dark spots (TPWD 2007a, USFWS 1993a).

2.6.2 Distribution and Abundance

Walker's manioc was first discovered in 1853 by Arthur Schott near Fort Ringgold, Texas, a historic fort near Rio Grande City in Starr County. It was sighted again in 1888 on the Mexican side of the Rio Grande, and in 1940 Mrs. E. J. Walker collected the plant near Mission and La Joya in Hidalgo County, Texas. She sent the specimen to the University of Texas in Austin, which named it after her (USFWS 2007).

The specimens collected in 1853 near Ringgold Barracks, Rio Grande City, Starr County, and again in 1940 have not been relocated. A modern wastewater treatment plant occupies a portion of the old Ringgold barracks site, and no Walker's manioc has been relocated at the site. Attempts to locate plants where Mrs. Walker collected them near Mission and La Joya, Texas, have also been unsuccessful (USFWS 1993a).

In 1960, Marshall Johnston discovered Walker's manioc growing among remnant grasslands at two locations in east-central Tamaulipas, Mexico. He collected specimens from the Rancho Loreto area of Tamaulipas. In 1989, this area was resurveyed by a Mexican botanist, but no plants were found. The species was feared to be extinct in the wild, since years had passed with unsuccessful survey results (USFWS 2007).

A vigorous colony of Walker's manioc on the University of Texas Austin campus, planted from material received from Mrs. Walker, was vandalized in the spring of 1982. The population was reduced to only two or three plants, and a severe freeze in 1990 left only one plant at this location. Thereafter, the Center for Plant conservation had plants from the University of Texas stand under cultivation in pots at the San Antonio Botanical Garden (USFWS 1993a).

In 1990, botanist Phil Clayton found a single plant on private property near La Joya, Texas. Landowners were willing to protect the single plant and allow botanists to study it and collect seeds. In 1992, Mexican botanist Francisco Gonzales Medrano, aided by a grant from the USFWS, rediscovered a small population near Johnston's 1960 find, as well as a new population in southern Tamaulipas, Mexico (USFWS 2007). The Rancho Loreto site was identified as having only 8 to 10 individuals and reduced available habitat. The reduced available habitat may have been a result of long-term cattle grazing (USFWS 1993a).

In 1995, Walker's manioc was located in three different areas on the Lower Rio Grande National Wildlife Refuge in Starr and Hidalgo counties. The populations consisted of 6 to 150 individual plants, with individual populations often many miles from the next nearest population (Rio Delta Wild 2007). A map was generated of refuge sites using Global Positioning System (GPS) information (USFWS 2007). It is very likely that additional populations still exist on lands that have not been surveyed (Rio Delta Wild 2007).

Dr. Robert Lonard discovered a new population of Walker's manioc in March 1997 on a public road ROW north of La Joya. In May 1997, Tom Patterson and Chris Best discovered another population consisting of 6 individuals along Mexican Highway 97 north of Pedro J. Mendez, Tamaulipas. During that same period, Arturo Longoria discovered a viable population on a private ranch about 7 miles north of Rio Grande City (Best 1998). A small population (more than 20 plants) was also discovered at a cemetery in Peñitas, Hidalgo County, and another population was discovered by The Nature Conservancy on private lands in Duval County (Best 2007a)

Since 1998, the Texas Department of Transportation (TxDOT) has protected a single population found along the FM 2221 right-of-way in Hidalgo County. The population is offered protection, management, and monitoring under the Pharr District Resource Protection Signing Program. In July and August 2002, 13 additional Walker's manioc plants were counted at that site on a routine field survey. That same year, a new population consisting of several plants was found approximately 0.2 miles north of the existing population. No other new populations have been found to date (TxDOT 2007).

Currently 10 populations of Walker's manioc exist in the United States. There are 5 in Starr County and 5 in Hidalgo County. These populations occur on private and public lands. From 2003 to 2005, Pronatura Noreste biologist Alberto Contreras, in collaboration with The Nature Conservancy, Texas Parks and Wildlife, and USFWS personnel, visited more than 200 sites and collected more than 300 plant specimens in northeast Mexico. The Pronatura Noreste survey detected Walker's manioc in 24 locations, including previously reported sites at Rancho Loreto and Ejido Morales in east central Tamaulipas (Best 2007a). It is not known, however, if the Mexican plants are too distantly related to be crossed with the U.S. plants (Rio Delta Wild 2007, USFWS 2007).

2.6.3 Habitat

Walker's manioc usually grows among low shrubs, native grasses, and herbaceous plants, either in full sunlight or in the partial shade of shrubs. It is found in sandy, calcareous soil, shallowly overlying indurated caliche and conglomerate of the Goliad Formation on rather xeric slopes and uplands, or over limestone as in the case of the Aldama population (TPWD 2007a, Rio Delta Wild 2007).

Principal woody associates at the largest known site—on very gentle upper slopes of bluffs along the Rio Grande near Rio Grande City—include calderona (*Krameria ramosissima*), blackbrush acacia (*Acacia rigidula*), cenizo (*Leucophyllum frutescens*), Mission fiddlewood (*Citharexylum spathulatum*), coyotillo (*Karwinskia humboldtiana*), and tasajillo (*Opuntia leptocaulis*). Other plants that grow in association with Walker's manioc include anacahuita (*Cordia boissieri*), barreta (*Helietta parvifolia*), blue sage (*Salvia ballotaeflora*), drago (*Jatropha dioica*), elbowbush (*Forestiera angustifolia*), guayacan (*Guaiacum angustifolium*), oregano cimarron (*Lippia graveolens*), and colima (*Zanthoxylum fagara*) (USFWS 1993a).

2.6.4 Threats

Among the threats facing Walker's manioc are habitat destruction/modification and fragmentation, since much of the native plant cover in this region of Texas, approximately 95 percent, has been lost to agricultural activities, residential development, and highway construction activities. Destruction and fragmentation of native brush and grassland habitat can occur by mechanical and chemical means, and prescribed fire activities (USFWS 1993a).

Mechanical brush clearing could include heavy steel chains, roller choppers, root plows, brush mowers, and tree grubbers, and could create soil disturbances. Herbicides are destructive because they are selective on broad-leaved plants. It is not known if the Walker's manioc tuberous root provides any protection for complete destruction from herbicides. Fire usually has temporary effects, because native vegetation resprouts from the roots after being burned (USFWS 1993a).

Fragmentation leaves remnant tracts of habitat surrounded by cultivated fields and development, potentially vulnerable to agricultural chemicals spread by drift from aerial spraying and runoff following rains. Uncontrolled fires caused by colonias (unincorporated border settlements) burning trash also threaten remnant tracts of brush, and the introduction of exotic species, especially grasses, has displaced some native vegetation (USFWS 1993a).

Walker's manioc is also vulnerable to strip or surface mining of caliche outcroppings for road-building material, because it occurs in scattered populations of soils overlying caliche ridges. Some level of herbivory has been observed at several population sites in Texas, although the agent and the effects of this herbivory are unknown. Also of note, in 2003, Refuge Law Enforcement Officer Joe Resendez and Refuge Ecologist Chris Best determined that tubers of Walker's manioc plants at three refuge tracts were occasionally excavated by wild animals. They were able to positively identify javelina tracks at a recently excavated site; this does not preclude that other animals may also be digging the roots (Best 2007a).

The human population is projected to increase 81 to 100 percent in Hidalgo County and 61 to 80 percent in Starr County between the years 2000-2025

(Murdock et al, 2002). With increased human population comes more commercial and residential development, further removing or fragmenting the last remaining tracts of habitat.

2.7 JOHNSTON'S FRANKENIA

Johnston's frankenia (*Frankenia johnstonii*) was listed August 7, 1984 (49 FR 31418), as an endangered species under the Endangered Species Act of 1973. Critical habitat was not designated for this species. On May 22, 2003, a proposed rule was published to delist the plant, but to date the final rule has not been published (68 FR 27961).

2.7.1 Species Description

Johnston's frankenia is a low, somewhat sprawling, perennial shrub, in the Frankeniaceae family. Mature plants are approximately 12 to 18 inches high, 12 to 24 inches wide, and rounded in appearance. This spineless sub-shrub has a woody, trunk-like stem that gives rise to several to many ascending or recurved herbaceous stems. The entire plant may be grayish-green or bluish-green most of the year, turning rusty brown in late fall, when it is easily detected among its surrounding deciduous neighbors. This color change can also be brought on by severe drought conditions (Janssen and Williamson 1993). The gray-green leaf surfaces are haired, with salt crystals frequently visible on the underside of the leaves. Leaf margins are somewhat rolled or turned under. Flowers are small, with five slightly fringed or toothed white petals and a distinct yellow center. Flowering occurs from April to November, especially when stimulated by rainfall (Janssen and Williamson 1994).

2.7.2 Distribution and Abundance

Johnston's frankenia was first collected in 1966 in Zapata County, Texas, by Dr. D. S. Correll, who later named the species in honor of Dr. M. C. Johnston (Correll 1966). At the time it was listed, Johnston's frankenia was known at only four sites in Texas (two in Zapata County and two in Starr County) and at one locality in Mexico. When the recovery plan for this species was finalized in 1988, a total of seven populations, including the original five, had been located, all occurring on private land. At that time, the six Texas populations were encompassed within a 56-mile radius, with the population in Mexico located approximately 125 miles to the west. The listing of Johnston's frankenia and subsequent recovery planning and implementation efforts generated increased inventory activities for the species throughout its known range and beyond. Since 1993, intensive surveys in Webb, Zapata, and Starr counties in southern Texas, as well as additional information from Mexico, have shown this species to be more widespread and abundant than was previously known. The discovery of new populations has extended the species' range to north and west of Laredo in Webb County, farther east in Zapata County, and farther south in Starr County (Janssen 1999). Currently a total of four populations are known in Mexico.

Three of these are relatively close to one another along Highway 53 in the State of Nuevo Leon, while the location of the fourth population extends the species' range north–northeast to the vicinity of Nuevo Laredo in western Tamaulipas (Janssen 1999).

An intensive status survey and study of ecological and biological characteristics of Johnston's frankenia was undertaken by TPWD botanist Gena Janssen between 1993 and 1999. The final report for this 6-year study contained documentation for 58 populations of Johnston's frankenia in the United States and 4 in Mexico (Janssen 1999). Four of these 62 total populations were part of the 7 populations referenced in the recovery plan. The results of the more recent status survey have dramatically increased the known numbers of individual plants, from approximately 1,500 at the time of listing to more than 9 million by 1999 (Janssen 1999).

Since the publication of the draft proposed rule to delist Johnston's frankenia in May 2003, additional populations have been discovered. One recently located Starr County population occurs south of the town of El Sauz and north of Rio Grande City. In Zapata County, a landowner who had previously signed conservation agreements for two populations on his ranch found four new sites on this property. Surveys on a Zapata County ranch that became accessible in 2004 turned up a previously undocumented large population containing "hundreds of thousands, if not millions" of plants (Janssen 2004). Also in 2004, a new site for *F. johnstonii* was located in Webb County. It is likely that this site is part of an already-documented population on an adjoining ranch. This population is located in the most northwestern part of the species' range, and the newly discovered portion of the population occurs on land belonging to individuals who have expressed an interest in rare plant conservation (Williams 2004). Adding these newly documented populations to those described in Janssen's 1999 report brings the total number of known populations in Texas to at least 60.

It is probable that populations still remain undiscovered throughout suitable habitat in all three Texas counties, with the highest potential in Zapata County, and in Mexico (Janssen 2001). In Mexico, the level of effort to survey for Johnston's frankenia has been limited. In Texas, Janssen estimated that approximately 80 percent of potential habitat had been surveyed for Johnston's frankenia (Janssen 2001). Landowner permission for access was one of the primary factors affecting the extent of potential habitat covered by surveys, since parts of all populations located to date occur on privately owned land. Within Texas, a greater extent of suitable habitat, defined by the presence of the correct types of soils, exists in Zapata County than in the neighboring Starr or Webb counties (Janssen 2000).

2.7.3 Habitat

Johnston's frankenia generally grows on open or sparsely vegetated, rocky, gypseous hillsides or saline flats. In Texas, this species is endemic to Webb,

Zapata, and Starr counties, where it occurs within the mesquite-blackbrush community encompassed in the South Texas Plains vegetation zone as described by McMahan et al. (1984). Johnston's frankenia populations have a clumped distribution, occurring in openings of the Tamaulipan thorn scrub where the plant thrives in a setting with high light intensity. Populations of this species appear to be restricted to pockets of hyper-saline soil, analysis of which shows salinity and sodium content that is approximately 10 times greater than that found in soils occurring outside the populations (Janssen and Williamson 1994). The population in Mexico occurs in the transition zone between the Tamaulipan scrub and the Chihuahuan desert (Whalen 1980).

2.7.4 Threats

At the time of listing, Johnston's frankenia was considered to be vulnerable to extinction due to the following: (1) the low number and restricted distribution of populations; (2) low numbers of individual plants; (3) threats to the integrity of the species' habitat, such as clearing and planting to improve pasture species, including introduced grasses; (4) direct loss from construction associated with highways, residential development, and oil- and natural gas-related activities; and (5) the species' low reproductive potential.

The intensive survey effort by TPWD in South Texas has shown Johnston's frankenia to be much more widespread and abundant than was known at the time of listing or when the recovery plan was prepared. Initial information regarding the species' vulnerability to competition from exotic plant species such as buffelgrass (*Pennisetum ciliare*) have been alleviated, as data collected for soils, structural characteristics, and composition of the surrounding plant community show Johnston's frankenia to be well adapted to the harsh environment in which it is a dominant vegetative component. This plant is a halophytic (salt-loving) perennial, suited to life in hyper-saline soils in which the elevated salinity and sodium levels are likely to exclude buffelgrass, the non–native grass species that is most frequently planted for pasture improvement purposes in Webb, Zapata, and Starr counties (Reilley 2001). In fact, Johnston's frankenia is the dominant woody species within the plant community where it is found (Janssen 1999).

Mechanical and chemical brush-clearing practices that are commonly used prior to planting pasture grasses can, however, adversely impact Johnston's frankenia populations or portions thereof by uprooting or damaging plants. Public lands on which Johnston's frankenia occurs include a National Wildlife Refuge tract, USIBWC-controlled lands, and a TxDOT right of way. All three (and possibly the fourth) sites on Federal land are small populations, and the state highway department ROW site has only 36 individual plants.

Oil and gas exploration and production activities, which can pose threats to portions of populations via road or well-pad construction or clearing of seismic lines, are impossible to quantify or to project in terms of future geographic sitings.

Rare species can be vulnerable to reproductive failure, and low reproductive potential was cited in the recovery plan as a potential threat to Johnston's frankenia (Turner 1980, USFWS 1988). Among the factors that can heighten the risk of reproductive failure in plants are high dependence on specialized pollinators, absence of back-up reproductive mechanisms such as self–fertilization and vegetative reproduction, and poor ability to compete for pollinators (Janssen 1999).

2.8 ZAPATA BLADDERPOD

The Zapata bladderpod was federally listed as endangered on November 22, 1999, with four populations being located and described in Starr and Zapata counties in South Texas (USFWS 1999). Since the listing, additional populations have been documented. Zapata bladderpod has a total of 11 occurrences (USFWS 2004). Critical habitat was designated on December 22, 2000 (USFWS 2000).

Data supporting the union of *Lesquerella* and *Physaria* resulted in 91 names in *Lesquerella*, including 75 at the specific rank, to be transferred to *Physaria*. Thus, Zapata bladderpod is now named *Physaria thamnophilia* (Al-Shehbaz and O'Kane 2002).

2.8.1 Species Description

Zapata bladderpod is a pubescent, silvery-green, herbaceous perennial of the Brassicaceae (Mustard) family, with sprawling stems 17 to 34 inches long. Basal leaves are narrowly elliptical to oblanceolate and acute, 1.5 to 4.8 inches long, and 0.3 to 0.6 inch wide, with entirely or slightly toothed margins. Stems leaves are linear to narrowly elliptical and acute, 1 to 1.5 inches long and 0.1 to 0.3 inches wide, and have entire or slightly toothed margins (USFWS 2004).

The flower is a loose raceme of yellow petals that appear after sufficient rainfall. The fruit is small, round, and inflated like a tiny bladder, and measures approximately 0.2 to 0.8 centimeters (0.08 to 0.3 inches) in diameter, and are on short, downward curving pedicels (Poole 1989).

2.8.2 Distribution and Abundance

When the species was listed in 1999, four populations were known to exist in Starr and Zapata counties (USFWS 1999) along approximately 2 miles of sandstone bluffs along the Rio Grande. In 2004, the species was known in Texas from 11 occurrences, with seven sites in Starr County and four in Zapata.

Only four of the seven populations known historically to occur in Starr County still support Zapata bladderpod plants (USFWS 2004). Two of the seven are in the highway rights of way between Zapata and Falcon, and one is on private property in the Siesta Shores subdivision. The largest populations occur on three tracts of LRGVNWR and on a privately owned ranch in Starr County

(USFWS 2004). These populations number in the thousands of individuals in rainy years but have a very restricted area covering only a few acres (Best 2006). In Zapata County, three of the four historically documented sites still support Zapata bladderpod.

