Section 6 Report Review

Attachment to letter dated 12/22/03

Project: The Conservation of Johnston's frankenia (Frankenia johnstonii): Annual Monitoring, a Requirement of Delisting

Final or interim report? Final

Job #: WER 23 **Grant #:** E10

Reviewer's Station: Corpus Christi ES

Lead station was contacted and concurs with the following comments:
_____ Yes _____ No x Not applicable (reviewer is from lead station)

Interim Report	Final Report
____ is acceptable as is	__x__ is acceptable as is
____ is acceptable as is, but the comments below need to be addressed in the next report	____ is acceptable, but needs minor revision (see comments below)
____ needs revision (see comments below)	____ needs major revision (see comments below)

Comments:

FINAL REPORT

As Required by

THE ENDANGERED SPECIES PROGRAM

TEXAS

Grant No. E-10

Endangered and Threatened Species Conservation

Project WER26: Johnston's frankenia (*Frankenia johnstonii*) Annual Monitoring

Prepared by: Gena K. Janssen

Robert Cook
Executive Director

John Herron
Program Director, Wildlife Diversity

Mike Berger
Division Director, Wildlife

November 1, 2003

FINAL REPORT

STATE: Texas **GRANT NUMBER:** E-10

GRANT TITLE: Endangered and Threatened Species Conservation

REPORTING PERIOD: May 1999 through August 31, 2003

PROJECT NUMBER: WER26

PROJECT TITLE: Johnston's frankenia (*Frankenia johnstonii*) Annual Monitoring

OBJECTIVES:

To establish annual photo-monitoring sites of Johnston's frankenia protected under voluntary conservation agreements; and to assess measures of vigor randomly at each population.

I. Segment Objectives:

Funding has Ended. Final Report Attached.

II. Summary of Progress:

Funding has Ended. Final Report Attached.

III. Significant Deviations:

After doing photo points in both Summer and Fall, I believe Fall is a better time to replicate the points. In addition to landscape vista shots at each population, a telephoto shot of each population was added in 2001 and 2002.

IV. Preliminary Findings:

Funding has Ended. Final Report Attached.

V. Location: Webb, Zapata, and Starr Counties

VI. Costs: $16,997.00

VII. Prepared by: Gena K. Janssen **Date:** November 1, 2003

Approved by: Neil (Nick) E. Carter **Date:** 11/20/03

Johnston's frankenia (*Frankenia johnstonii*) Annual Photo-point Monitoring
Final Report 2003

INTRODUCTION

Johnston's frankenia (*Frankenia johnstonii*) FRANKENIACEAE was listed as an endangered species by the U. S. Fish and Wildlife Service (USFWS) on August 7, 1984 (USFWS 1984), and by the state of Texas in January, 1987 (Poole and Riskind 1987). At the time of listing, there were five confirmed populations of *F. johnstonii*: two in Zapata County, Texas; two in Starr County, Texas; and, one along the border of the states of Coahuila and Nuevo Leon, Mexico. After concentrated searches and studies were conducted on this species in the 1990's, today the current total of verified *F. johnstonii* occurrences in Texas and Mexico is 62: 58 in Texas and four in Mexico (Janssen 1999).

The 58 populations of *F. johnstonii* verified for the State of Texas occur in Webb, Zapata and Starr Counties of the South Texas Brush Country vegetational region. While all 58 occur primarily on private land, portions of three sites belong to the federal government, and a portion of one belongs to Texas Department of Transportation. Seven sites are known from Webb County; 35 sites are known from Zapata County; and, 16 are known from Starr County.

With the new locality data in hand, the possibility of delisting Johnston's frankenia was visibly in the future. And, one requirement of delisting is five years of monitoring subsequent to the final rule. Anticipating these facts, an annual photo-point monitoring project was initiated at 27 different *F. johnstonii* populations.

Why photo-point monitoring? I wanted to be able to show the reader or viewer of the data something more than aerial diameter, height, number of flowers and number of fruits all nice and tidy in an Excel file. There could be a new highway right next to a monitoring plot, and my Excel file would look exactly the same (except for my little note in the margin that stated: *Wow, now I can drive right up to the monitoring site*!) The greatest value of a photo reference is helping others visualize and understand the current condition of a given site and the change over time or trends of that vegetation (Johnson 1991). I wanted the reader to see the site, the vista, the population, the landscape. I wanted the reader to see the change or the lack thereof. I wanted the reader to see threats looming in the distance. I wanted the reader to see land use changes, land management changes and maybe even successional changes. But most of all, I wanted the reader to see the persistence of these Johnston's frankenia populations over time (hopefully). Of additional importance is the fact that photo-point monitoring is aesthetically unobtrusive (Case, et al. 1982). Since 25 of the 27 monitoring points are on private ranches, it was important to me to have an easily replicable methodology that left little trace on the ranch.

Photo-point monitoring is a permanent camera point or photographic station from which a long-term photographic record is made, usually at predetermined times [U. S.

Department of Agriculture (USDA) 1982]. Photo-point monitoring should not be confused with "repeat photography". While photo-point monitoring is the intentional establishment of baseline photographic data to be replicated through time, "repeat photography" is the practice of finding the site of an *historical* photograph, reoccupying the original camera position, and making a new photograph of the same scene (Rogers et al. 1984).

Long-term photographic records are made to document changes in the appearance and condition of natural resources over time as a result of management and natural occurrence (USDA 1982). Additionally, baseline data of the resources and documentation of changes through time are needed in making management decisions that affect the resource (Case, et al. 1982). In the case of the listed endangered Johnston's frankenia, or any endangered plant species for that matter, photo records can play a major role in helping state and federal biologists determine whether delisting is appropriate, whether the populations are or are not remaining stable, or even whether there would be a future need to relist the species as endangered if significant site destruction has been documented.

A picture can tell so many stories; and, together with individual measures of vigor and other field notes, hopefully the reader will garner more than simply Mean Arial Diameter = 69 cm. Hopefully the reader will vicariously visit each site along with me every year, and experience some sense of confidence that these sites indeed persist on the landscape with little or no trace of change each year.

This photo-monitoring study was initiated in May 1999, and photos were replicated in 2000, 2001, and 2002. Although this is labeled as a "Final Report", this is truly an interim report of an open-ended study. It is my hope and honest intention to continue to replicate these points in the future.

MATERIALS AND METHODS

When determining the methodology for this project I referenced Johnson (1991), USDA (1982), and Case et al. (1982). Although I primarily relied upon Johnson (1991), I also wove in some of Case et al. (1982) and USDA (1982).

This project was initiated in May of 1999. However, only five photo-points were set up before my water broke 10 weeks early, and the baby came. All photo-points were established by the end of the year 2000.

In all, 27 photo-points were established (see Figure 1): five in Webb County (see Figure 2); 20 in Zapata County (see Figure 3); and, two in Starr County (see Figure 4). Each site was numbered using the first letter of the county in which it occurs (for example: W1, Z10, and S27). Twelve of the sites have only one picture per photo-point; and, 15 of the sites have two photos taken at two different angles from the same photo-point.

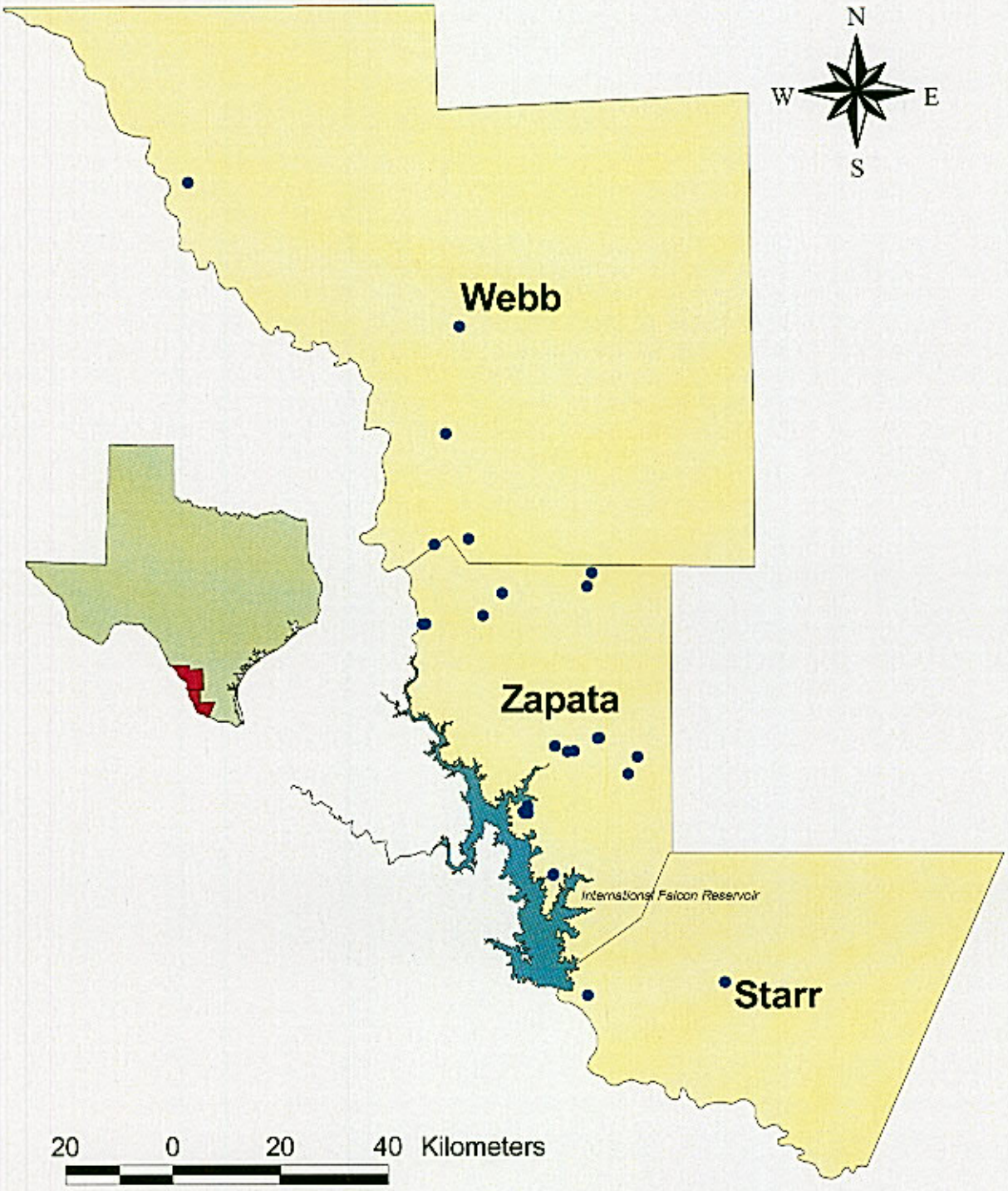

Figure 1. Distribution of all 27 photo-points established across the range of *Frankenia johnstonii* sites in Webb, Zapata and Starr Counties.

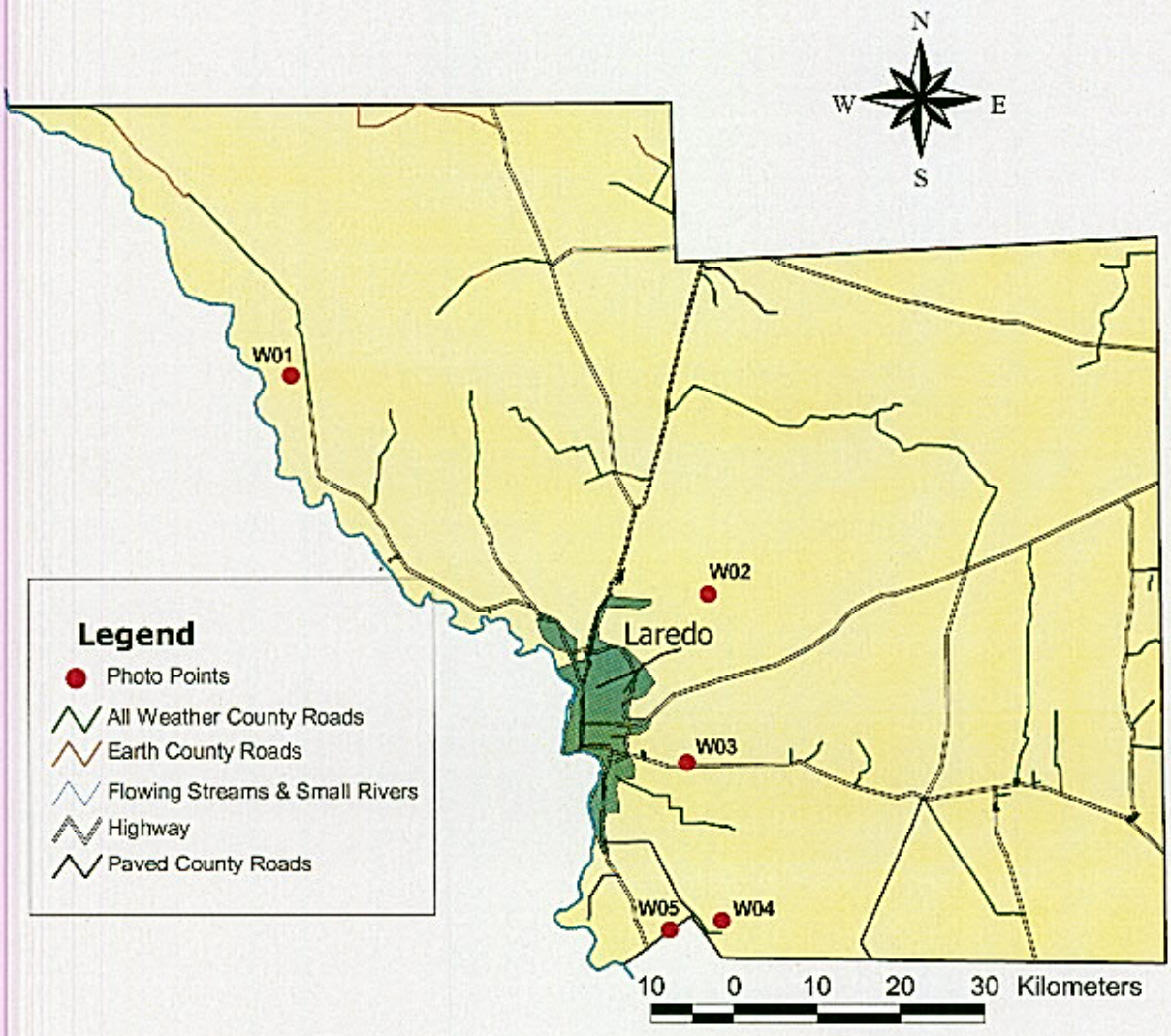

Figure 2. Distribution of the five *Frankenia johnstonii* photo-points (W1-W5) in Webb County, Texas.