In 2001, permanent monitoring plots were established on an LRGVNWR tract where a ROW was cleared with a Woodgator, a piece of equipment that cuts brush and trees without disturbing the soil. A dramatic increase in the Zapata bladderpod density and reproduction was observed in the cleared ROW during the first 2 years. Two newly discovered sites have also been added to the monitoring program. Surveys in similar areas resulted in two new populations being discovered on privately owned land in March 2007. One site, in Zapata County, had several hundred individuals. The other, in Starr County, had an undetermined number of plants (Best 2007b), bringing the total to nine known populations occurring in Starr and Zapata counties.

In 2005, botanists from TPWD, Pronatura Noreste, and USFWS relocated a historic population in Mexico (TPWD 2007b). The population has been documented at Rancho Loreto, in the State of Tamaulipas (USFWS 2004); however, recent genetic evidence demonstrates that the Tamaulipan population now appears to be a distinct, undescribed species (Pepper 2007).

The predominance of private lands in South Texas limits access for surveys, so the species range may be more extensive than what is currently known. The size of populations fluctuates, depending on rainfall and weather cycles, making them more difficult to locate (USFWS 2004).

2.8.3 Habitat

Zapata bladderpod is endemic to South Texas and Tamaulipas. In Starr and Zapata counties, Texas, Zapata bladderpod occurs as a narrow geo-endemic on sandstone outcrops of the Jackson, Yegua, and Laredo formations, in close association with overlying deposits of fossil eocene oyster shell. Soils are classified as Catarina and Copita series; specifically, these are yellowish sandy soils with crystalline gypsum (calcium sulfate) often visible at the soil surface. Due to low cohesiveness and sloping topography, these soils are extremely susceptible to hydraulic erosion.

Upon review in September 2007, Chris Best, state botanist, clarified that the soil types where the bladderpod occurred were high in gypsum (calcium sulfate). The final rule describes these as calcareous soils (usually interpreted as high in calcium carbonate), and included the Jimenez-Quemado soil series. However, none of the populations in Starr and Zapata counties are found in the Jimenez-Quemado soils, or other limestone or caliche-derived soils high in calcium carbonate. The primary constituent elements of this species are found in the Catarina soil series, generally along the slopes of hills, with sandy loam to loamy sand of low to moderate salinity and high gypsum content, and an absence of substantial previous soil disturbance and seeding or sodding of exotic grasses.

The associated vegetation includes cenizo (*Leucophyllum frutescens*), Wherry mimosa (*Mimosa wherryana*), palo verde (*Parkinsonia texana* var. *texana*), and other shrubs, together with slim tridens (*Tridens muticus*), red grama (*Bouteloua trifida*), side-oats grama (*B. curtipendula*), and other grasses and herbaceous plants. Zapata bladderpod tolerates partial shading by shrubs, but the highest densities and reproductive growth occur where there is little or no competition from woody plants.

A disjunct population occurs 150 miles to the southeast of Starr County, in the Loreto sand plain of Tamaulipas. The Loreto population occurs in loose sandy soil shallowly overlying indurated caliche of the Miocene or Pliocene Goliad formation. The associated vegetation is open grassland, including slender grama (*B. radicosa*), seacoast little bluestem (*Schyzachyrium scoparium* var. *litorrale*), and pan-American balsamscale (*Elioneuron trypsacoides*), with other herbaceous and sub-shrub plants. However, recent DNA analyses have shown that the Loreto plants are genetically distinct from the Texas population and probably represent a new, undescribed species (Pepper 2007).

2.8.4 Threats

Primary threats to the survival of the Zapata bladderpod have been identified as habitat modification and destruction from increased road and highway construction and associated urban development, increased oil and gas exploration and development, alteration and conversion of native plant communities to improved pastures, overgrazing, and vulnerability due to extreme endemism and low population numbers (USFWS 1999, 2004).

2.9 ZAPATA BLADDERPOD CRITICAL HABITAT

Eight critical habitat units were designated in Starr County. Seven of the units encompass 5,158 acres of the LRGVNWR. Refuge tracts designated as critical habitat include Cuellar, Chapeno, Arroyo Morteros, Las Ruinas, Arroyo Ramirez, Los Negros Creek, and La Puerta. Only two critical habitat units of the seven contain Zapata bladderpod plants. The remaining five refuge units contain the same vegetation and soil qualities as the known population sites and could serve as potential reintroduction sites. The eighth unit consists of 1.36 acres on private property. Critical habitat was not designated at the occupied sites in Zapata County due to the low numbers of plants present on-site and the associated low potential for continued survival or sustainability at these sites (USFWS 2004).

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3. ACTION AREA

The Action Area is defined by a corridor that extends approximately 300 feet from construction access routes, staging areas, and construction sites where pile driving will not occur, or 1,800 feet from construction sites where pile driving will occur. These are the areas affected by the Project. The extension of 300 feet represents the approximate distance that project-related noise (with the exception of pile driving) is estimated to attenuate to ambient noise levels of 55 to 80 dBA. Pile driving is estimated to attenuate to ambient noise levels of 55 to 80 dBA within approximately 1,800 feet. Pile driving will not occur in staging areas or along construction access roads. The Action Area includes primary pedestrian fence and patrol road construction activities, construction access roads, and construction staging areas (see **Appendix A** for a detailed map of the Action Area).

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4. EFFECTS OF THE ACTION

Approximately 1,175 acres of vegetation will be directly impacted by the installation of the primary pedestrian fence in the Rio Grande Valley Sector, based on GIS data, dated 6 May 2008. This includes direct effects on vegetation resulting from disturbance at construction access roads and staging areas. The primary pedestrian fence will cut across or abut portions of Los Negros Creek (Section O-1), Rio San Juan, Los Velas, and Los Velas West tracts (Section O–2), Los Ebanos (Section O-3), Peñitas, Abrams West, Abrams, Peñitas WMA, and Chihuahua Woods (TNC) (Section O-4), Pate Bend and Hidalgo Bend (Section O-6), Monterrey Banco (Section O-7), Champion WMA and La Coma (Section O-8), Llano Grande Banco (Section O–9), Rosario Banco (Section O–10), Anacua WMA (Section O-11), Culebron Banco tract (Section O-13), Vaqueteria Banco (Section O-15), Palo Banco and Phillips Banco (Section O-18) Jeronimo Banco (Section O-20), and Boscaje del la Palma and Southmost ranch (Section O-21), but the fence will avoid the Arroyo Ramirez tract (Section O-1) and the Tahuachal Banco tract (Section O–16) of the LRGVNWR (see **Table 4-1** for the total area impacted in national wildlife refuges). Note that WMAs are owned by TPWD and managed by LRGVNWR.

Complete lists of the vegetative alliances and other land uses within each component of the project footprint are presented in **Appendix B**. **Appendix B, Table 1** presents the vegetation alliances within the 60-foot impact corridor north of Sections O-1 through O-3 and O-11 through O-21. **Appendix B, Table 2** presents the vegetative alliances within the 40-foot impact corridor south of Sections O-4 through O-10. **Appendix B, Table 3** presents the vegetative alliances impacted within the staging areas. **Appendix B, Table 4** presents the vegetative alliances impacted by the construction access roads. A summary of the direct impacts on grasslands, shrublands, woodlands, open waters, and other land uses is presented in **Table 1-3**. A summary of impacts on wetlands in the project footprint is presented in **Table 4-2**. The Project will impact approximately 2.77 acres of delineated wetlands and other waters of the United States.

4.1 OCELOT AND GULF COAST JAGUARUNDI

Implementation of the Project may affect and is likely to adversely affect ocelots and jaguarundis in each section (Sections O-1 through O-21). Implementing general and species-specific BMPs will help to avoid impacts on these species (see **Section 1.3**). Additionally, mitigation measures will compensate for impacts on these species and their habitat (see **Section 1.3.3**). The Project is located fully within Picachos Corridor, a wildlife corridor that is being developed with Mexico under a binational Memorandum of Understanding (MOU) (see **Figure 4–1**), and therefore it is assumed that ocelot and jaguarundi habitat occurs in each section (see **Table 4-2**). Currently, 11 agencies (3 from the United States and 8 from Mexico) are developing the MOU to establish wildlife corridors on both sides of the Rio Grande (north and south of the Texas/Mexico border from

Table 4-1. Impacts on Wildlife Refuges

Fence Section	Name of Refuge	Length Intersected (miles)	Impact Area (acreage)
O-1	Los Negros Creek, LRGVNWR	0.331	2.41
O-2	Rio San Juan, LRGVNWR	0.158	0.63
O-2	Los Velas West, LRGVNWR	1.126	7.44
O-2	Los Velas, LRGVNWR	0	5.30
O-3	Los Ebanos, LRGVNWR	0.538	4.04
O-3	Los Ebanos, LRGVNWR	0.139	0.79
O-4	Peñitas, LRGVNWR	0.213	0.41
O-4	Chihuahua Woods, TNC	0	0.11
O-6	Hidalgo Bend, LRGVNWR	0.375	0.30
O-6	Pharr Settling Basin, LRGVNWR	0	1.59
O-6	Pate Bend, LRGVNWR	0.110	2.93
O-7	Monterrey Banco, LRGVNWR	0.880	4.24
O-8	La Coma, LRGVNWR	0.185	0.90
O-10	Rosario Banco, LRGVNWR	0.342	1.70
O-13	Culebron Banco, LRGVNWR	0.099	0.06
O-16	Tahuachal Banco, LRGVNWR	0	0.03
O-18	Palo Banco, LRGVNWR	1.169	2.23
O-18	Phillip Banco, LRGVNWR	0	7.74
O-21	Jeronimo Banco, LRGVNWR	0.289	2.10
O-21	Boscaje de la Palma, LRGVNWR	0.313	2.28
Total Impacts		**6.28**	**47.23**

Falcon Dam to Laguna Madre). To date, all U.S. government agencies and nongovernmental organizations (including USFWS, TPWD, and The Nature Conservancy) have signed the MOU. Mexican agencies are expected to sign in 2008. The wildlife corridors will begin to reconnect fragmented habitat for the ocelot/jaguarundi, birds, bats, and other mammals. The MOU will work to connect LRGVNWR tracts along the Rio Grande with areas in the states of Tamaulipas and Nuevo Leon, Mexico, and natural protected areas in Mexico. Laguna Atascosa NWR and Laguna Madre Natural Protected Area in Tamaulipas, Mexico are working together to establish a sister park relationship and also to reconnect wildlife corridors along the coast for ocelot, jaguarundi, and other wildlife species. They are also working on a Binational Management Plan with the establishment of wildlife corridors to recover these endangered cats as a top priority.

Table 4-2. Impacts on Wetlands by Section

Wetland ID	Wetland Type	Tactical Infrastructure Section	Size (acres)	Impacts (acres)
WL1	PEM/PSS	O-10	0.42	0.02
WL2	PEM	O-9	2.62	0.24
WL4	PEM/ditch	O-8	0.11	0.03
WL6	PEM/POW	O-5	0.38	0
WL8	Stream	O-1	0.36	0.14
WL11	Arroyo	O-1	0.08	0
WL12	Arroyo	O-1	2.85	0
WL14	PFO/PEM	O-1	0.37	0.16
WL15	Arroyo	O-1	0.12	0.05
WL16	PFO/PEM	O-2	0.36	0
WL18	PSS/PEM	O-20	0.02	0
WL19	PEM/POW	O-17	0.5	0
WL20	PSS/PEM	O-17	2.65	0.21
WL23	PFO along ditch	O-11	3.25	0.96
WL25	POW/PFO/PEM	O-12	1.08	0
WL26	PSS/POW/PEM	O-13	0.79	0
WL29	PFO/PEM	O-13	0.09	0
WL30	PFO/PSS	O-13	0.18	0
WL31	PSS/PEM	O-13	0.14	0
WL32	PEM	O-13	0.14	0
WL33	PEM	O-13	0.44	0.08
WL36	PFO	O-18	0.04	0
WL37	PEM/PSS	O-18	0.17	0
WL38	POW/PEM	O-18	0.68	0
WL46	PFO/PEM	O-21	0.27	0
WL47	POW/PEM	O-21	1.82	0
WL51	PEM	O-2	1.6	0
WL52	PFO	O-2	0.25	0.09
WL53	PFO	O-2	0.22	0.13
WL54	PFO	O-2	0.22	0.09
WL55	Stream	O-2	0.04	0.04
WL56	PFO	O-2	1.13	0.53
WL57	PFO	O-20	0.4	0
Total Impact				**2.77**

Notes: PEM=Palustrine Emergent; PSS=Palustrine Scrub-Shrub; POW=Palustrine Open Water; PFO= Palustrine Forested

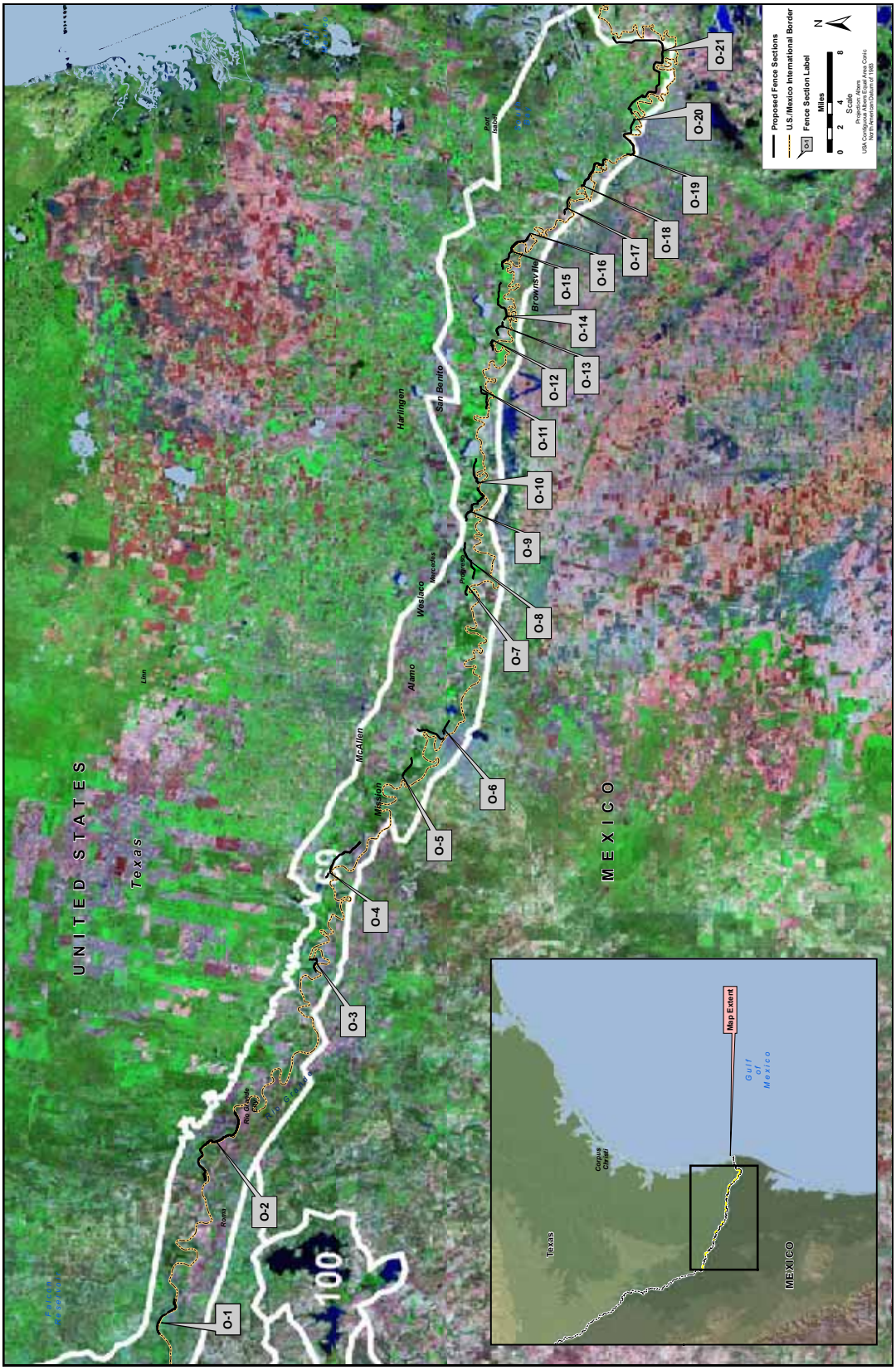

Figure 4-1. Project Footprint within Picachos Corridor

Direct Effects

Primary Pedestrian Fence. All grasslands, shrublands, woodlands, open water, and other wetlands within the Picachos Corridor are potentially ocelot and jaguarundi habitat. However, the most appropriate habitat expected to be affected includes thorn scrub shrubland and woodland habitat, predominantly honey mesquite and retama; disturbed floodplain shrubland, woodland, and forest habitat, predominantly honey mesquite and sugarberry; and to a lesser extent sabal palm.

Habitat fragmentation is the separation of a landscape into various land uses (development, agriculture, etc.), resulting in numerous small, disjunct habitat patches left for use by wildlife. Fragmentation eliminates habitat for species like the ocelot and jaguarundi that require large, unbroken blocks of habitat.

Additionally, the small habitat patches resulting from fragmentation often do not provide sufficient food and cover resources for many species that attempt to use them. This can result in an increased risk of death by predation, if the animal has to venture beyond the cover of the patch to find new food resources.

Many remnant brush tracts in the LRGV are small (less than 100 acres) and scattered (USFWS 1984 as cited by Jahrsdoerfer and Leslie 1988). Isolated native brush tracts in extensively cleared areas may serve as “islands” of wildlife habitat (as described by Blake and Karr 1984 as cited by Jahrsdoerfer and Leslie 1988). The size of natural areas, or the degree of fragmentation, and their proximity to each other influence recruitment and extinction relationships (Diamond 1975 as cited by Jahrsdoerfer and Leslie 1988). Larger areas, or smaller areas with close neighbors, provide increased diversity, dispersal potential, and lower extinction rates (Harris 1984 as cited by Jahrsdoerfer and Leslie 1988). There is evidence of isolation from contiguous gene pools in surrounding but fragmented natural habitat (Miller and Harris 1977 as cited by Jahrsdoerfer and Leslie 1988). Brushland tracts in the LRGV are isolated. Movement rates and distances moved between tracts by various species in the LRGV are unknown.

Reduction of habitat connectivity within portions of the wildlife corridor will likely impact ocelot and jaguarundi movement, access to traditional water sources, and potential for gene flow. Reduction of habitat connectivity is a particular concern in units of the LRGVNWR that will be bisected by the fence. These include Rosario Banco and Los Negros Creek in Section O-1, Rosario Banco in Section O-10, Anacua WMA in Section O-11, Boscaje de la Palma in Section O-21, and Southmost Ranch in Section O-21. Sufficient data are not available to determine the impacts of this on movements of these two species of cats, as their actual movement corridors or movement patterns in the area affected by the fence are not known. If their primary movement is perpendicular to the river, then the fence could substantially impact movements for some individuals. Such impacts to movement could correlate with reduced access to traditional water sources, and reduced gene flow between portions of the population for each species.

However, the fence is not a solid feature 70 miles long. There are areas of habitat between fence sections through which the cats, which are relatively mobile species, could move. In addition, wildlife openings—holes in the base of the fence through which ocelot and jaguarundi could pass—have been incorporated in the fence design; and the placement of the openings include the areas considered most likely to serve as movement corridors for these two species (see **Appendix A** for the location of cat holes). Consequently, impacts on these species relative to habitat connectivity are anticipated to be both short- and long-term, and range from minor to major depending upon the actual fence section. Movement of individuals parallel to the river is still impacted by the fence due to reduction in travel corridors, especially in areas where international bridges act as an east-west barrier.

Patrol Roads. Patrol roads that are being built or improved as part of the Project are located within the project footprint as described above (within the 60-foot corridor north of the fence for Sections O-1 through O-3 and O-11 through O-21, and within the 40-foot corridor south of the fence for Section O-4 through O-10). Therefore, direct impacts on vegetation and habitat are included in the totals in **Table 1-3**. Additionally, roads are assumed to fragment ocelot and jaguarundi home ranges and travel corridors. Fragmentation results from conversion and development of the most productive and/or most accessible sites, leaving the remaining smaller patches increasingly isolated.

Vehicular traffic associated with the fence construction, and with operation and maintenance activities, will remain on established roads. Rehabilitation of affected soils will include revegetation of the disturbed area to reduce erosion while allowing the area to return to native vegetation. Erosion control measures will be utilized to avoid siltation of aquatic habitats. Any excess soils not used during construction of the tactical infrastructure or subsequent rehabilitation will be hauled from the site and disposed of properly.

Vegetation Removal/Mowing. Maintenance activities on revegetated sites, (such as mowing, herbicide application, or noxious species control) will be targeted primarily for herbaceous species (grasses) and will occur within the project footprint as described above (within the 60-foot corridor north of the fence for Sections O-1 through O-3 and O-11 through O-21, and within the 40-foot corridor south of the fence for Section O-4 through O-10). Therefore, direct impacts on vegetation and habitat are included in the totals in **Table 1-3** and in the discussion of impacts on ocelot and jaguarundi habitat (above). Additionally, herbicide applications could have long-term effects on federally listed species and their habitat within the project footprint. The implementation of BMPs will reduce impacts on federally listed species and their habitats. CBP will coordinate with USIBWC to adhere to the 1993 Biological Opinion regarding USIBWC mowing operations and the terms and conditions of the 2003 Biological Opinion issued to the Immigration and Naturalization Service for Operation Rio Grande. These measures will reduce the effects on federally listed plant species.

Temporary Construction—Noise and Lights. Noise created during construction will have the potential to affect ocelot and jaguarundi individuals within the action area (see **Appendix A**). All project-related noise will be temporary and will only be heard within the action area. All project-related noise (with the exception of pile driving) is expected to attenuate to ambient noise levels of 55 to 80 dBA within 300 feet. Pile driving will attenuate to ambient noise levels of 55 to 80 dBA within 1,800 feet (see **Appendix A**).

The impacts of noise will include subtle, localized impacts from the overall elevation of ambient noise levels during construction. Noise levels after construction are anticipated to return to close to current ambient levels. Elevated noise levels during construction could result in reduced communication ranges, interference with predator/prey detection, or habitat avoidance in the action area. More intense impacts could include behavioral change, disorientation, or hearing loss. Predictors of wildlife response to noise include the noise type (continuous or intermittent), prior experience with noise, proximity to the noise source, stage in the breeding cycle, activity, and age. Prior experience with noise is the most important factor in the response of wildlife to noise, because wildlife can become accustomed (or habituate) to the noise. The Project runs along many areas that are developed, and it is likely that any ocelots or jaguarundis that inhabit the action area have prior experience with noise. The rate of habituation to short-term construction is not known, but it is anticipated that most ocelots and jaguarundis will only be permanently displaced from the areas where the habitat is cleared and the fence and associated tactical infrastructure constructed, and will be temporarily dispersed from areas adjacent to the project areas, within and outside the project footprint, during construction periods.

Ocelots are primarily nocturnal, while jaguarundis are primarily diurnal with some nocturnal activity recorded. Therefore, the use of lights for nighttime construction will have the potential to adversely affect migration, dispersal, and foraging activities of individual ocelots and, to a lesser extent, jaguarundis within the action area. However, the dense habitat through which these cats tend to move resists substantial light penetration. Lights used for construction will be shielded to avoid unnecessary illumination of potential habitat for these two species. Finally, the Project runs along many areas that already experience above-normal illumination. Therefore, construction lights will not have more than temporary, minor to moderate adverse effects on any ocelots or jaguarundis inhabiting the action area.

Indirect Effects

Primary Pedestrian Fence. The height of the primary pedestrian fence will restrict the cat's movements. However, cats could continue to travel through a vegetated corridor to the ends of the primary pedestrian fence and through wildlife openings in Section O-1 through O-3 and O-11 through O-21, although the extent to which they will do so is unknown. This additional travel time will expend additional energy and increase the risk of encountering humans or vehicular strikes.

Removing vegetation and grading during construction could temporarily increase siltation in the river and wetlands and therefore have short-term minor adverse impacts on water quality of water sources for ocelots and jaguarundis. However, implementing standard BMPs, such as silt fences, should reduce this potential impact to negligible.

All ocelot and jaguarundi habitat between the fence and the Rio Grande could be indirectly, adversely affected by the presence of the primary pedestrian fence if it is not as accessible for management purposes or if it is disconnected from other suitable habitats. Units of the LRGVNWR that will be located completely south of the fence include Los Ebanos in Section O-3; Caballo Banco, Abrams West, Peñitas and La Pesquera, and Abrams in Section O-4; Gabrielson and Cottam in Section O-5; Pate Bend and Hidalgo Bend in Section O-6; Monterrey Banco in Section O-7; La Coma in Section O-8; Rosario Banco in O-10; Llano Grand Banco in Section O-11; Culebron Banco in Section O-13; Villitas Banco in Section O-11; Vaquerito Banco East in Section O-15; Las Palomas Banco in Section O-14; Vaqueteria Banco in Section O-15; Ranchito in Section O-16; South Palo Banco, Phillips Banco, and Champion Bend in Section O-18; and Jeronimo Banco, Boscaje De La Palma, and Southmost Ranch in Section O-21. National Land Cover Data (NLCD) indicate that the land between the primary pedestrian fence and U.S./Mexico international border consists of 10,558 acres of planted/cultivated land; 1,706 acres of developed land; 4,880 acres of undeveloped land; and 6,700 acres of WMAs and NWRs. Therefore, potentially 12,580 acres of ocelot and jaguarundi habitat (undeveloped, WMA, and NWR lands) will be indirectly impacted by the presence of the primary pedestrian fence.

Wildfires occur regularly along the river. With the addition of a fence or flood control wall, additional impacts from wildfires could occur to ocelots and jaguarundis and their habitat. The cats could be trapped between the river and the fence/wall during a wildfire. Firefighters might not risk personnel behind the fence/wall if their escape routes are limited to fight a wildfire safely. This type of situation could have negative impacts to ocelots and jaguarundis trying to escape a wildfire. Also, more habitat could be lost due to restrictions associated with fighting fires safely.

Indirect effects on ocelot and jaguarundi habitat will occur in units of the LRGVNWR that occur north of the fence. In these sections ocelots and jaguarundis could be separated from water sources. This impact will be greater in Section O-4 through O-10, where there will be no wildlife openings. Units that will occur north of the fence include Los Negros Creek in Section O-1; Los Velas West and Los Velas in Section O-2; Los Ebanos in Section O-3; Peñitas in Section O-4, Granjeno in Section O-5; La Coma in Section O-8; Rosario Banco in O-10; Villanueva in Section O-15; Phillips Banco, and Villanueva in Section O-18; Brownsville in Section O-20 ;and Boscaje De La Palma, and Southmost Ranch in Section O-21.

Beneficial indirect effects on ocelot and jaguarundi habitat could occur from the reduction of illegal cross-border traffic. Because some of this primary pedestrian fence borders agricultural and residential areas, it will likely decrease the number of dogs and humans gaining access to the area near the river in some sections of the fence. Areas disturbed by vehicular traffic, foot traffic, and litter alter the composition, structure, and function of wildlife habitats. Dogs could harass the ocelots; the fencing could potentially decrease such harassment adjacent to urban areas. Gaps in the fence occur near the wildlife refuges Arroyo Ramirez and Los Negros Creek in Section O-1; Rio San Juan in Section O-2; Los Ebanos in Section O-3; La Parada Banco in Section O-4; Madero in Section O-5; Pharr Settling Basin in Section O-6; La Gloria in Section O-11; Tahuachal Banco in Section O-16; and Phillips Banco in Section O-18. Construction and operation of tactical infrastructure will increase border security in the Rio Grande Valley Sector and might result in a change to illegal traffic patterns. Changes in cross–border violator traffic patterns result from a variety of factors in addition to border patrol operations; and therefore, are considered unpredictable and beyond the scope of this BRP.

4.2 THREATENED AND ENDANGERED PLANT SPECIES

The Project may affect and is likely to adversely affect the Zapata bladderpod and Zapata critical habitat in Section O-1. Implementing general and species-specific BMPs will help to avoid impacts on these species (see **Section 1.3**). The Project is not likely to adversely affect threatened and endangered plant species, including the star cactus, Texas ayenia, south Texas ambrosia, Walker's manioc, Johnston's frankenia, or their habitat in sections where suitable habitat for these species occur, or in sections where there are elements of occurrence (see **Table 4-3**). General and species-specific BMPs will help to avoid impacts on these species (see **Section 1.3**). No threatened or endangered plant species were observed during October and December 2007 or March and April 2008 surveys (e²M 2008). Suitable habitat for some federally listed species was observed during the October and December 2007 surveys of the corridor. No suitable habitat for federally listed species was observed south of the levee in Sections O-4 through O-10 during the April and March 2008 surveys (see **Table 4-3**) (e²M 2008). No effect on threatened or endangered plant species will occur if no suitable habitat exists in a section, or if there are no records of occurrence in the vicinity of a section (see below).

Direct Effects

Based on survey results and the implementation of BMPs, the Project is not likely to directly adversely affect individuals or populations of these federally listed plants, but may directly affect potential habitat for these species. Impacts on federally listed plant habitats are anticipated to be long-term, moderate, and adverse. The project corridor will also avoid several known locations of Zapata bladderpod and Walker's manioc.

Table 4-3. Effects of the Project on Threatened and Endangered Species, by Section

Section	Species	Status	Habitat	Elements of Occurrence*	Determination of Effect
O-1	Ocelot	E[1]	Yes	Multiple observations in vicinity	LAA[2]
O-1	Gulf Coast jaguarundi	E	Yes	—	LAA
O-1	Johnston's frankenia	E	Yes	Observed in vicinity 1968	NLAA[3]
O-1	Star cactus	E	Yes	—	NLAA
O-1	Walker's manioc	E	No	—	NE[4]
O-1	Zapata bladderpod	E	Yes	Observed in vicinity 2002 and 2003	LAA
O-1	Zapata bladderpod critical habitat	D[5]	Yes	—	LAA
O-2	Ocelot	E	Yes	—	LAA
O-2	Gulf Coast jaguarundi	E	Yes	—	LAA
O-2	Johnston's frankenia	E	No	—	NE
O-2	Star cactus	E	No	Observed on gravelly loam on northeast facing slope from 1959 to 2003	NLAA
O-2	Walker's manioc	E	No	Observed in vicinity 1993–1995; historic sighting in 1940	NLAA
O-2	Zapata bladderpod	E	No	—	NE
O-2	Zapata bladderpod critical habitat	D	No	—	NE
O-3	Ocelot	E	Yes	—	LAA
O-3	Gulf Coast jaguarundi	E	Yes	1 observation in vicinity 1987–1988	LAA
O-3	Star cactus	E	No	—	NE
O-3	Texas ayenia	E	No	—	NE
O-3	Walker's manioc	E	No	Occurrence in vicinity 1995–2002	NLAA
O-4	Ocelot	E	Yes	7 observations in vicinity 1991–1992	LAA
O-4	Gulf Coast jaguarundi	E	Yes	10 observations in vicinity 1988–1993	LAA

Section	Species	Status	Habitat	Elements of Occurrence*	Determination of Effect
O-4	Star cactus	E	No	—	NE
O-4	Texas ayenia	E	No	—	NE
O-4	Walker's manioc	E	No	Observed in vicinity 1990–1992, 1997–2002; historic observations 1940–1941	NLAA
O-5	Ocelot	E	Yes	Captured in vicinity 1992; observed in vicinity 1981	LAA
O-5	Gulf Coast jaguarundi	E	Yes	23 observations in vicinity 1987–1993	LAA
O-5	Texas ayenia	E	No	—	NE
O-5	Walker's manioc	E	No	Historic observation in vicinity 1940	NLAA
O-6	Ocelot	E	Yes	7 observations in vicinity 1989–1991	LAA
O-6	Gulf Coast jaguarundi	E	Yes	23 observations in vicinity 1987–1993	LAA
O-6	Texas ayenia	E	No	—	NE
O-6	Walker's manioc	E	No	—	NE
O-7	Ocelot	E	Yes	7 observations in vicinity 1989–1991	LAA
O-7	Gulf Coast jaguarundi	E	Yes	—	LAA
O-7	Texas ayenia	E	No	—	NE
O-7	Walker's manioc	E	No	—	NE
O-8	Ocelot	E	Yes	7 observations in vicinity 1989–1991	LAA
O-8	Gulf Coast jaguarundi	E	Yes	1 observation in vicinity 1988–1989	LAA
O-8	Texas ayenia	E	No	—	NE
O-8	Walker's manioc	E	No	—	NE
O-9	Ocelot	E	Yes	—	LAA
O-9	Gulf Coast jaguarundi	E	Yes	—	LAA
O-9	Texas ayenia	E	No	Observed 1977–1988	NLAA
O-9	Walker's manioc	E	No	—	NE
O-10	Ocelot	E	Yes	—	LAA

Section	Species	Status	Habitat	Elements of Occurrence*	Determination of Effect
O-10	Gulf Coast jaguarundi	E	Yes	—	LAA
O-10	Texas ayenia	E	No	—	NE
O-10	Walker's manioc	E	No	—	NE
O-11	Ocelot	E	Yes	—	LAA
O-11	Gulf Coast jaguarundi	E	Yes	—	LAA
O-11	South Texas ambrosia	E	No	—	NE
O-11	Texas ayenia	E	No	—	NE
O-12	Ocelot	E	Yes	—	LAA
O-12	Gulf Coast jaguarundi	E	Yes	3 observations in vicinity 1988–1989	LAA
O-12	South Texas ambrosia	E	No	—	NE
O-12	Texas ayenia	E	No	—	NE
O-13	Ocelot	E	Yes	—	LAA
O-13	Gulf Coast jaguarundi	E	Yes	—	LAA
O-13	South Texas ambrosia	E	No	—	NE
O-13	Texas ayenia	E	No	—	NE
O-14	Ocelot	E	Yes	—	LAA
O-14	Gulf Coast jaguarundi	E	Yes	—	LAA
O-14	South Texas ambrosia	E	No	—	NE
O-14	Texas ayenia	E	No	Observed in vicinity 2001 and 2002	NLAA
O-15	Ocelot	E	Yes	—	LAA
O-15	Gulf Coast jaguarundi	E	Yes	—	LAA
O-15	South Texas ambrosia	E	No	—	NE
O-15	Texas ayenia	E	No	Observed in vicinity 1932–1939	NLAA
O-16	Ocelot	E	Yes	—	LAA
O-16	Gulf Coast jaguarundi	E	Yes	—	LAA
O-16	South Texas ambrosia	E	No	Observed in vicinity 1932–1938	NLAA
O-16	Texas ayenia	E	No	—	NE
O-17	Ocelot	E	Yes	—	LAA