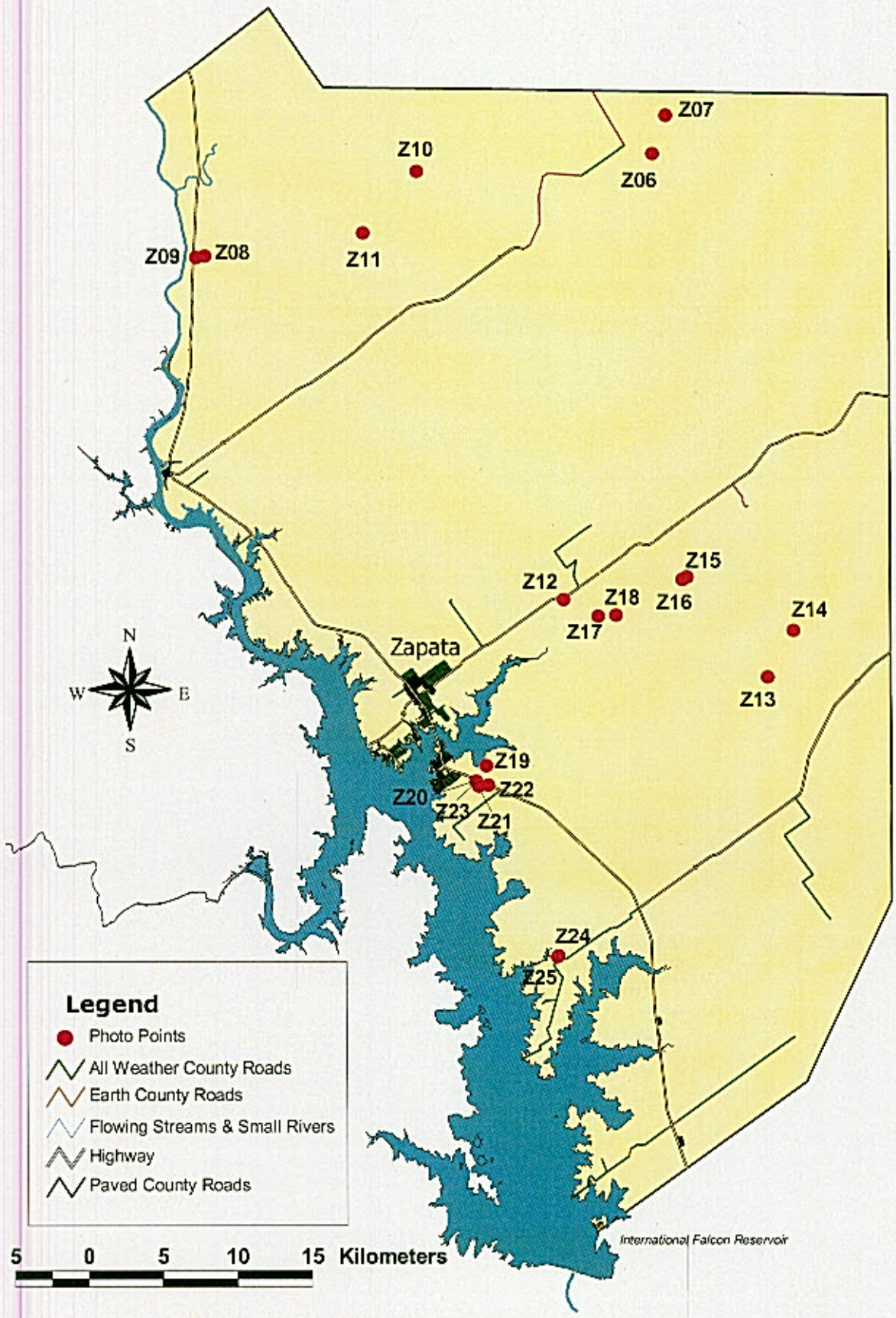

Figure 3. Distribution of the 20 *Frankenia johnstonii* photo-points in Zapata County, Texas

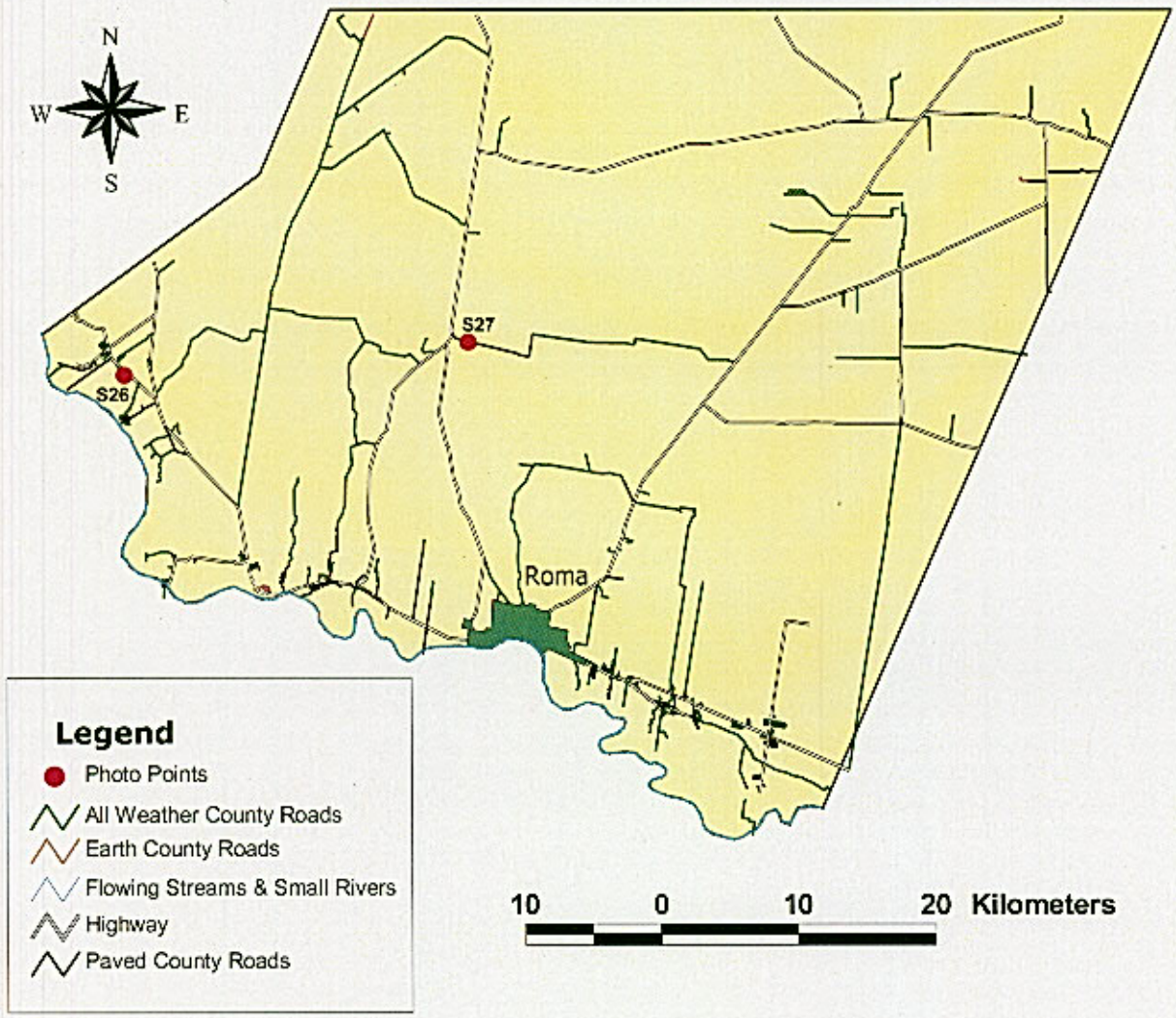

Figure 4. Distribution of the two *Frankenia johnstonii* photo-points in Starr County, Texas.