Section	Species	Status	Habitat	Elements of Occurrence*	Determination of Effect
O-17	Gulf Coast jaguarundi	E	Yes	4 observations in vicinity 1991–1992	LAA
O-17	South Texas ambrosia	E	No	—	NE
O-17	Texas ayenia	E	No	—	NE
O-18	Ocelot	E	Yes	—	LAA
O-18	Gulf Coast jaguarundi	E	Yes	3 observations in vicinity 1991–1992	LAA
O-18	South Texas ambrosia	E	No	—	NE
O-18	Texas ayenia	E	No	Observed under cultivation in vicinity 1945–1963	NLAA
O-19	Ocelot	E	Yes	—	LAA
O-19	Gulf Coast jaguarundi	E	Yes	—	LAA
O-19	South Texas ambrosia	E	No	—	NE
O-19	Texas ayenia	E	No	—	NE
O-20	Ocelot	E	Yes	1 observation in vicinity 1989–1991	LAA
O-20	Gulf Coast jaguarundi	E	Yes	—	LAA
O-20	South Texas ambrosia	E	No	—	NE
O-20	Texas ayenia	E	No	—	NE
O-21	Ocelot	E	Yes	2 individuals in vicinity 1988–1991, including 1 radio-collared male 1990–1991	LAA
O-21	Gulf Coast jaguarundi	E	Yes	36 observations in vicinity 1987–1993, including 1 incident of road mortality	LAA
O-21	South Texas ambrosia	E	Yes	—	NLAA
O-21	Texas ayenia	E	Yes	—	NLAA

Notes:
* Based on Natureserve and TPWD data
[1] Endangered
[2] Likely to adversely affect
[3] Not likely to adversely affect
[4] No effect
[5] Designated

Vegetation Removal/Mowing. Herbicide application could have long-term effects on federally listed species and their habitat within the project footprint. The implementation of BMPs will reduce impacts on federally listed species and their habitats. CBP will coordinate with USIBWC to adhere to the 1993 Biological Opinion regarding USIBWC mowing operations and the terms and conditions of the 2003 Biological Opinion issued to Immigration and Naturalization Service for Operation Rio Grande. These measures will reduce the effect on federally listed plant species.

Indirect Effects

Long-term negligible to minor beneficial effects could result from reducing or preventing cross-border violator traffic through habitats for and populations of the star cactus, Johnston's frankenia, Zapata bladderpod, Texas ayenia, Walker's manioc, and South Texas ambrosia.

A known population of Zapata bladderpod occurs to the west of the western end of Section O-1, within identified Zapata bladderpod critical habitat in the Arroyo Ramirez tract of the LRGVNWR. Construction and operation of tactical infrastructure will increase border security in the Rio Grande Valley Sector and might result in a change to illegal traffic patterns. Changes in cross-border violator traffic patterns result from a variety of factors in addition to border patrol operations; and therefore, are considered unpredictable and beyond the scope of this BRP.

5. DETERMINATION OF EFFECT

There are 17 federally listed species that are known to occur or have the potential to occur within or adjacent to the project area (see **Tables 5-1**, **5-2**, and **5-3**). Additionally, two of the listed species have designated critical habitat in the project area.

Table 5-1. Federally Listed Species and Critical Habitats Within Starr County and the Determination of Effects Resulting from the Project

Species	Listing/Critical Habitat Designated	Determination of Effect
Ocelot, *Leopardus pardalis*	Endangered	Likely to adversely affect
Gulf Coast jaguarundi, *Herpailurus yagouaroundi cacomitli*	Endangered	Likely to adversely affect
Least tern, *Sterna antillarum*	Endangered	No effect
Piping plover, *Charadrius melodus*	Endangered	No effect
Piping plover, critical habitat	Designated	No effect
Ashy dogweed, Thymophylla tephroleuca	Endangered	No effect
Johnston's frankenia, *Frankenia johnstonii*	Endangered	Not likely to adversely affect
Star cactus, Astrophytum asterias	Endangered	Not likely to adversely affect
Walker's manioc, *Manihot walkerae*	Endangered	Not likely to adversely affect
Zapata bladderpod, *Lesquerella thamnophila*	Endangered	Likely to adversely affect
Zapata bladderpod, critical habitat	Designated	Likely to adversely affect

The species and habitats listed in **Table 5-1**, **5-2**, and **5-3** are known to occur within 25 miles of the border in Starr, Hidalgo, and Cameron counties. The Project may affect and is likely to adversely affect the ocelot, jaguarundi, Zapata bladderpod, and Zapata bladderpod critical habitat. The Project is not likely to adversely affect the star cactus, Texas ayenia, south Texas ambrosia, Walker's manioc, or Johnston's frankenia where suitable habitat for these species occur or in sections where there are elements of occurrence (see **Table 4-3**). Based upon the information provided regarding the tactical infrastructure sections, no effects are anticipated for the least tern, piping plover, piping plover critical

Table 5-2. Federally Listed Species and Critical Habitats Within Hidalgo County and the Determination of Effects Resulting from the Project

Species	Listing Status	Determination
Ocelot, *Leopardus pardalis*	Endangered	Likely to adversely affect
Gulf Coast jaguarundi, *Herpailurus yagouaroundi cacomitli*	Endangered	Likely to adversely affect
Northern aplomado falcon, *Falco femoralis septentrionalis*	Endangered	No effect
Star cactus, *Astrophytum asterias*	Endangered	No effect
Piping plover, *Charadrius melodus*	Endangered	No effect
Piping plover, critical habitat	Designated	No effect
Texas ayenia, *Ayenia limitaris*	Endangered	Not likely to adversely affect
Walker's manioc, *Manihot walkerae*	Endangered	Not likely to adversely affect

Table 5-3. Federally Listed Species and Critical Habitats Within Cameron County and the Determination of Effects Resulting from the Project

Species	Listing Status	Determination
Ocelot, *Leopardus pardalis*	Endangered	Likely to adversely affect
Gulf Coast jaguarundi, *Herpailurus yagouaroundi cacomitli*	Endangered	Likely to adversely affect
Brown pelican, *Pelecanus occidentalis*	Endangered	No effect
Northern aplomado falcon, *Falco femoralis septentrionalis*	Endangered	No effect
Hawksbill sea turtle, *Eretmochelys imbricata*	Endangered	No effect
Kemp's Ridley sea turtle, *Lepidochelys kempii*	Endangered	No effect
Leatherback sea turtle, *Dermochelys coriacea*	Endangered	No effect
South Texas ambrosia, *Ambrosia cheiranthifolia*	Endangered	Not likely to adversely affect
Texas ayenia, *Ayenia limitaris*	Endangered	Not likely to adversely affect
Piping plover, *Charadrius melodus*	Threatened	No effect
Piping plover critical habitat	Designated	No effect
Green sea turtle, *Chelonia mydas*	Threatened	No effect
Loggerhead sea turtle, *Caretta caretta*	Threatened	No effect

habitat, and ashy dogweed in Starr County; the star cactus, the Northern aplomado falcon, piping plover, and piping plover critical habitat in Hidalgo County; or the brown pelican, Northern aplomado falcon, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, piping plover, piping plover critical habitat, green sea turtle, and loggerhead sea turtle in Cameron County.

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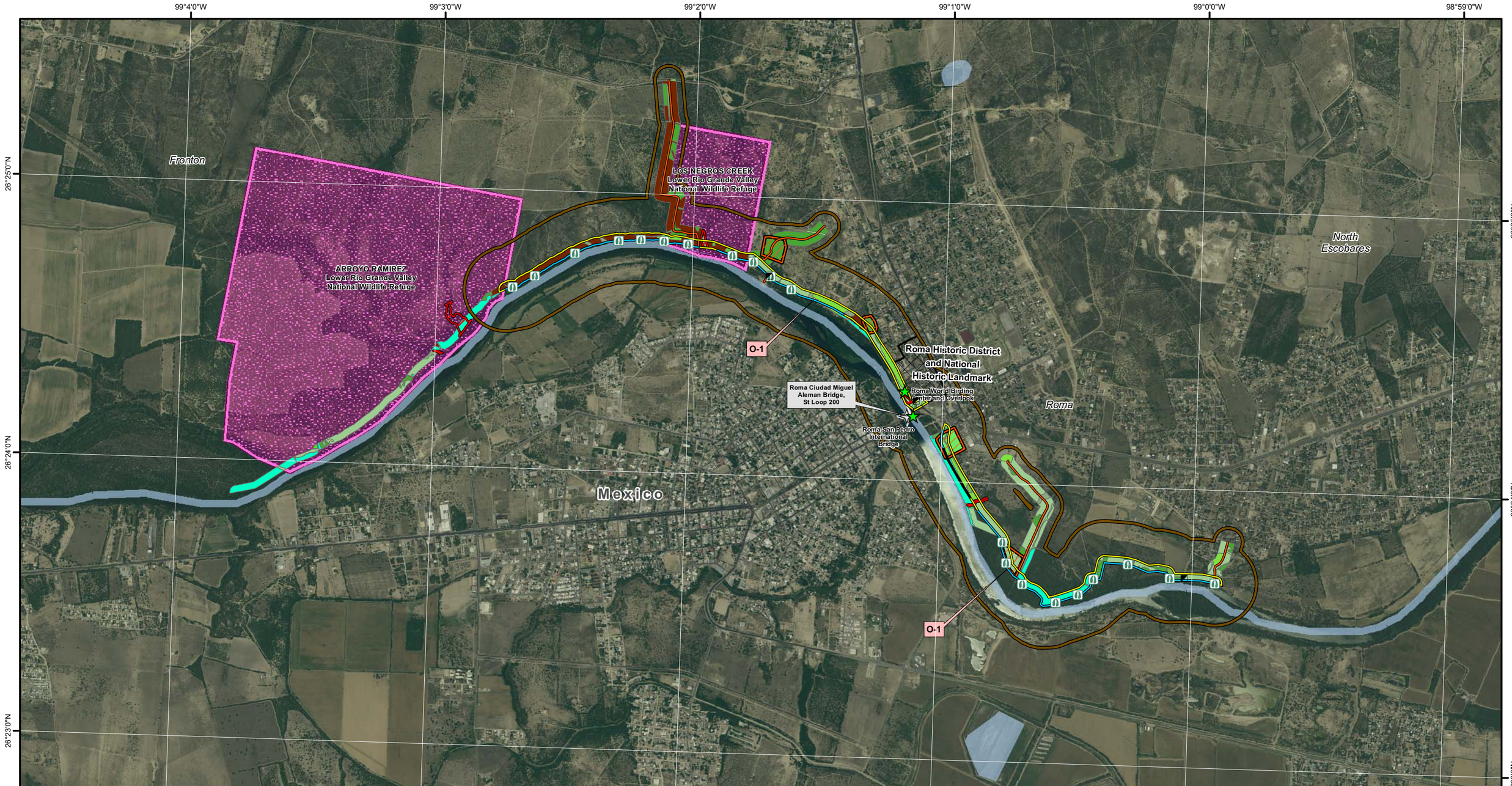
APPENDIX A

Detailed Area Action Maps



- Bollard or Picket Fence
- Concrete Retaining Wall
- Floating Fence
- 150ft Corridor
- Staging Areas
- Access Roads
- Action Area
- Surface Water
- NWI Wetlands Outside Assessment Area
- USACE Approved Wetlands & OWOUS
- Rio Grande
- Parks and Refuges
- Zapata Bladderpod Critical Habitat
- Historic District
- Historic Property
- Ports of Entry
- Wildlife Openings
- Gate Points

Vegetation Habitats

- Agricultural Field/Fallow
- Agriculture Cropped
- Arroyo Shrubland
- Bermuda Grass Herbaceous Vegetation
- Buffelgrass Herbaceous Vegetation
- Cenizo – Blackbrush Shrubland
- Giant Reed Shrubland / Herbaceous Vegetation
- Honey Mesquite Riparian Forest / Woodland
- Other Land Use
- Residential Development
- Roads, Trails, Canal Banks and Berms
- Sugarberry Riparian Forest / Woodland

N

Feet

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Scale

USBP
Biological Resources Plan
Rio Grande Valley Sector, Texas
Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008	Scale 1" = 2000'	Map 1 of 17

98°51'0"W 98°50'0"W 98°49'0"W 98°48'0"W 98°47'0"W 98°46'0"W

26°23'0"N 26°22'0"N 26°21'0"N

Rio Grande City

de la Pena, Silverio, Drugstore and Post Office

LaBorde House, Store and Hotel

Fort Ringgold Historic District

O-2

Rio Grande City - Camargo Bridge, Bridge Ave

RIO SAN JUAN Lower Rio Grande Valley National Wildlife Refuge

Mexico

Las Lomas

Santa Cruz

- Bollard or Picket Fence
- Floating Fence
- 150ft Corridor
- Staging Areas
- Access Roads
- Action Area
- Surface Water
- NWI Wetlands Outside Assessment Area
- USACE Approved Wetlands & OWOUS
- Rio Grande
- Parks and Refuges
- Zapata Bladderpod Critical Habitat
- Historic District
- Historic Property
- Ports of Entry
- Wildlife Openings
- Gate Points

Vegetation Habitats

- Agricultural Field/Fallow
- Agriculture Cropped
- Arroyo Shrubland
- Buffelgrass Herbaceous Vegetation
- Honey Mesquite Riparian Forest / Woodland
- Honey Mesquite Woodland / Shrubland
- Lovegrass – Mixed Forb Annual Herbaceous Vegetation
- Open Water River / Ditch / Canal
- Other Land Use
- Residential Development
- Roads, Trails, Canal Banks and Berms
- Sugarberry Riparian Forest / Woodland
- Urban Development

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USBP
Biological Resources Plan
Rio Grande Valley Sector, Texas
Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008 | Scale 1" = 2000' | Map 2 of 17

98°49'0"W
98°48'0"W
98°47'0"W
98°46'0"W
98°45'0"W
98°44'0"W
26°21'0"N
26°20'0"N
26°19'0"N

O-2

La Puerta

LA PUERTA
Lower Rio Grande Valley
National Wildlife Refuge

Santa Cruz

El Refugio

LOS VELAS
Lower Rio Grande Valley
National Wildlife Refuge

LOS VELAS WEST
Lower Rio Grande Valley
National Wildlife Refuge

Mexico

LA CASITA WEST
Lower Rio Grande Valley
National Wildlife Refuge

Bollard or Picket Fence
150ft Corridor
Staging Areas
Access Roads
Action Area
Surface Water
NWI Wetlands Outside Assessment Area
USACE Approved Wetlands & OWOUS
Rio Grande
Parks and Refuges
Zapata Bladderpod Critical Habitat
Historic District
Historic Property
Ports of Entry
Wildlife Openings
Gate Points

Vegetation Habitats
Agricultural Field/Fallow
Agriculture Cropped
Buffelgrass Herbaceous Vegetation
Honey Mesquite Riparian Forest / Woodland
Honey Mesquite Woodland / Shrubland
Lovegrass – Mixed Forb Annual Herbaceous Vegetation
Other Land Use
Roads, Trails, Canal Banks and Berms
Sugarberry Riparian Forest / Woodland
Urban Development

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USBP
Biological Resources Plan
Rio Grande Valley Sector, Texas
Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008 | Scale 1" = 2000' | Map 3 of 17

98°36'0"W
98°35'0"W
98°34'0"W
98°33'0"W
98°32'0"W
26°15'0"N
26°14'0"N
26°13'0"N

CUEVITAS
Lower Rio Grande Valley
National Wildlife Refuge

Starr County
Hidalgo County

Cuevitas

LOS EBANOS
Lower Rio Grande Valley
National Wildlife Refuge

LOS EBANOS
Lower Rio Grande Valley
National Wildlife Refuge

LOS EBANOS
Lower Rio Grande Valley
National Wildlife Refuge

LOS EBANOS
Lower Rio Grande Valley
National Wildlife Refuge

Los Ebanos

O-3

International Ferry

LOS EBANOS
Lower Rio Grande Valley
National Wildlife Refuge

Mexico

YTURRIA BRUSH
Lower Rio Grande Valley
National Wildlife Refuge

SAM FORDYCE-NORTH
Lower Rio Grande Valley
National Wildlife Refuge

SAM FORDYCE NORTH
Lower Rio Grande Valley
National Wildlife Refuge

HAVANA-NORTH
Lower Rio Grande Valley
National Wildlife Refuge

SAM FORDYCE SOUTH
Lower Rio Grande Valley
National Wildlife Refuge

HAVANA SOUTH
Lower Rio Grande Valley
National Wildlife Refuge

LA JOYA
Lower Rio Grande Valley
National Wildlife Refuge

- Bollard or Picket Fence
- Floating Fence
- 150ft Corridor
- Staging Areas
- Access Roads
- Action Area
- Surface Water
- NWI Wetlands Outside Assessment Area
- USACE Approved Wetlands & OWOUS
- Rio Grande
- Parks and Refuges
- Zapata Bladderpod Critical Habitat
- Historic District
- Historic Property
- Ports of Entry
- Wildlife Openings
- Gate Points

Vegetation Habitats

- Agricultural Field/Fallow
- Agriculture Cropped
- Bermuda Grass Herbaceous Vegetation
- Buffelgrass Herbaceous Vegetation
- Honey Mesquite Riparian Forest / Woodland
- Mule's Fat Shrubland
- Residential Development
- Roads, Trails, Canal Banks and Berms
- Switchgrass Herbaceous Vegetation

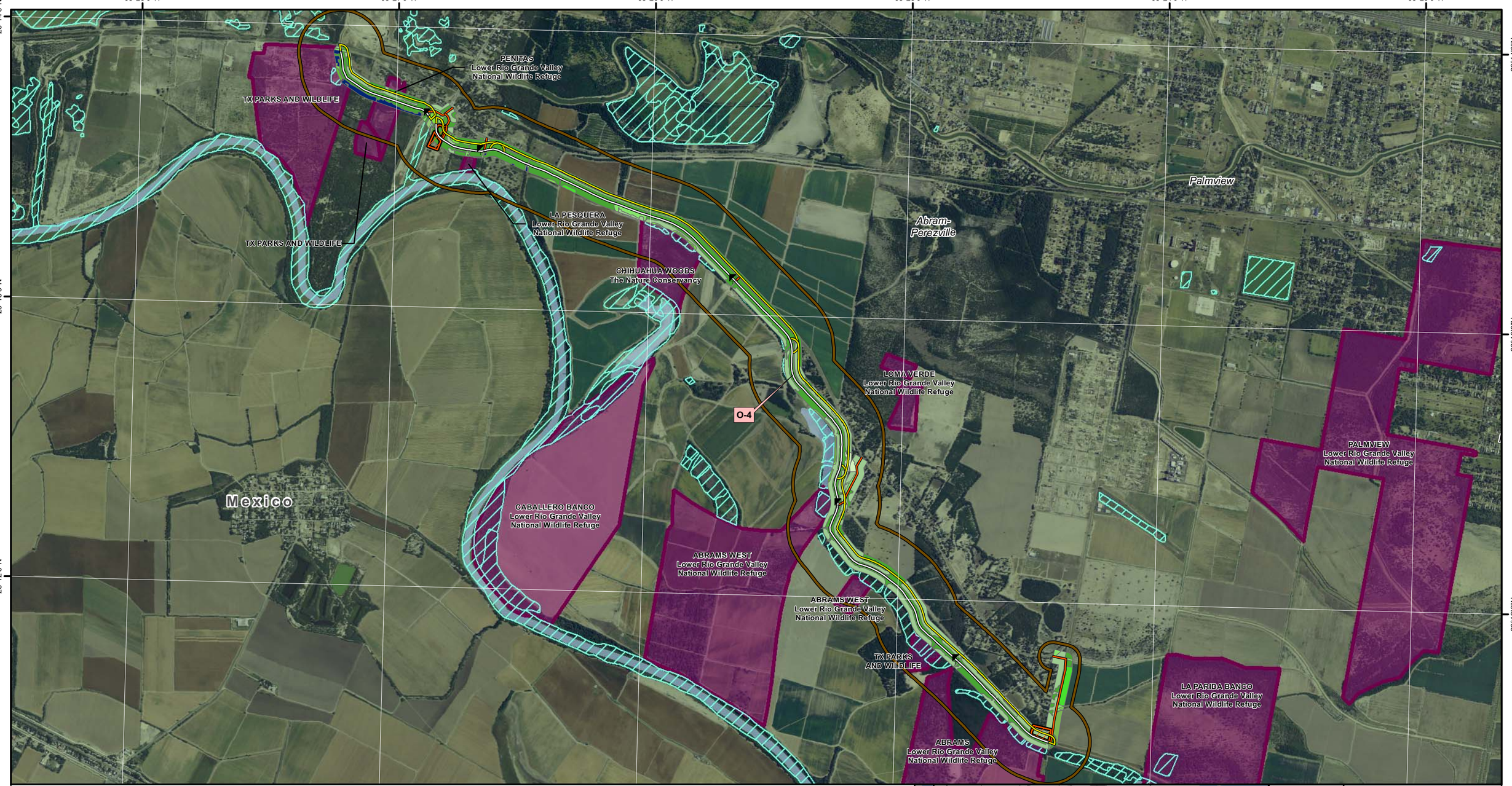
N

Feet
0 500 1,000 2,000
Scale

USBP
Biological Resources Plan
Rio Grande Valley Sector, Texas
Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008	Scale 1" = 2000'	Map 4 of 17



Concrete Flood Protection Structure/Concrete Fence
150ft Corridor
Staging Areas
Access Roads
Action Area
Surface Water
NWI Wetlands Outside Assessment Area

USACE Approved Wetlands & OWOUS
Rio Grande
Parks and Refuges
Zapata Bladderpod Critical Habitat
Historic District
Historic Property
Ports of Entry
Wildlife Openings

Gate Points

Vegetation Habitats

Agricultural Field/Fallow
Agriculture Cropped
Alkali Sacaton Herbaceous Vegetation
Buffelgrass Herbaceous Vegetation
Granjeno Woodland / Shrubland
Honey Mesquite Riparian Forest / Woodland
Honey Mesquite Woodland / Shrubland
Narrowleaf Cattail Herbaceous Vegetation
Open Water Pond / Lake
Open Water River / Ditch / Canal
Quelite Cenizo – Buffelgrass Herbaceous Vegetation
Residential Development
Roads, Trails, Canal Banks and Berms
Urban Development

N

Feet
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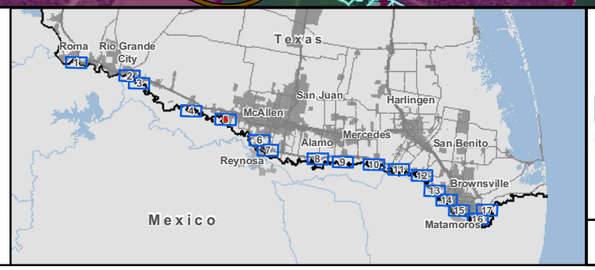
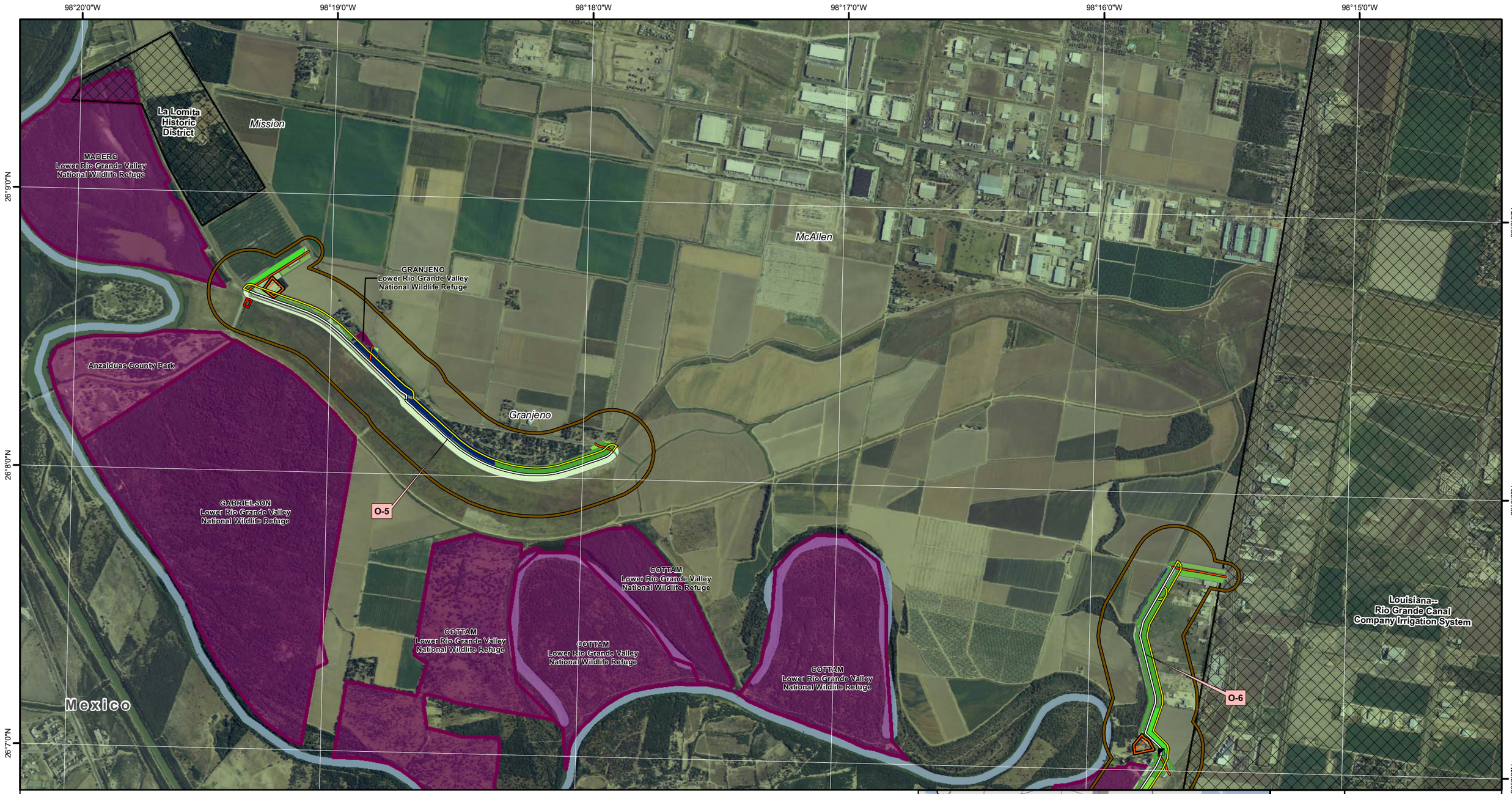
Scale



USBP
Biological Resources Plan
Rio Grande Valley Sector, Texas
Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008	Scale 1" = 2000'	Map 5 of 17



- Concrete Flood Protection Structure/Concrete Fence
- 150ft Corridor
- Staging Areas
- Access Roads
- Action Area
- Surface Water
- NWI Wetlands Outside Assessment Area
- USACE Approved Wetlands & OWOUS
- Rio Grande
- Parks and Refuges
- Zapata Bladderpod Critical Habitat
- Historic District
- Historic Property
- Ports of Entry
- Wildlife Openings
- Gate Points

Vegetation Habitats

- Agricultural Field/Fallow
- Agriculture Cropped
- Alkali Sacaton Herbaceous Vegetation
- Bermuda Grass Herbaceous Vegetation
- Buffelgrass Herbaceous Vegetation
- Granjeno Woodland / Shrubland
- Honey Mesquite Riparian Forest / Woodland
- Open Water River / Ditch / Canal
- Other Land Use
- Residential Development
- Roads, Trails, Canal Banks and Berms
- Silver Bluestem Herbaceous Vegetation
- Urban Development

N

Feet

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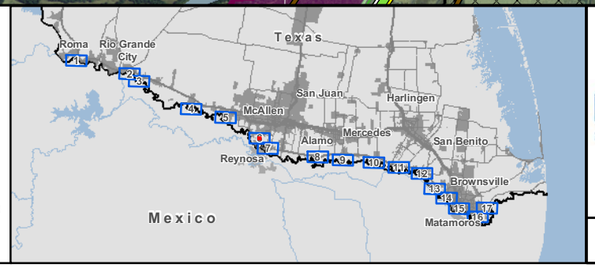
Scale



USBP
Biological Resources Plan
Rio Grande Valley Sector, Texas
Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008	Scale 1" = 2000'	Map 6 of 17

98°18'0"W
98°17'0"W
98°16'0"W
98°15'0"W
98°14'0"W
98°13'0"W

26°7'0"N
26°6'0"N
26°5'0"N

COTTAM
Lower Rio Grande Valley
National Wildlife Refuge

COTTAM
Lower Rio Grande Valley
National Wildlife Refuge

Mexico

COTTAM
Lower Rio Grande Valley
National Wildlife Refuge

PATE BEND
Lower Rio Grande Valley
National Wildlife Refuge

Company Irrigation System

O-6

Louisiana--
Rio Grande Canal
Company Irrigation System

Hidalgo

Old Hidalgo
Courthouse
and Buildings

Old Hidalgo School

Old Hidalgo
Pumphouse Nature
Park

O-6

O-6

McAllen-Hidalgo-
Reynosa, TX-
241-Spur, US-281-Spur

HIDALGO BEND
Lower Rio Grande Valley
National Wildlife Refuge

PHARR SETTLING BASIN
Lower Rio Grande Valley
National Wildlife Refuge

PHARR SETTLING BASIN
Lower Rio Grande Valley
National Wildlife Refuge

VELA WOODS
Lower Rio Grande Valley
National Wildlife Refuge

Concrete Flood Protection Structure/Concrete Fence
150ft Corridor
Staging Areas
Access Roads
Action Area
Surface Water
NWI Wetlands Outside Assessment Area

USACE Approved Wetlands & OWOUS
Rio Grande
Parks and Refuges
Zapata Bladderpod Critical Habitat
Historic District
Historic Property
Ports of Entry
Wildlife Openings

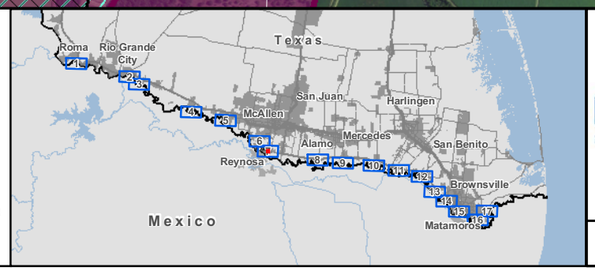
Gate Points

Vegetation Habitats
Agriculture Cropped
Buffelgrass Herbaceous Vegetation
Granjeno Woodland / Shrubland
Honey Mesquite Riparian Forest / Woodland

Open Water Pond / Lake
Open Water River / Ditch / Canal
Other Land Use
Residential Development
Roads, Trails, Canal Banks and Berms
Urban Development

N

Feet
0 500 1,000 2,000
Scale



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Action Area Maps
Version 1

Projection: Albers
USA Contiguous Albers Equal Area Conic
North American Datum of 1983

May 6, 2008 | Scale 1" = 2000' | Map 7 of 17

98°6'0"W 98°5'0"W 98°4'0"W 98°3'0"W 98°2'0"W 98°1'0"W

26°5'0"N

26°4'0"N

O-7

O-8

MONTERREY BANCO
Lower Rio Grande Valley
National Wildlife Refuge

TX PARKS AND WILDLIFE

LA COMA
Lower Rio Grande Valley
National Wildlife Refuge

Lower Rio Grande Valley
National Wildlife Refuge

LA COMA
Lower Rio Grande Valley
National Wildlife Refuge

Mexico

Mexico

Concrete Flood Protection Structure/Concrete Fence
150ft Corridor
Staging Areas
Access Roads
Action Area
Surface Water
NWI Wetlands Outside Assessment Area

USACE Approved Wetlands & OWOUS
Rio Grande
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Gate Points

Vegetation Habitats

Agricultural Field/Fallow
Agriculture Cropped
Bermuda Grass Herbaceous Vegetation
Black Willow Woodland / Shrubland
Buffelgrass Herbaceous Vegetation
Granjeno Woodland / Shrubland
Honey Mesquite Riparian Forest / Woodland
Honey Mesquite Woodland / Shrubland
Johnsongrass Herbaceous Vegetation
Narrowleaf Cattail Herbaceous Vegetation
Open Water River / Ditch / Canal
Other Land Use
Residential Development
Roads, Trails, Canal Banks and Berms
Sugarberry Riparian Forest / Woodland