Photo-points were permanently established at each site with three foot pieces of rebar pounded into the ground leaving about two inches or less above ground. An aluminum tag with the photo-point number was then wired on the rebar close to the ground. The tag was covered with a rock to keep curious four-legged creatures from chewing them. Photo-points were recorded using the Trimble Geo Explorer 2, averaging on a minimum of 60 positions. (Point data was later analyzed and maps made using Arc View GIS 3.3.)

Detailed data sheets were filled out each year at each photo-point (see Appendix A). The camera tripod was placed over the rebar, and the Canon Z135 Camera was positioned. Once the field of view was chosen, the exact height of the camera lens was recorded along with a compass bearing of the direction the camera was facing. The center point of the field of view was also recorded (for example, "gnarly fence post" or "guapilla mountain"). The time of day the photograph was taken was recorded. A vicinity sketch was made of each site depicting the location of the photo-point, the direction the camera was facing, and other landscape features such as roads, hills, gas wells, fences, etc. Each film roll number and photo frame number was recorded for each photograph (for example: Roll 2, Frame 5 & 6). Observational notes were made each year regarding general site conditions, and presence of flowers or fruits. The remaining information on the data sheet to be filled out is: camera, film, photographer, others present, and film developer. All of this information will help others in the future duplicate this method.

When possible, I tried to include potential threats looming in the background. For example, roads or civilization in general are visible in the field of view of six photopoints: W3—the Tonquesitos Colonia and old Trans Texas gas yard; Z8—La Perla caliche road (lots of traffic); Z9—Highway 83; Z12—Highway 16; Z23—Highway 83; and S27—La Morita caliche road. Gas activity has been captured in the field of view of four photo-points: W4 (100°)—pad site; Z11 (340°)—old pad site and tank battery; Z15 (190°)—pad site; Z24 (170°)—Pipeline pump station.

Although I initiated the photo-monitoring in May, I also either set up or replicated some sites in June, and October. I found that October was definitely a better time to replicate the points. Not only is October a little cooler, but fall in general in south Texas is also a little wetter. The plants are just more photogenic after a rainfall event versus the typical drought-stressed conditions of May and June.

Site selection was based upon ease of vehicle access, ease of landowner permission for access, whether or not there was a signed conservation agreement protecting the population, and whether or not the site was what I considered "at risk" or "remote". I categorized a site as "at risk" if it was one mile or less from a paved road. I considered those sites greater than a mile from a paved road "remote". Of the 27 photo-points established, 15 are considered "remote" and 12 are considered "at risk" (see Table 1). However, although a site is categorized as "remote" or "at risk" the likelihood that it may be impacted by gas activity is still high. New pad site locations, new gas roads, new pipelines, new seismics, expansion of old existing gas locations, and the like all have the possibility of impacting any given site at any given time. Therefore, for the purposes of this study, "at risk" is only a reflection of proximity to potential urban sprawl.

Table 1. Each photo-point was categorized as having a Conservation Agreement, yes or no; and either as *Remote*: greater than a mile from a paved road, or *At Risk*: a mile or less from a paved road.

PHOTO-POINT	Conservation Agreement?	"Remote" or "At Risk"?
W1	No	Remote
W2	No	Remote
W3	No	At Risk
W4	Yes	Remote
W5	Yes	Remote
Z6	Yes	Remote
Z7	Yes	Remote
Z8	No	At Risk
Z9	No	At Risk
Z10	Pending	Remote
Z11	Pending	Remote
Z12	Yes	At Risk
Z13	No	Remote
Z14	Yes	Remote
Z15	Yes	Remote
Z16	Yes	Remote
Z17	Yes	At Risk
Z18	Yes	Remote
Z19	Yes	At Risk
Z20	Yes	At Risk
Z21	Yes	At Risk
Z22	Yes (TxDOT MOU)	At Risk
Z23	Yes	At Risk
Z24	Yes	Remote
Z25	Yes	Remote
S26	Federal Property	At Risk
S27	Yes	At Risk

When replicating the photograph each year, care was taken to make sure that I got out to the site at about the same time of day as the initial photograph, since angle of the sun contributes greatly to the appearance of the photograph.

Randomized measures of vigor were assessed for 10 individuals per site starting in 2001. Using a random numbers table, direction and number of paces would be selected. For example, the first choice would represent north or south (even or odd) and the number of steps I would take. If 8 was selected, I would go north eight steps and measure the nearest plant. The next selection would represent east or west (even or odd) and the number of steps. If 13 was selected, I would walk west 13 steps and measure. This would continue until 10 individuals were measured.

Also in 2001, I experimented with using the telephoto lens and zooming in closer to the individual plants. I decided this was a great compliment to the grander vista shot, and did both the vista and the telephoto for each photo-point in 2002.

A compilation of data sheet notes for each year and vigor sampling can be found in Appendix B.

Color slide film was consistently developed at Holland Photo in Austin, Texas.

Slides were jacketed in Print File® Archival Preservers and were stored indoors at approximately 77° F year-round.

For this report, slides were scanned into the computer using the EPSON Perfection 3200 Photo Scanner at 300 dpi.

RESULTS

I hate to bore my reader, but there have been no landscape changes at any *F. johnstonii* population being studied at this time (see photos in Appendix C). There were slightly detectable changes for individuals at sites Z13 and Z18 in 2002. At both sites some individuals showed evidence of browsing, probably by jackrabbits.

Johnston's frankenia is a long-lived perennial subshrub, and the populations appear to be in a climax community state. Broad-scale landscape changes or impacts such as bulldozing, root-plowing, oil and gas activities, road construction or widening, urban sprawl, or any other activity which would actually destroy individuals of Johnston's frankenia has not been observed or recorded to date.

DISCUSSION

Although setting up each photo-point took a long time (primarily from hiking the site looking for the best place to set the camera), annual replication went relatively quickly and smoothly. I could usually replicate all sites within 10 field days by doing 2 to 3 sites a day. Weather conditions turned out to be my most-limiting factor when replicating points. In October of 2002, there had been torrential rains just previous to my field visit, and many of the roads I needed were washed out. So in 2002, I had to park the truck and hike in to many of the sites. While replicating all points in 2002, the rains came again and made many of the photos dark, especially the telephoto shots.

I believe the two greatest weaknesses of this study are 1) realignment trouble from year to year; and, 2) pixilation of the scanned in slides.

In 2001 I had so much trouble with my compass spinning out of control that I had difficulty realigning my pictures. When the compass was spinning wildly, I would fall

back on my recorded "center point" for the picture. While it may seem painfully obvious now, having a center point of "mesquite" or "big *Opuntia*" is not really all that helpful when you are standing in the middle of the Tamaulipan thorn-scrub. So, needless to say my photos for 2001 are awful. I now know that relying solely on a compass to realign my field of view was a mistake, and there are other problems with compass records. According to Case et al. (1982):

> *Care must be taken to ensure that yearly magnetic variation is accounted for when taking magnetic azimuth readings. This is especially important in the western and central United States, and through time. For example, if an area had a magnetic variation of 20 minutes per year, in three years the azimuth would be one degree off. In 12 years, it would be four degrees off!*

Hall (2002) has a much better method of relocating photo-points. He uses a site locator field book which is a pocket-sized set of cards with directions and the first photograph mounted directly on the card. Using the scanned images, I could easily insert the image directly onto my data sheet in the future. As long as you can get back to your photo-point each year, I believe that the best way to make sure you realign your successive photos is by having that first photo there as a reference. Lesson learned!

I am disappointed in the way the scanned slides printed out, and it is completely my fault. I scanned in each slide at 300 dpi, and I should have scanned them in at 600 dpi or better. When enlarging a slide image that's been scanned in at 300 dpi into a 4 X 6 image, the focus starts to degrade and hence, pixilation. Even at 300 dpi, it took an entire day to print out 90 photo pages.