N

Feet

0 500 1,000 2,000

Scale

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USA Contiguous Albers Equal Area Conic
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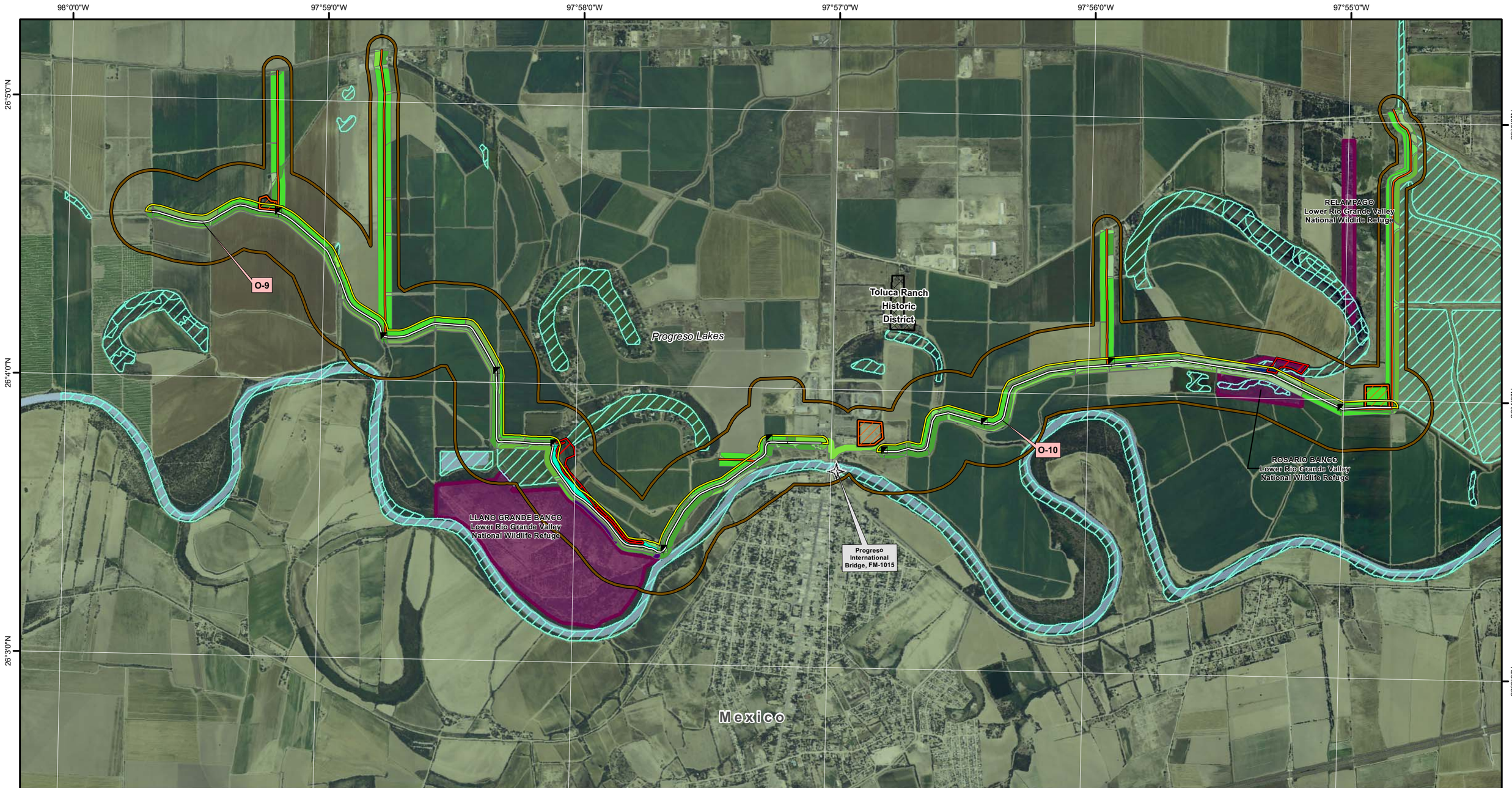
Scale 1" = 2000'

Map 8 of 17



Concrete Flood Protection Structure/Concrete Fence
150ft Corridor
Staging Areas
Access Roads
Action Area
Surface Water
NWI Wetlands Outside Assessment Area
USACE Approved Wetlands & OWOUS
Rio Grande
Parks and Refuges
Zapata Bladderpod Critical Habitat
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Historic Property
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Wildlife Openings
Gate Points

Vegetation Habitats

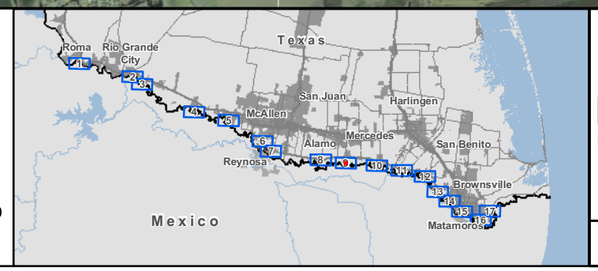
Agricultural Field/Fallow
Agriculture Cropped
Bermuda Grass Herbaceous Vegetation
Buffelgrass Herbaceous Vegetation
Castor Bean / Buffelgrass Shrubland
Giant Reed Shrubland / Herbaceous Vegetation
Granjeno Woodland / Shrubland
Honey Mesquite Riparian Forest / Woodland
Honey Mesquite Woodland / Shrubland
Johnsongrass Herbaceous Vegetation
Mule's Fat Shrubland
Narrowleaf Cattail Herbaceous Vegetation
Open Water Pond / Lake
Open Water River / Ditch / Canal
Residential Development
Roads, Trails, Canal Banks and Berms
Sugarberry Riparian Forest / Woodland
Urban Development

N

Feet

0 500 1,000 2,000

Scale



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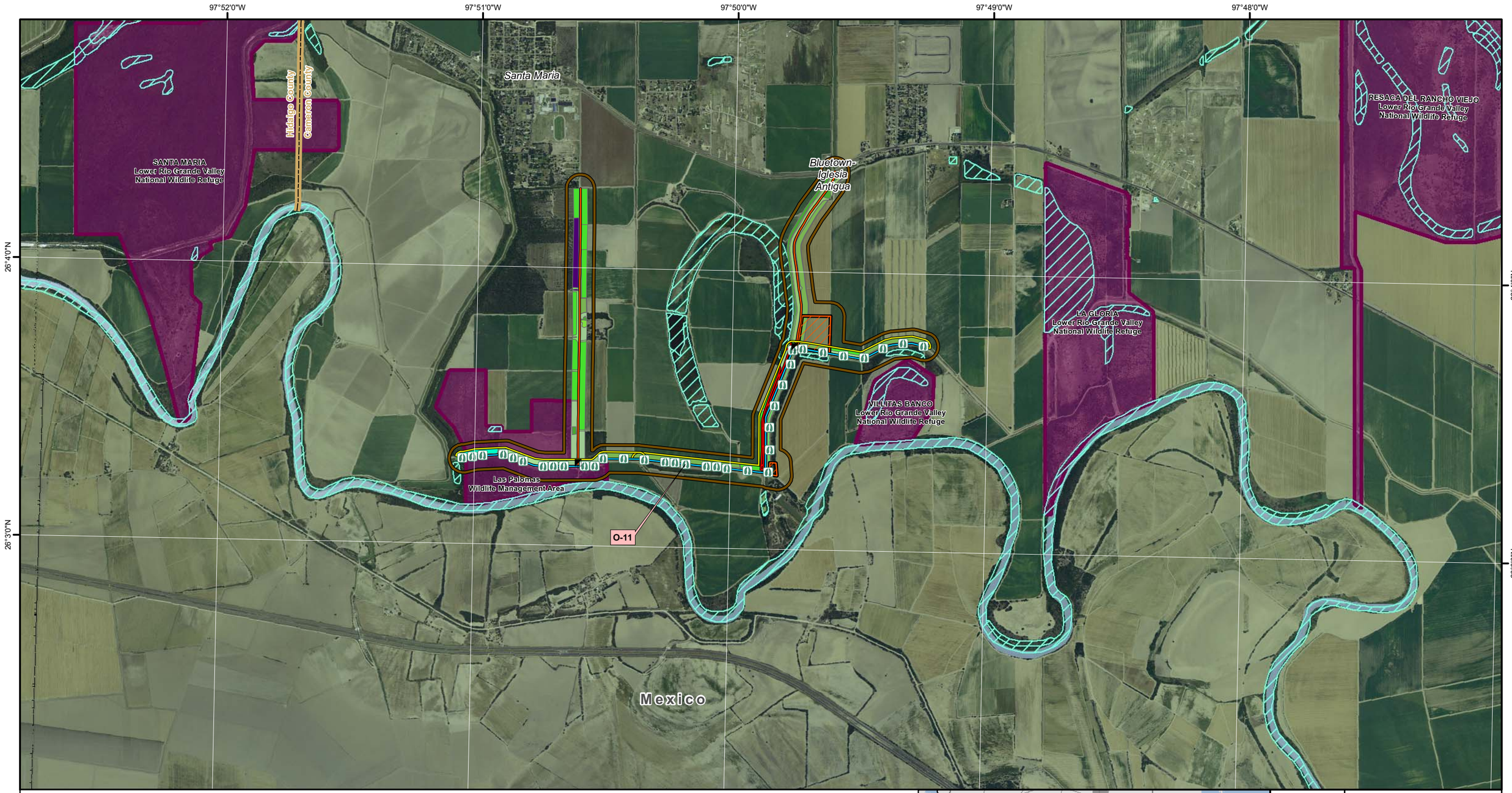

Bollard or Picket Fence
150ft Corridor
Staging Areas
Access Roads
Action Area
Surface Water
NWI Wetlands Outside Assessment Area
USACE Approved Wetlands & OWOUS
Rio Grande
Parks and Refuges
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Vegetation Habitats

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Agriculture Cropped
Bermuda Grass Herbaceous Vegetation
Buffelgrass Herbaceous Vegetation
Honey Mesquite Riparian Forest / Woodland
Honey Mesquite Woodland / Shrubland
Johnsongrass Herbaceous Vegetation
Open Water River / Ditch / Canal
Residential Development
Roads, Trails, Canal Banks and Berms
Sugarberry Riparian Forest / Woodland
Switchgrass Herbaceous Vegetation

N

Feet

0 500 1,000 2,000

Scale

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97°46'0"W 97°45'0"W 97°44'0"W 97°43'0"W 97°42'0"W

26°4'0"N 26°3'0"N 26°2'0"N

SAN BENITO SETTLING BASIN
Lower Rio Grande Valley
National Wildlife Refuge

Los Indios

O-12

O-13

O-14

CULEBRON BANCO
Lower Rio Grande Valley
National Wildlife Refuge

LAS PALOMAS BANCO
Lower Rio Grande Valley
National Wildlife Refuge

LAS SIERRITAS BANCO
Lower Rio Grande Valley
National Wildlife Refuge

Free Trade Bridge, Cantu Road

CAPOTE BANCO
Lower Rio Grande Valley
National Wildlife Refuge

Mexico

- Bollard or Picket Fence
- Floating Fence
- 150ft Corridor
- Staging Areas
- Access Roads
- Action Area
- Surface Water
- NWI Wetlands Outside Assessment Area
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- Rio Grande
- Parks and Refuges
- Zapata Bladderpod Critical Habitat
- Historic District
- Historic Property
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Vegetation Habitats

- Agricultural Field/Fallow
- Agriculture Cropped
- Black Willow Woodland / Shrubland
- Buffelgrass Herbaceous Vegetation
- Giant Reed Shrubland / Herbaceous Vegetation
- Honey Mesquite Riparian Forest / Woodland
- Johnsongrass Herbaceous Vegetation
- Lovegrass – Mixed Forb Annual Herbaceous Vegetation
- Mule's Fat Shrubland
- Narrowleaf Cattail Herbaceous Vegetation
- Open Water River / Ditch / Canal
- Ratama Shrubland
- Residential Development
- Roads, Trails, Canal Banks and Berms
- Smartweed Herbaceous Vegetation
- Sugarberry Riparian Forest / Woodland
- Switchgrass Herbaceous Vegetation
- Windmill Grass Herbaceous Vegetation

N

Feet

0 500 1,000 2,000

Scale

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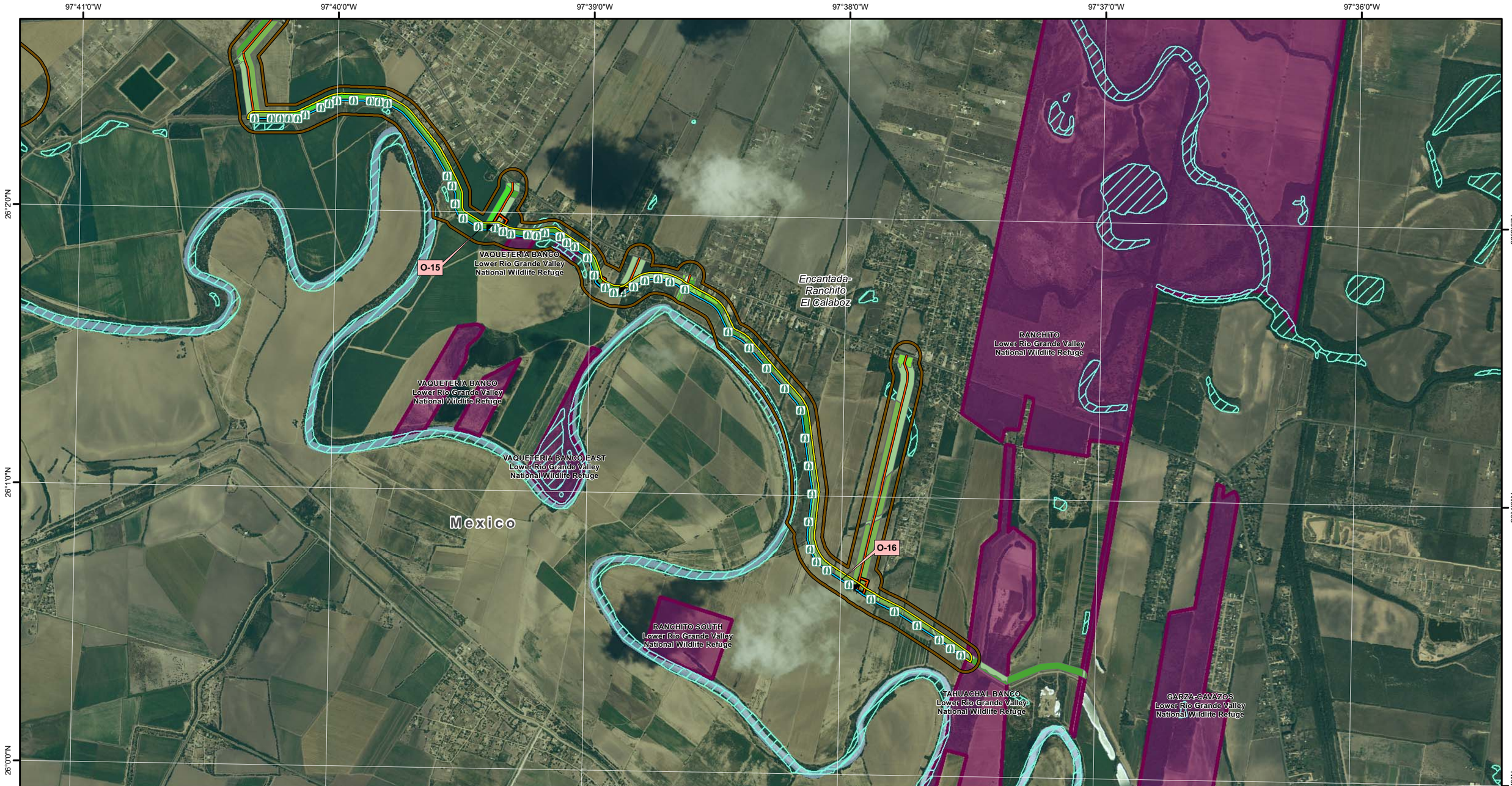

Bollard or Picket Fence
150ft Corridor
Staging Areas
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Rio Grande
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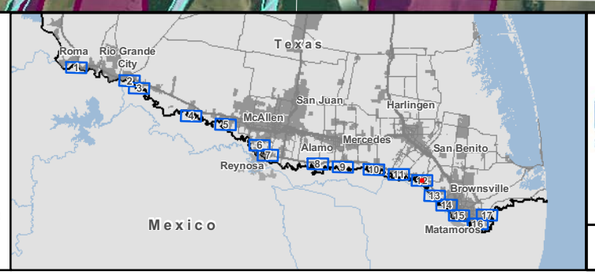
- Agricultural Field/Fallow
- Agriculture Cropped
- Alkali Sacaton Herbaceous Vegetation
- Bermuda Grass Herbaceous Vegetation
- Buffelgrass Herbaceous Vegetation
- Chinaberry Woodland
- Giant Reed Shrubland / Herbaceous Vegetation
- Honey Mesquite Riparian Forest / Woodland
- Open Water River / Ditch / Canal
- Residential Development
- Roads, Trails, Canal Banks and Berms
- Switchgrass Herbaceous Vegetation

N

Feet
0 500 1,000 2,000
Scale



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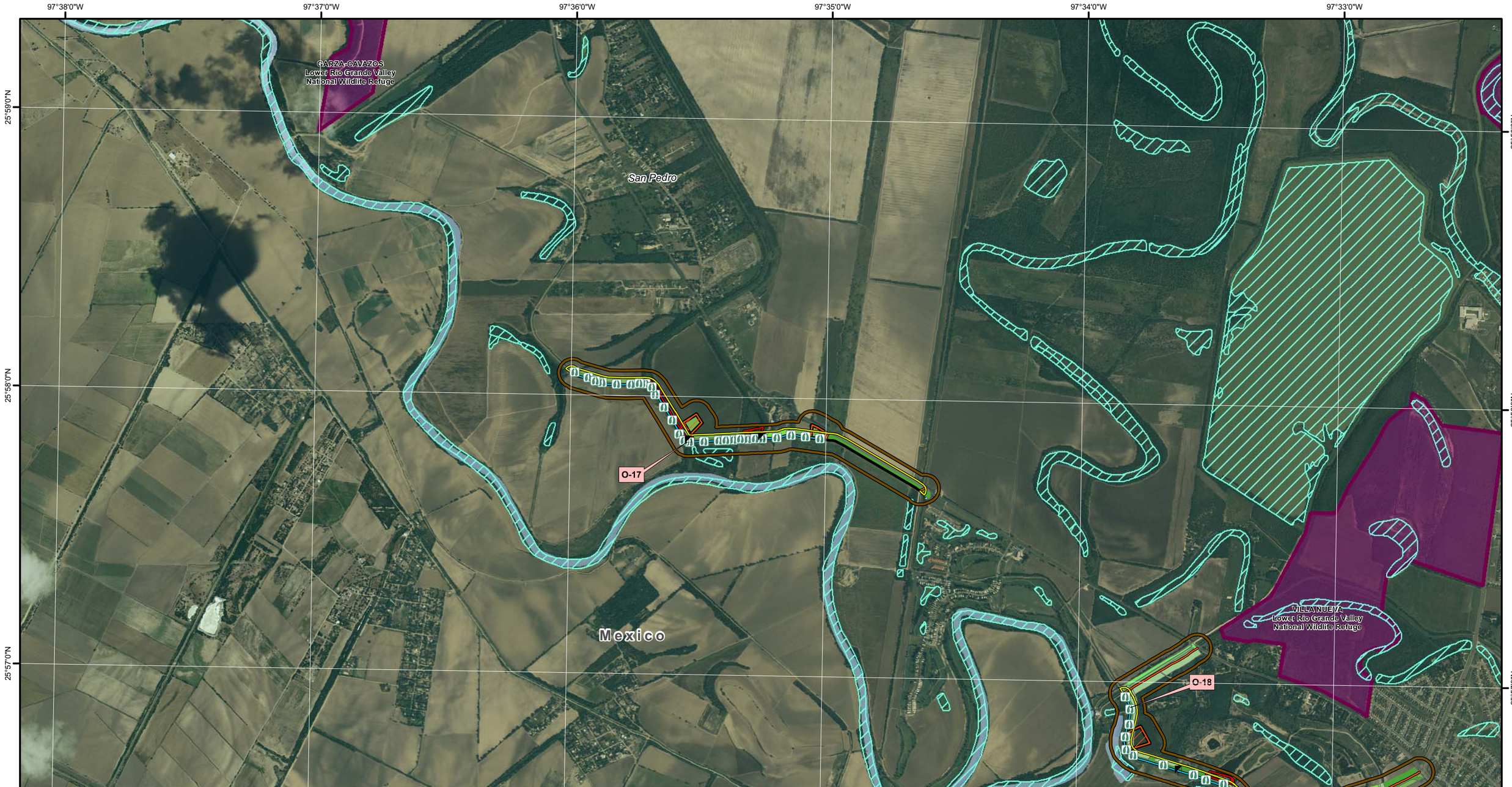

Bollard or Picket Fence
Floating Fence
150ft Corridor
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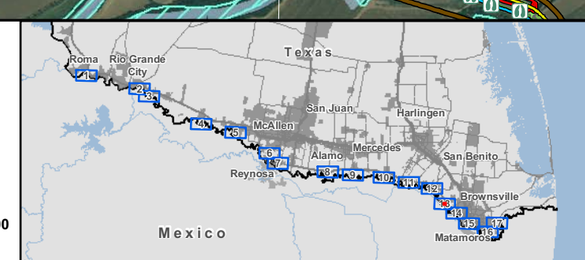
Narrowleaf Cattail Herbaceous Vegetation
Open Water Pond / Lake
Open Water River / Ditch / Canal
Residential Development
Roads, Trails, Canal Banks and Berms

N

Feet
0 500 1,000 2,000
Scale



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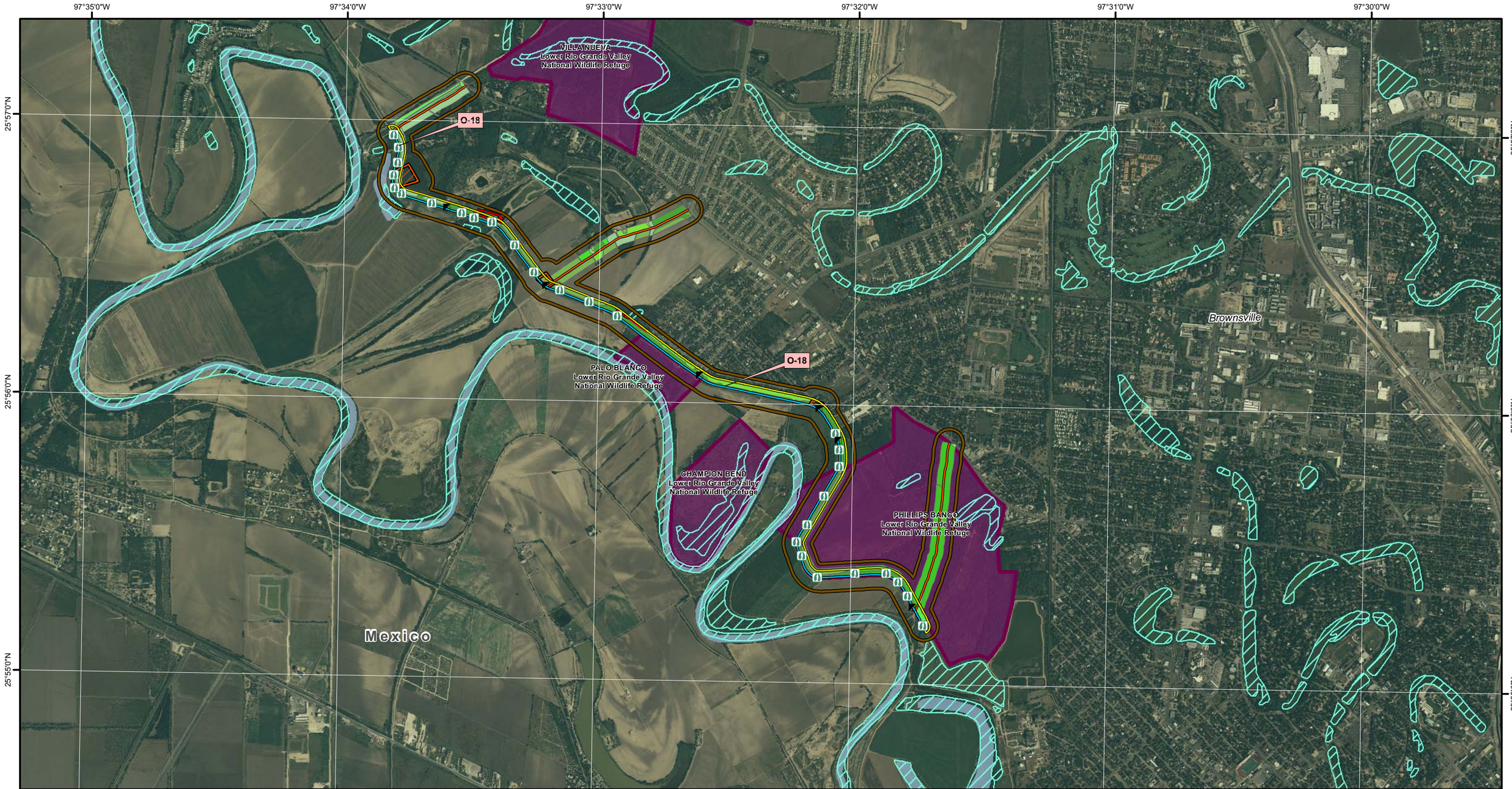
May 6, 2008 | Scale 1" = 2000' | Map 13 of 17



Bollard or Picket Fence
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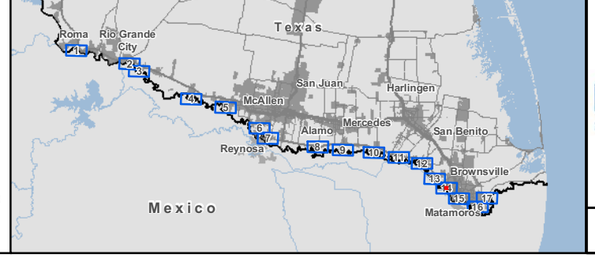
Open Water River / Ditch / Canal
Ratama Shrubland
Residential Development
Roads, Trails, Canal Banks and Berms
Tepeguahe Woodland

N

Feet
0 500 1,000 2,000
Scale



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May 6, 2008 | Scale 1" = 2000' | Map 14 of 17

97°32'0"W 97°31'0"W 97°30'0"W 97°29'0"W 97°28'0"W 97°27'0"W

25°55'0"N 25°54'0"N 25°53'0"N

Manautou House
Southern Pacific Railroad Passenger Depot
Celaya-Creager House
Browne-Wagner House
La Madrilena
Cameron County Jail, Old
Brooks-Samuel Wallace House
Cameron County Courthouse
Celaya, Augustine, House
Fernandez, Miguel, Hide Yard
La Nueva Libertad
Immaculate Conception Church
The Gem
Stillman House
Cope Park
Brownsville
University of Texas at Brownsville and Texas Southernmost College
BROWNSVILLE Lower Rio Grande Valley National Wildlife Refuge
City of Brownsville Linscln Park
Gateway International Bridge, US-77, US-83
B&M Railroad, MP Railroad, Union Pacific Railroad
B&M Bridge
Fort Brown
Fort Brown Memorial Golf Course
O-20
O-19
Santa Rosalia Cemetery
JERONIMO BANCO Lower Rio Grande Valley National Wildlife Refuge
JERONIMO BANCO Lower Rio Grande Valley National Wildlife Refuge
Veterans International Bridge
O-21
Mexico

Bollard or Picket Fence
Floating Fence
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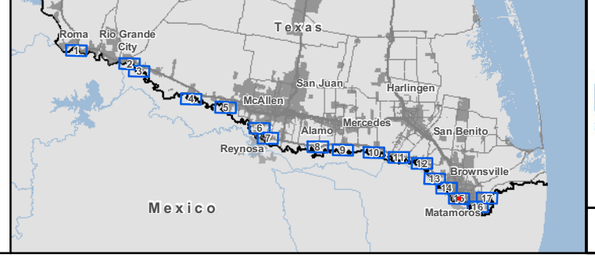
Honey Mesquite Woodland / Shrubland
Mule's Fat Shrubland
Open Water River / Ditch / Canal
Residential Development
Roads, Trails, Canal Banks and Berms
Sabal Palm Forest / Woodland
Switchgrass Herbaceous Vegetation
Windmill Grass Herbaceous Vegetation

N

Feet
0 500 1,000 2,000
Scale



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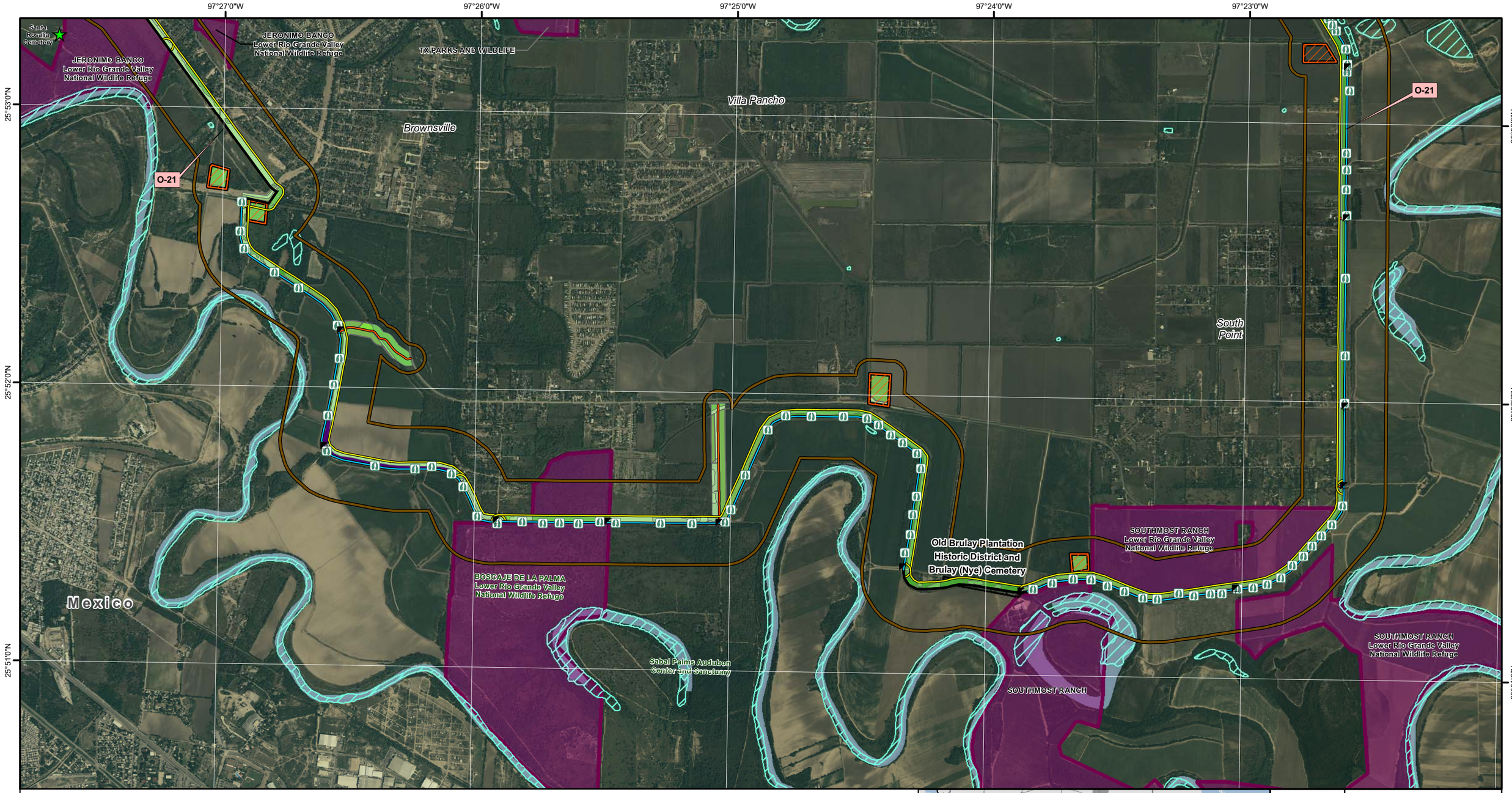
May 6, 2008 | Scale 1" = 2000' | Map 15 of 17



- Bollard or Picket Fence
- Floating Fence
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N

Feet

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Scale

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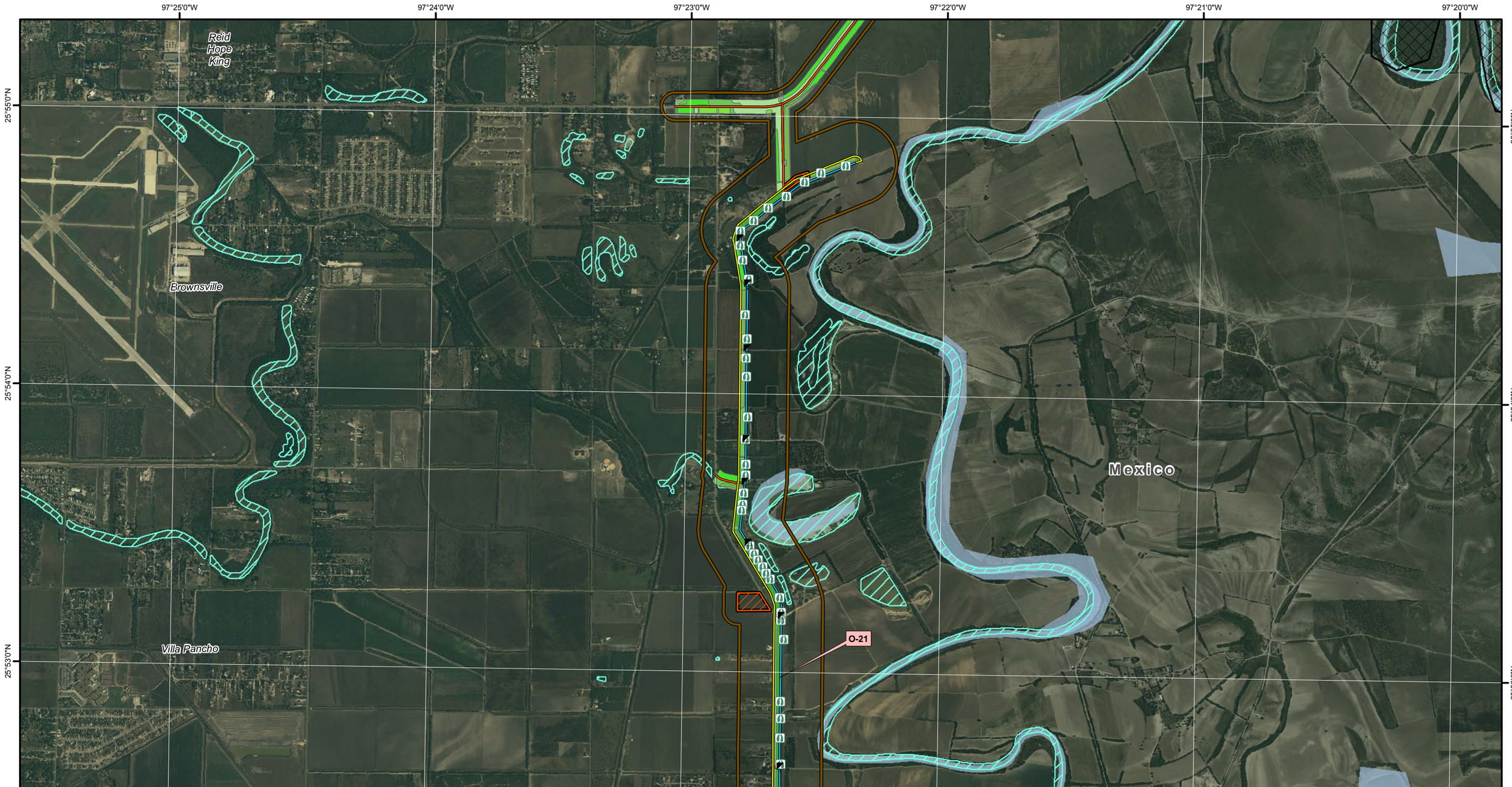