In the future, I would like to change to a digital camera, and just omit this entire scanning step altogether. There are some drawbacks to using digital cameras for photo-point data however, but as technology continues to improve, those drawbacks should shake out.

The original purpose for starting this study no longer exists. According to the Proposed Rule to delist Johnston's frankenia (USFWS 2003), since *F. johnstonii* is proposed for delisting primarily due to new information about this species rather than recovery, the Act does not require a post-listing monitoring plan under these circumstances. However, I believe some sort of safeguard, such as annual photo-point montoring, should be in place to ensure the persistence of this species on the landscape.

Photo-point monitoring of Johnston's frankenia does not need to be completed every year, although that would be ideal. Every other year, every three or even every five years I believe would be sufficient to monitor this particular species. I would like to continue replicating these points because I feel as though these initial years had a tremendous learning curve. Only now do I feel like I have a true understanding of what it would take to replicate this study accurately over time, and to improve the quality of the data. And lastly, I feel a personal responsibility to assure the perpetuation of this species into the future.

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APPENDIX A

Field Data Sheet

Johnston's frankenia Photo Monitoring Study
Data Sheet

Camera Point Number_____

Date_____ Time_____ Weather_____

Landowner_____ Ranch_____ Location_____

Topo Map_____ GPS Point_____

VIEW 1
Camera Height_____
Vert. Angle_____
Bearing_____
Center Pt._____
Other Notes:_____

VIEW 2
Camera Height_____
Vert. Angle_____
Bearing_____
Center Pt._____
Other Notes:_____

_____

_____

_____

_____

_____

Retake Information:

Camera_____

Film_____

Photographer_____

Others Present_____

Developer_____

Vicinity Sketch:

APPENDIX B

Annual Data Sheet Notes

Appendix B—Johnston's frankenia (*Frankenia johnstonii*) Annual Monitoring

A data sheet is completed at each photo-point at the time of replication. The following is a compilation of each data sheet and its contents:

WEBB COUNTY

Photo-point: W-1

Topographic Map: Pinto Creek
Ranch: The Galvan
Conservation Agreement: No
View 1: Hgt. 127 cm; Angle 246°

Time: 1:45-1:50 pm
GPS Point: R051919A
Location: River Pasture
Category: Remote
View 2: Hgt. 127 cm; Angle 333°

Photos for W1 are located in Appendix C, pages 1-6.

1999 Field Notes: May 19
Plants are in full flower and fruit. No graze or browse pressure noted at all. This pasture has not had cows for years and years.

2000 Field Notes: June 3
Plants covered with flowers and fruits. Some individuals are partially red with some dropped leaves indicating a little drought stress. Over-all no change. The Menodora is in bloom.

2001 Field Notes: May 15
Site looks great. Looks like there's been a lot more rain here than at some of the other populations. Plants are green and robust, but currently few to no flowers or fruits. The Menodora is in bloom, and Orabanche is everywhere. Although the ownership of this site has recently changed, there are still no cows in this pasture. My compass is going completely crazy. It's spinning around and around!

2002 Field Notes: October 22
Plants look great. Not as much new growth on the plants here as I saw in central Webb County earlier this week. Plants have a few flowers, but are covered with fruits. Zexmenia, Saladillo, Menodora, and Isocoma all in bloom now also. This site hasn't changed a bit. Still no cows, no poop.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 87.4 cm	Mean Height: 46.3 cm
Mean Flowers: 43	Mean Fruits: 8
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 105.5 cm	Mean Height: 48.2 cm
Mean Flowers: 1.2	Mean Fruits: 861

Photo-point: W-2

Topographic Map: Cibilo Ranch
Ranch: The Ortiz
Conservation Agreement: No
View 1: Hgt. 135 cm; Angle 71°

Time: 4:50 pm
GPS Point: R051921B
Location: Abrias/Farias Pastures
Category: Remote
View 2: N/A

Photos for W2 are located in Appendix C, pages 7-9.

1999 Field Notes: May 19
Plants are in full flower. Some are in fruit. No graze or browse pressure noted.

2000 Field Notes: June 2
Plants covered with flowers and fruits. Some individuals are partially red with some dropped leaves indicating a little drought stress.

2001 Field Notes: May 14
The site is very dry. The cows have been in this pasture recently, but the plants show few signs of pressure or impacts. The stocking rate here is very low. Some individuals have red and gold leaves and some stems are turning red (drought stress). No flowers or fruits at all.

2002 Field Notes: October 21
Wow! The plants look great! October is definitely THE month to monitor! Plants have lots of new growth. Beautiful. I love this little site. Plants in flower and fruit. The tasajillo is in fruit, and Billilturnera is everywhere.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 56 cm	Mean Height: 35.3 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 72.7 cm	Mean Height: 48 cm
Mean Flowers: 10	Mean Fruits: 139

Photo-point: W-3

Topographic Map: Laredo South
Ranch: Tonquesitos Colonia
Conservation Agreement: No
View 1: Hgt. 127 cm; Angle 240°

Time: 2:50-3:00 pm
GPS Point: R060220A
Location: "The Dump"
Category: At Risk
View 2: N/A

Photos for W3 are located in Appendix C, pages 10-11.

2000 Field Notes: June 2

Plants in flower but not completely covered. Site looks very dry (Although there must have been a recent small shower since the A. wrightii are starting to sprout).

2001 Field Notes: May 14

Dry Dry Dry. Leaves on many individuals are turning red and orange. Something (an armadillo?) appears to have been doing a lot digging within the population. Can't imagine there could actually be feral hogs or havelina in this Colonia, but I guess you never know! The old Trans-Texas yard immediately to the West is vacant and becoming over-grown. Still no activity in this or surrounding lots. My compass is freaking out.

2002 Field Notes: October 21

Plants look great. Plants have lots of new green growth and both flowers and fruits. Still no growth in this section of the Colonia. The old Trans Texas Yard still sits abandoned. There are new houses and a Mission of sorts just to the north. Somebody really needs to clean this place up and make it park! Hey, I think I know what all that digging was last year…cactus poachers! Many of the beautiful cacti that once covered this site are now noticeably gone! Gee, I wonder why they didn't dig up any Frankenia!?

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 68.1 cm	Mean Height: 45.6 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 74.1 cm	Mean Height: 41.8 cm
Mean Flowers: 33.4	Mean Fruits: 128.5

Photo-point: W-4

Topographic Map: Blancas Creek South
Ranch: The San Antonio
Conservation Agreement: Yes
View 1: Hgt. 103 cm; Angle 85°

Time: 3:30 pm
GPS Point: R060314A
Location: Capones Pasture
Category: Remote
View 2: Hgt. 103 cm; Angle 100°

Photos for W4 are located in Appendix C, pages 12-16.

1999 Field Notes: May 20

Plants are in full flower and fruit. Some browse pressure noted.

2000 Field Notes: June 3

Added View 2 in 2000 just so folks can get an idea of how large this site is. There is a gas well pad site on the horizon in the center of the shot. We'll see if activity increases in this direction over the years. There are a lot of new gas wells going in this year on the ranch, but none around the Frankenia sites thank goodness. Plants in flower, but flowers are not prolific. It is very dry and many leaves have fallen off of the plants. Some browse pressure noted.

2001 Field Notes: May 15
The site is SO very dry. The plants are still green, but starting to drop leaves. There are no flowers or fruits at all. Some browse pressure noted.