Bollard or Picket Fence
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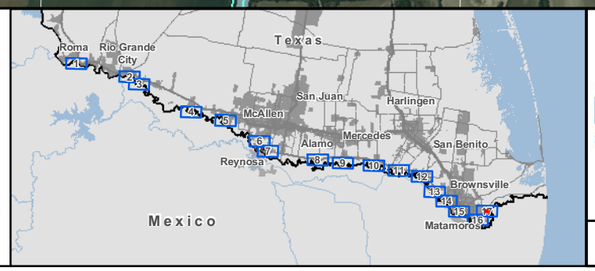
N

Feet
0 500 1,000 2,000
Scale



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APPENDIX B

Detail of Vegetative Alliances and Other Land Uses with the Project Area

Table 1. Direct Effects by Vegetative Alliance within the 60 Foot Corridor for Fence Sections O-1 through O-3 and O-11 through O-21

60-foot corridor	O-1	O-2	O-3	O-11	O-12	O-13	O-14	O-15	O-16	O-17	O-18	O-19	O-20	O-21	Total
Grassland															
Bermuda Grass Herbaceous Vegetation	0.848	0.000	0.298	2.285	0.000	0.000	0.000	2.663	0.000	0.000	0.012	0.000	0.000	0.000	6.106
Buffelgrass Herbaceous Vegetation	2.400	10.476	1.294	0.000	0.000	0.000	8.362	8.511	6.308	6.949	20.587	9.598	5.889	46.438	126.812
Johnsongrass Herbaceous Vegetation	0.000	0.000	0.000	0.001	0.000	0.407	0.589	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.996
Switchgrass Herbaceous Vegetation	0.000	0.000	3.610	6.405	2.371	4.493	4.560	0.000	0.343	0.000	0.000	0.000	0.000	20.267	42.049
Silver Bluestem Herbaceous Vegetation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Windmill Grass Herbaceous Vegetation	0.000	0.000	0.000	0.000	1.342	0.257	0.000	0.000	0.000	0.000	0.000	4.797	0.000	0.000	6.396
Quelite Cenizo - Buffelgrass Herbaceous Vegetation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Narrowleaf Cattail Herbaceous Vegetation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.009	0.000	0.000	0.000	0.009
Alkali Sacaton Herbaceous Vegetation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Smartweed Herbaceous Vegetation	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Lovegrass - Mixed Forb Annual Herbaceous Vegetation	0.000	1.466	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.466
Grassland Total	**3.248**	**11.943**	**5.202**	**8.691**	**3.713**	**5.157**	**13.511**	**11.174**	**6.651**	**6.949**	**20.608**	**14.395**	**5.889**	**66.705**	**183.834**
Shrubland															
Castor Bean/Buffelgrass Shrubland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Honey Mesquite Woodland / Shrubland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.947	0.000	4.691	5.638
Cenizo - Blackbrush Shrubland	7.923	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	7.923
Ratama Shrubland	0.000	0.000	0.000	0.000	0.000	0.892	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.892
Mule's Fat Shrubland	0.000	0.000	0.180	0.000	0.000	0.725	0.000	0.000	0.000	0.000	0.492	0.000	0.219	0.000	1.616
Giant Reed Shrubland / Herbaceous Vegetation	0.031	0.000	0.000	0.000	0.000	0.124	0.000	0.000	0.114	0.000	0.000	0.000	0.000	0.001	0.270
Arroyo Shrubland	0.915	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.915
Shrubland Total	**8.869**	**0.000**	**0.180**	**0.000**	**0.000**	**1.741**	**0.000**	**0.000**	**0.114**	**0.000**	**0.492**	**0.947**	**0.219**	**4.691**	**17.255**
Woodland and Forest															
Chinaberry Woodland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.319	0.000	0.000	0.000	0.000	0.000	0.319
Tepeguahe Woodland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.001
Granjeno Woodland / Shrubland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.330	0.000	0.000	0.000	0.000	2.330
Honey Mesquite Riparian Forest / Woodland	8.530	22.855	3.171	2.748	0.592	0.000	3.235	0.000	1.260	0.000	0.161	1.929	0.082	1.312	45.877
Sugarberry Riparian Forest / Woodland	3.990	0.175	0.000	0.442	1.779	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	6.387
Sabal Palm Forest / Woodland	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.335	8.335
Woodland Total	**12.521**	**23.030**	**3.171**	**3.190**	**2.371**	**0.000**	**3.236**	**0.000**	**1.579**	**2.330**	**0.163**	**1.929**	**0.082**	**9.647**	**63.249**
Open Water															
Open Water River / Ditch / Canal	0.000	0.000	0.000	0.032	0.000	0.046	0.496	0.000	0.019	0.000	0.023	0.000	0.000	0.042	0.658
Open Water Pond / Lake	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.047	0.047
Open Water Total	**0.000**	**0.000**	**0.000**	**0.032**	**0.000**	**0.046**	**0.496**	**0.000**	**0.019**	**0.000**	**0.023**	**0.000**	**0.000**	**0.089**	**0.705**
Other Land Use															
Agriculture Cropped	0.000	14.991	0.000	0.219	0.000	0.000	0.012	0.938	0.000	0.000	0.000	0.000	0.000	0.918	17.078
Agricultural Field / Fallow	0.252	6.286	1.362	4.344	0.000	3.935	2.648	0.467	2.168	1.410	0.833	0.001	0.000	8.299	32.005
Residential Development	1.987	1.656	3.275	0.000	0.000	0.000	0.126	0.004	0.240	0.399	0.979	2.327	0.186	0.294	11.473
Roads, Trails, Canal Banks and Berms	0.454	5.551	0.893	0.669	0.874	0.773	6.310	1.143	6.692	0.799	3.140	5.012	0.411	3.816	36.538
Other Land Use	0.122	0.081	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.203
Other Land Use Total	**2.816**	**28.566**	**5.530**	**5.232**	**0.874**	**4.708**	**9.096**	**2.552**	**9.100**	**2.607**	**4.952**	**7.340**	**0.597**	**13.327**	**97.298**
Grand Total	**27.454**	**63.539**	**14.083**	**17.145**	**6.958**	**11.652**	**26.338**	**13.726**	**17.464**	**11.885**	**26.237**	**24.610**	**6.788**	**94.460**	**362.339**

Table 2. Direct Effects by Vegetative Alliance within the 40 Foot Corridor for Fence Sections O-4 through O-10

40-foot Corridor	O-4	O-5	O-6	O-7	O-8	O-9	O-10	Total Acreage
Herbaceous								
Bermuda Grass Herbaceous Vegetation						0.543		**0.543**
Buffelgrass Herbaceous Vegetation	17.392		14.882	3.162	4.812	6.622	4.607	**51.477**
Johnsongrass Herbaceous Vegetation								**0.000**
Total	17.392		14.882	3.162	4.812	7.164	4.607	**52.020**
Mixed Woodland / Wooded Herbaceous Vegetation								
Granjeno Woodland / Shrubland	0.038		0.002		0.003		0.050	**0.093**
Honey Mesquite Woodland / Shrubland				0.054		0.001		**0.055**
Huisache Woodland / Shrubland						0.037		**0.037**
Total	0.038		0.002	0.054	0.003	0.038	0.050	**0.185**
Mixed Riparian Forest / Woodland								
Honey Mesquite Riparian Forest / Woodland	0.150		0.732				0.058	**0.941**
Total	0.150		0.732				0.058	**0.941**
Wetland/Riparian								
Alkali Sacaton Herbaceous Vegetation		4.463						**4.463**
Common Reed Herbaceous Vegetation								**0.000**
Giant Reed Shrubland / Herbaceous Vegetation								**0.000**
Narrowleaf Cattail Herbaceous Vegetation							1.184	**1.184**
Total		4.463					1.184	**5.646**
Land Use								
Agricultural Field/Fallow								**0.000**
Agriculture Cropped							0.001	**0.001**
Open Water Pond / Lake						0.210		**0.210**
Open Water River / Ditch / Canal		2.253		0.002		0.596		**2.851**
Other Land Use								**0.000**
Roads, Trails, Canal Banks, and Berms	3.655	1.856	2.894	0.756	11.106	10.784	5.508	**36.559**
Urban Development			0.185			0.040		**0.224**
Total	3.655	4.109	3.079	0.757	11.106	11.630	5.510	**39.846**
Grand Total	**21.235**	**8.571**	**18.696**	**3.973**	**15.920**	**18.833**	**11.409**	**98.638**

Table 3. Direct Effects on Vegetation Resulting from Disturbance in Construction Staging Areas

Staging Areas	O-1	O-2	O-3	O-4	O-5	O-6	O-7	O-8	O-9	O-10	O-11	O-12	O-13	O-14	O-15	O-16	O-17	O-18	O-19	O-20	O-21	
Herbaceous Vegetation																						
Bermuda Grass Herbaceous Vegetation	4.206		0.623																			4.829
Buffelgrass Herbaceous Vegetation	4.649		0.006	1.999		17.724		0.091	1.836	6.003				0.252	0.652	0.029		0.434	4.191	0.631	0.536	39.036
Switchgrass Herbaceous Vegetation											0.050	0.251	0.001								1.470	1.772
Windmill Grass Herbaceous Vegetation													0.518									0.518
Narrowleaf Cattail Herbaceous Vegetation												1.252										1.252
Lovegrass - Mixed Forb Annual Herbaceous Vegetation		9.665																				9.665
Total	8.855	9.665	0.630	1.999		17.724		0.091	1.836	6.003	0.050	1.503	0.519	0.252	0.652	0.029		0.434	4.191	0.631	2.006	57.072
Shrubland																						
Cenizo - Blackbrush Shrubland	0.012																					0.012
Ratama Shrubland													1.482									1.482
Mule's Fat Shrubland																				0.499		0.499
Total	0.012												1.482							0.499		1.993
Woodland and Forest																						
Granjeno Woodland / Shrubland																	0.037					0.037
Honey Mesquite Riparian Forest / Woodland	2.940	0.171	1.081	1.973	2.108	1.029					0.876			0.072	0.978			3.486		0.105		14.817
Sugarberry Riparian Forest / Woodland	0.064																					0.064
Sabal Palm Forest / Woodland																					6.669	6.669
Total	3.004	0.171	1.081	1.973	2.108	1.029					0.876			0.072	0.978		0.037	3.486		0.105	6.669	21.586
Land Use																						
Agriculture Cropped		3.481		0.118			2.958	10.005		5.027		2.310									5.208	29.107
Agricultural Field / Fallow		3.758	0.000								10.341	0.360		1.865		0.883	3.130	0.769			10.153	31.259
Residential Development	0.029		0.338			0.181									0.004			0.001	0.636			1.189
Roads, Trails, Canal Banks and Berms	0.603	5.926	0.051	0.176		0.387	0.476	0.000	0.042			0.076		0.003	0.019			0.036	0.003		1.112	8.910
Other Land Use	1.695																					1.695
Total	2.326	13.165	0.389	0.294		0.568	3.434	10.005	0.042	5.027	10.341	2.746		1.868	0.023	0.883	3.130	0.807	0.639		16.473	72.159
Grand Total	**14.197**	**23.001**	**2.099**	**4.266**	**2.108**	**19.321**	**3.434**	**10.096**	**1.878**	**11.031**	**11.266**	**4.249**	**2.001**	**2.192**	**1.653**	**0.912**	**3.167**	**4.727**	**4.830**	**1.235**	**25.148**	**152.810**

Table 4. Direct Effects on Vegetation Resulting from Disturbance in Construction Access Roads

Access Roads	O-1	O-2	O-3	O-4	O-5	O-6	O-7	O-8	O-9	O-10	O-11	O-12	O-13	O-14	O-15	O-16	O-17	O-18	O-19	O-20	O-21	
Herbaceous Vegetation																						
Bermuda Grass Herbaceous Vegetation			0.372							4.203	0.164				0.000			2.087				6.826
Buffelgrass Herbaceous Vegetation	7.630	6.292	4.438	3.823	1.398	5.721	6.875	4.622	2.389	5.831	0.883	1.809		1.193	1.659	0.408	0.453	2.292	6.033	0.454	0.515	64.716
Switchgrass Herbaceous Vegetation			2.517								0.000	0.773	0.916	0.211							11.766	16.183
Windmill Grass Herbaceous Vegetation													0.813									0.813
Narrowleaf Cattail Herbaceous Vegetation				0.159					0.077	0.061		0.226										0.524
Alkali Sacaton Herbaceous Vegetation				0.209	0.198											0.219						0.626
Smartweed Herbaceous Vegetation														0.066								0.066
Lovegrass - Mixed Forb Annual Herbaceous Vegetation		3.920										0.556										4.476
Total	7.630	10.212	7.326	4.191	1.596	5.721	6.875	4.622	2.466	10.095	1.047	3.365	1.729	1.470	1.659	0.627	0.453	4.379	6.033	0.454	12.281	94.229
Shrubland																						
Honey Mesquite Woodland / Shrubland		1.796					0.220				1.615								0.066			3.697
Cenizo - Blackbrush Shrubland	9.582																					9.582
Ratama Shrubland													1.333									1.333
Mule's Fat Shrubland																		0.569		0.011		0.581
Giant Reed Shrubland / Herbaceous Vegetation																0.251						0.251
Arroyo Shrubland	0.277	0.453																				0.729
Total	9.858	2.248					0.220				1.615		1.333			0.251		0.569	0.066	0.011		16.173
Woodland and Forest																						
Chinaberry Woodland																0.000						0.000
Tepeguahe Woodland																		10.564				10.564
Granjeno Woodland / Shrubland					0.950	0.329																1.280
Honey Mesquite Riparian Forest / Woodland	8.575	16.022	6.895	5.808	1.200	3.655	0.729	5.950	0.218	0.738	3.367	3.644		1.958	2.305	7.929		3.598	0.790	0.349	2.095	75.824
Sugarberry Riparian Forest / Woodland	0.225	9.224						0.093				0.026										9.567
Sabal Palm Forest / Woodland																					4.687	4.687
Total	8.799	25.245	6.895	5.808	2.150	3.985	0.729	6.043	0.218	0.738	3.367	3.670		1.958	2.305	7.929		14.161	0.790	0.349	6.782	101.922
Open Water																						
Open Water River / Ditch / Canal		0.028			0.063	0.080	1.728	0.010		0.622	7.685	1.208	0.151	0.134		0.051		0.787			0.086	12.633
Open Water Pond / Lake						0.011				3.812								0.080			0.198	4.101
Total		0.028			0.063	0.091	1.728	0.010		4.434	7.685	1.208	0.151	0.134		0.051		0.867			0.285	16.734
Land Use																						
Agriculture Cropped		6.471	11.710	1.240	1.394		2.947	14.827	24.212	9.304	8.043	4.015		13.176	0.957			0.557			4.506	103.358
Agricultural Field / Fallow		18.908	0.919	0.732	0.690	1.003				1.448	2.997	0.273	0.890	4.948	4.718	7.454	0.041	3.550	4.096		4.899	57.567
Residential Development	0.887		0.394	0.391	0.187	12.612		0.389	0.458		0.108	1.104		0.074		0.849		1.403	0.066		10.175	29.097
Roads, Trails, Canal Banks and Berms	5.856	20.321	7.389	4.516	2.026	14.858	1.518	11.054	7.223	9.839	8.101	4.885		7.755	2.117	3.801	0.176	4.993	5.010	0.392	16.104	137.935
Urban Development		1.268				1.747																3.016
Other Land Use						0.034																0.034
Total	6.744	46.969	20.412	6.878	4.297	30.256	4.465	26.270	31.892	20.592	19.249	10.277	0.890	25.952	7.793	12.104	0.217	10.504	9.171	0.392	35.684	331.008
Grand Total	33.031	84.701	34.633	16.877	8.107	40.052	14.017	36.945	34.576	35.859	32.963	18.521	4.103	29.515	11.757	20.962	0.669	30.480	16.060	1.207	55.031	560.065