2002 Field Notes: October 22
Plants are green and show some new growth. There are some flowers, but mostly fruits. It is apparent that the cows are in and out of this pasture, but overall there has been no change to the landscape over the years.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 71.3 cm	Mean Height: 39.9 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 72.4 cm	Mean Height: 38.2 cm
Mean Flowers: 5.6	Mean Fruits: 312

Photo-point: W-5

Topographic Map: O'Keefe Lake
Ranch: The San Antonio
Conservation Agreement: Yes
View 1: Hgt. 131 cm; Angle 30°
Time: 1:00 pm
GPS Point: Rover file
Location: Hermanas Pasture
Category: Remote
View 2: N/A

Photos for W5 are located in Appendix C, pages 17-18.

2000 Field Notes: June 3
Very Dry. Many leaves have dropped from the plants. Very few flowers. Some browse pressure noted (or it may just be drought deciduousness I'm seeing).

2001 Field Notes: May 15
The site is very very very dry. Plants are dropping leaves, and there are no flowers or fruits.

2021 Field Notes: October 23
There is lots of new green growth. Plants always seem a little smaller here. It is very dark and about to rain.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 53.9 cm	Mean Height: 33.5 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 59.5 cm	Mean Height: 31.5 cm
Mean Flowers: 20.2	Mean Fruits: 127

ZAPATA COUNTY

Photo-point: Z-6

Topographic Map: Chargos Creek
Ranch: The Barrocito
Conservation Agreement: Yes
View 1: Hgt. 133 cm; Angle 232°

Time: 10:30 am
GPS Point: R052415B
Location: Canal Site
Category: Remote
View 2: N/A

Photos for Z6 are located in Appendix C, pages 19-20.

1999 Field Notes: May 24
A new seismic line has been put in next to the canal site population. Close call! (Mr. Bruni is good about making sure they don't hit any Frankenia sites.) It's pretty dry this year, and the plants are reddish with just a few flowers here and there.

2000 Field Notes: June 4
Many leaves have dropped from the plants. Drought stress is evident. There are some flowers though. No change in the site.

2001 Field Notes: May 16
The site is dry dry dry! Many of the leaves on the plants are orange and red, and still many others are on the ground around the base of the plant. There are no flowers or fruits at all. This drought doesn't seem to phase the nighthawk. Her eggs are at the base of one of the Frankenia plants.

2002 Field Notes: October 22
Uh Oh. Mrs. Bruni died earlier this year. She was the matriarch. Now the remaining four siblings are feuding over the ranch, and I cannot get access this year. Hopefully things will settle down and I will be able to regain access next year.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 58.2 cm	Mean Height: 34.4 cm
Mean Flowers: 0	Mean Fruits: 0

Photo-point: Z-7

Topographic Map: Chargos Creek
Ranch: The Barrocito
Conservation Agreement: Yes
View 1: Hgt. 134 cm; Angle 94°

Time: 10:30 am
GPS Point: R052418A
Location: East Pasture
Category: Remote
View 2: Hgt. 134 cm; Angle 170°

Photos for Z7 are located in Appendix C, pages 21-24.

1999 Field Notes: May 24

It's pretty dry this year, and the plants are reddish with just a few flowers here and there. [By the way, it was the evening of May 24th that my water broke and started the whole chain of events that resulted in me not being able to complete the initiation/installation of these photo-points in 1999, and my son Sammy finally being born on May 29th, 1999, after 5 days of trendellenberg (head down, feet up) bed rest.]

2000 Field Notes: June 4

Had to change a few things to the photo-point: 1) I had to replace the rebar and move it a little closer into the population since the ranch road had been widened just a touch and took out my original rebar; and, 2) I added View 2 this year. Plants have dropped most of their leaves. There are some flowers. No change in the site.

2001 Field Notes: May 16

So dry! Plants are somewhat robust, but losing dried, orange and red leaves. The ground literally crunches while you're walking. There are no flowers or fruits. A bunch of old hoof prints are running through the population. Looks like both cows and horses have been in here in the last couple of months.

2002 Field Notes: October 22

Uh Oh. Mrs. Bruni died earlier this year. She was the patriarch. Now the remaining four siblings are feuding over the ranch, and I cannot get access this year. Hopefully things will settle down and I will be able to regain access next year.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 74.8 cm	Mean Height: 41.8 cm
Mean Flowers: 0	Mean Fruits: 0

Photo-point: Z-8

Topographic Map: Arroyo Salado West
Ranch: The Tejon
Conservation Agreement: No
View 1: Hgt. 130 cm; Angle 210°

Time: 9:00 am
GPS Point: R101713A
Location: La Perla Road fenceline
Category: At Risk
View 2: Hgt. 130 cm; Angle 270°

Photos for Z8 are located in Appendix C, pages 25-28.

2000 Field Notes: October 17

Dry, dusty and caliche covered plants. It's so dry and the trucks going in and out of La Perla Road are sending tons of caliche into the pasture. One flower seen, otherwise there are no other flower and fruits. The Varilla has dropped all of its leaves and the Frankenia appears to have dropped at least half of its leaves. Some stems are red also.

2001 Field Notes: May 16
The caliche blanket persists and this site looks horrible. Very dry and no flowers or fruits to speak of.

2002 Field Notes: October 23
Wow! I can actually see the plants this year. The recent rain has washed away all the caliche. Lots of fruits.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 66.1 cm	Mean Height: 43.3 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 82.4 cm	Mean Height: 41.1 cm
Mean Flowers: 8.7	Mean Fruits: 1074

Photo-point: Z-9

Topographic Map: Arroyo Salado West
Ranch: La Perla Farms
Conservation Agreement: No
View 1: Hgt. 125 cm; Angle 270°

Time: 9:15 am
GPS Point: R101714A
Location: adjacent to La Perla Road
Category: At Risk
View 2: Hgt. 125 cm; Angle 310°

Photos for Z9 are located in Appendix C, pages 29-32.

2000 Field Notes: October 17
Dry, dusty and caliche covered plants. It's so dry and the trucks going in and out of La Perla Road are sending tons of caliche into this little hillside. Frankenia has dropped at least half of its leaves. Some stems are red also.

2001 Field Notes: May 16
There are some flowers on the plants that are right in the gully-wash area, otherwise there are no other flowers or fruits. Still pretty dry. Compass is wacky. I'm having a hard time realigning things.

2002 Field Notes: October 23
Lots of new growth. Tons of fruits. Otherwise, no change.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 58.2 cm	Mean Height: 40.3 cm
Mean Flowers: 3.5	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 68 cm	Mean Height: 35.7 cm
Mean Flowers: 5.5	Mean Fruits: 601.5

Photo-point: Z-10

Topographic Map: Arroyo Salado East
Ranch: The Hancock Ranch
Conservation Agreement: Pending
View 1: Hgt. 130 cm; Angle 10°

Time: 11:15 am
GPS Point: R101716A
Location: Jaral Pasture
Category: Remote
View 2: Hgt. 130 cm; Angle 60°

Photos for Z10 are located in Appendix C, pages 33-36.

2000 Field Notes: October 17
Many of the plants have dropped 50% to all of their leaves. Leaves and stems are red on about 25 to 50% of plants. Flower buds on a few plants from last week's rain. Some browse pressure noted.

2001 Field Notes: June 2
Hot and dry and I'm crazy to be out here in June. Note to self: no more photo-monitoring in June.

2002 Field Notes: October 24
Looks great. Jicamilla is sprouting all over the place. There has been a lot of rain! Some flowers and lots of fruits on the Frankenia plants. No change otherwise.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 76.8 cm	Mean Height: 42.1 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 64.2 cm	Mean Height: 38 cm
Mean Flowers: 5.9	Mean Fruits: 203

Photo-point: Z-11

Topographic Map: Arroyo Salado East
Ranch: The Hancock Ranch
Conservation Agreement: Pending
View 1: Hgt. 130 cm; Angle 340°

Time: 12:00 pm
GPS Point: R101717A
Location: Canales Pasture
Category: Remote
View 2: Hgt. 130 cm; Angle 20°

Photos for Z11 are located in Appendix C, pages 37-40.

2000 Field Notes: October 17
Many of the plants have dropped 50% to all of their leaves. Many leaves and stems are red. The Saladillo has dropped all of its leaves. Even in this sorry drought-state, this site still blows my mind. Chingos!

2001 Field Notes: June 2
Hot and red No flowers or fruits.

2002 Field Notes: October 24

There is lots of new green growth and the plants look great. There are a K-zillion Frankenia plants out here. Too cool. Some flowers, and a ton of fruits. Each branch of Frankenia is loaded with fruits. No change to the landscape.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 88.7 cm	Mean Height: 46 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 89.4 cm	Mean Height: 44.4 cm
Mean Flowers: 17.4	Mean Fruits: 4000

Photo-point: Z-12

Topographic Map: Arroyo Veleno	Time: 2:00 pm
Ranch: Higinio's Ranch	GPS Point: R101718A
Conservation Agreement: Yes	Location: Valley
View 1: Hgt. 130 cm; Angle 230°	Category: At Risk
	View 2: Hgt. 130 cm; Angle 270°

Photos for Z12 are located in Appendix C, pages 41-44.

2000 Field Notes: October 17

Very dry. Ick. Most of the leaves have dropped off of the plants. No flowers or fruits.

2001 Field Notes: May 16

Hot and dry. Site looks barren. My compass is totally going crazy this year! It keeps spinning at every site! And I mean constantly spinning. I keep waiting for a space ship to land or something. No flowers or fruits.

2002 Field Notes: October 24

Okay, so maybe this site never looks good. No change otherwise.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 58.2 cm	Mean Height: 38 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 60.7 cm	Mean Height: 37.6 cm
Mean Flowers: 7.4	Mean Fruits: 167.8

Photo-point: Z-13

Topographic Map: Arroyo Huisache
Ranch: Pete Villareal's Ranch
Conservation Agreement: No
View 1: Hgt. 130 cm; Angle 0° due North

Time: 10:00 am
GPS Point: R101814A
Location: Fence line site
Category: Remote
View 2: N/A

Photos for Z13 are located in Appendix C, pages 45-46.

2000 Field Notes: October 17

This site is heavily impacted in two areas where it is apparent that heavy equipment has been turning around (You can't see it in the picture. It's just to the right of the field of view.) There are two new Conoco pad sites on either side of this little population. Central Zapata County has obviously had more rain than Northern Zapata County because the plants here have new green growth and flower and fruits.

2001 Field Notes: May 16

Hot and dry. Still looks the same. Impacted area still has not revegetated, but it looks like the trucks stopped turning around there now. Some plants have fruits, but they are "burned" and red-looking. Surely they will abort.

2002 Field Notes: October 24

Hey, where'd everybody go? Eaten? All the plants have been browsed and/or grazed big time. I bet the jackrabbits were here. They tend to stay in one place and eat until most of everything is gone. Cows might have helped too. No poop or tracks though. Well, it is raining right now, so hopefully next year things will look better. The "old turn around" site now has Russian thistle in it. Primary succession, here we go.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 54.2 cm	Mean Height: 39.2 cm
Mean Flowers: 0	Mean Fruits: 22.5 red & "burned"
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 60.7 cm	Mean Height: 37.6 cm
Mean Flowers: 7.4	Mean Fruits: 167.8

Photo-point: Z-14

Topographic Map: Arroyo Huisache
Ranch: The Hayne's Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 310°

Time: 11:15 am
GPS Point: R101916A
Location: SE corner
Category: Remote
View 2: N/A

Photos for Z14 are located in Appendix C, pages 47-48.

2000 Field Notes: October 18
Plants have dropped about 25% of their leaves. Many plants have crimson leaves and stems. Plants in flower and fruit. Plants looks fabulous, considering. No graze or browse pressure noted.

2001 Field Notes: May 17
Dry. Plants look okay though. Some plants have orange-brown leaves and some leaves have dropped. There are some big hoof prints left in the clay through the population but the plants don't look any worse for wear.

2002 Field Notes: October 24
This site always looks fabulous. No change.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 62.5 cm	Mean Height: 37.1 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 72.8 cm	Mean Height: 36.6 cm
Mean Flowers: .2	Mean Fruits: 690

Photo-point: Z-15

Topographic Map: Arroyo Huisache
Ranch: Rafa Flores' Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 340°

Time: 9:00 am
GPS Point: Rover file
Location: The pad site
Category: Remote
View 2: Hgt. 130 cm; Angle 190°

Photos for Z15 are located in Appendix C, pages 49-52.

2000 Field Notes: November 9
Well I wonder what this site used to look like. This is now a gas well pad site with Frankenia hanging on at the north end (actual pad site on the south end). I do not know when this well went in, but it has been like this since I've been on the ranch. It appears as though the plants may be impacted by truck and equipment turn-around, not to mention Rafa's high intensity grazing. Plants are small, but plentiful, and in flower and fruit. Hopefully we can watch this site recover through the years.

2001 Field Notes: May 17
Everything is dry and crispy, but other wise look the same. A few fruits, but no flowers. No change in the gas well.

2002 Field Notes: October 25
Okay, so maybe we won't get to watch this site recover over the years. Maybe the plants look a little bigger, but definitely still stunted. I think they are suffering from Savory-

System-Perpetual-Puniness. I love Rafa to death, but I don't love his grazing system! No change in the gas well.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 32.8 cm	Mean Height: 24.3 cm
Mean Flowers: 0	Mean Fruits: 2.5
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 39.7 cm	Mean Height: 26.7 cm
Mean Flowers: .6	Mean Fruits: 161

Photo-point: Z-16

Topographic Map: Arroyo Huisache
Ranch: Rafa Flores' Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 330°

Time: 9:35 am
GPS Point: R110915B
Location: Central Site
Category: Remote
View 2: Hgt. 130 cm; Angle 165°

Photos for Z16 are located in Appendix C, pages 53-56.

2000 Field Notes: November 9
Plants very green from recent rains. In both flower and fruit and look relatively happy.

2001 Field Notes: May 17
Everything is dry and crispy, but otherwise look the same. There are some fruits, but no flowers.

2002 Field Notes: October 25
Everything looks exactly the same as the other 10,000 times I've come out here. A few flowers and fruits.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 35.5 cm	Mean Height: 24.5 cm
Mean Flowers: 0	Mean Fruits: 17
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 51.7 cm	Mean Height: 31 cm
Mean Flowers: .8	Mean Fruits: 304

Photo-point: Z-17

Topographic Map: Arroyo Veleno
Ranch: Joe Dodier's Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 355°

Time: 11:15 am
GPS Point: Rover file
Location: Tank Dam Overlook
Category: At Risk (1.3 mi. from 16)
View 2: N/A

Photos for Z17 are located in Appendix C, pages 57-58.

2000 Field Notes: November 9
Plants a little greener from recent rains. Plants in both flower and fruit. This site is starting to look a little better than it did years ago during the worst part of the drought.

2001 Field Notes: May 17
It is SO dry, that this tank is completely dried up, and I have never in 10 years seen this tank dry. Everything is red and crispy. There are no flowers, but some fruits that look like they will abort.

2002 Field Notes: October 25
The tank is full again and full of black-bellied whistling ducks and happy bull frogs. Some flowers present, but mostly fruits. A little browse pressure noted. I mentioned this to Joe and he swears the jackrabbits come in every night to feed at this site.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 56.2 cm	Mean Height: 34.2 cm
Mean Flowers: 0	Mean Fruits: 23.5
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 56.7 cm	Mean Height: 33.6 cm
Mean Flowers: .5	Mean Fruits: 212.5

Photo-point: Z-18

Topographic Map: Arroyo Veleno
Ranch: Joe Dodier's Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 340°

Time: 1:25 pm
GPS Point: R110919A
Location: Central Site
Category: Remote
View 2: N/A

Photos for Z18 are located in Appendix C, pages 59-60.

2000 Field Notes: November 9
The plants here seem larger than at other sites on the ranch. Plants in flower and fruit. Everything looks great right now. A jackrabbit dug a den beneath two Frankenia individuals. He came scampering out when I went to go check out the site. Oh great, as if eating here every night wasn't enough. Now they're setting up housekeeping!

2001 Field Notes: May 17

Plants are mostly red. No flowers, some fruits. There is a new deer feeder down here just out of the field of view of the photo.

2002 Field Notes: October 25

Okay, whose been eating the children? There are a couple of individuals eaten down to nubs. I think there are a bunch of jackrabbits hopping around here and on Pete's place with their bellies full of Frankenia It's very dark and raining, so these pictures probably won't be the best.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 61.3 cm	Mean Height: 38.4 cm
Mean Flowers: .4	Mean Fruits: 78.5
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 57.4 cm	Mean Height: 34.6 cm
Mean Flowers: 0	Mean Fruits: 102

Photo-point: Z-19

Topographic Map: Arroyo Clareno
Ranch: Cabeza de Vaca Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 45°

Time: 2:30 pm
GPS Point: R118120A
Location: Deer Blind
Category: At Risk
View 2: N/A

Photos for Z19 are located in Appendix C, pages 61-62.

2000 Field Notes: November 9

The plants seem smallish although they are green and in flower. This site hasn't changed a bit since the first time I saw it in 1994, deer blind and all. This entire hillside is covered with Frankenia, not just this little pocket where I am taking the picture.

2001 Field Notes: May 17

Eek. Plants have lost most of their leaves. No flowers or fruits. Looks sad.

2002 Field Notes: October 25

Well, this site doesn't look much better than it did last year. But, it doesn't look any worse either. Just a few flowers and fruits. It's raining right now, so hopefully next visit will show some improvement.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 37 cm	Mean Height: 25.8 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 37.6 cm	Mean Height: 26 cm
Mean Flowers: .1	Mean Fruits: 446

Photo-point: Z-20

Topographic Map: Arroyo Clareno
Ranch: Cabeza de Vaca Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 90°

Time: 4:00 pm
GPS Point: R118120A
Location: Patti's Backside
Category: At Risk
View 2: N/A

Photos for Z20 are located in Appendix C, pages 63-64.

2000 Field Notes: November 9
Plants look great, in flower and fruit. This ranch in divided by Highway 83. The Deer Blind Site is on the East side, and all the remaining Cabeza de Vaca Ranch sites are on the West side. Mr. Lopez is worried about TxDOT expanding Highway 83 because they are trying to purchase 300 feet of his property on this side (the west) for the expansion. If the new highway doesn't destroy this site, it will certainly negatively impact it.

2001 Field Notes: May 19
Plants have lost most of their leaves. A few flowers and fruits.

2002 Field Notes: October 25
Plants look great. It's raining. Flowers and fruits noted.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 61.6 cm	Mean Height: 35.6 cm
Mean Flowers: .7	Mean Fruits: 105.5
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 62.1 cm	Mean Height: 36.1 cm
Mean Flowers: .8	Mean Fruits: 222

Photo-point: Z-21

Topographic Map: Arroyo Clareno
Ranch: Cabeza de Vaca Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 330°

Time: 4:30 pm
GPS Point: R110922A
Location: "†" Hilltop
Category: At Risk
View 2: N/A

Photos for Z21 are located in Appendix C, pages 65-66.

2000 Field Notes: November 9
There is a large cross on the top of this hill where the photo point is. It's made of mesquite and bailing wire, and if you look closely you can see it from 83. Mr. Lopez said his father put it there to "keep out the town of Zapata". This population looks more spindly than in years past, and I can see that there has been mortality in the center of the site. Hopefully new individuals will replace the dead ones. In flower and fruit.

2001 Field Notes: May 19
Plants have lost most of their leaves. No flowers or fruits.

2002 Field Notes: October 25
Plants look okay. It's raining. Just a few flowers and fruits.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 40.2 cm	Mean Height: 24 cm
Mean Flowers: 0	Mean Fruits: 0
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 37.6 cm	Mean Height: 23 cm
Mean Flowers: .3	Mean Fruits: 21

Photo-point: Z-22

Topographic Map: Arroyo Clareno
Ranch: TxDOT
Conservation Agreement: TxDOT MOU
View 1: Hgt. 130 cm; Angle 120°

Time: 9:15 am
GPS Point: R110922A
Location: Highway Right-of-way
Category: At Risk
View 2: N/A

Photos for Z22 are located in Appendix C, pages 67-68.

2000 Field Notes: November 10
If Mr. Lopez is correct about the new Highway expansion, this site is toast. I guess this photo-point will just become a historical reference. Plants look fine, and in flower and fruit.

2001 Field Notes: May 18
No change. No flowers, some fruits.

2002 Field Notes: October 25
Plants look okay. It's raining. Just a few flowers and fruits.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 55 cm	Mean Height: 36.2 cm
Mean Flowers: 0	Mean Fruits: 30.6
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 60 cm	Mean Height: 35.4 cm
Mean Flowers: .1	Mean Fruits: 296.1

Photo-point: Z-23

Topographic Map: Arroyo Clareno
Ranch: Cabeza de Vaca Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 370°

Time: 8:25 am
GPS Point: Rover File
Location: Patti's Site
Category: At Risk
View 2: Hgt. 130 cm; Angle 90°

Photos for Z23 are located in Appendix C, pages 69-72.

2000 Field Notes: November 10

Mr. Lopez is worried about TxDOT expanding Highway 83 because they are trying to purchase 300 feet of his property on this side (the west) for the expansion. The new highway will certainly destroy this site if it comes in 300 feet. ["Patti's Backside" (photo-point Z20) is the back slope or the other side of this hill.] I made a point to make sure that you could see Highway 83 in both views of this photo-point. Plants are very green and in flower and fruit.

2001 Field Notes: May 19

Plants seem smaller and have lost most of their leaves. No flowers and just a few fruits.

2002 Field Notes: October 25

Plants look okay. It's dark and raining. I NOW KNOW THAT THE HIGHWAY IS GOING TO BE EXPANDED ON THE OTHER SIDE (EAST SIDE OF THE RANCH). So, this site may actually persist. Just a few flowers and many fruits.

2001 Randomized Vigor Sample (N=10):

Mean Diameter: 66.2 cm	Mean Height: 33.3 cm
Mean Flowers: 0	Mean Fruits: 2

2002 Randomized Vigor Sample (N=10):

Mean Diameter: 66 cm	Mean Height: 33 cm
Mean Flowers: 19.3	Mean Fruits: 47

Photo-point: Z-24

Topographic Map: Arroyo Clareno
Ranch: M. Alexander's Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 210°

Time: 11:00 am
GPS Point: Rover file
Location: Tank Battery Lookout
Category: Remote
View 2: Hgt. 130 cm; Angle 170°

Photos for Z24 are located in Appendix C, pages 73-76.

2000 Field Notes: November 10

There is just one word for this site: Awesome! Millions of Frankenia cover this entire ranch and valley. Plants look very happy and are covered with flowers and fruits. The plants here are huge!

2001 Field Notes: May 19
Had to redo the photo-point rebar. There has been some dozing up here at the tank battery in an attempt to prevent erosion, and they dozed away my rebar. I love this site. Some flowers, lots of fruits.

2002 Field Notes: October 25
This site is just as beautiful and breath-taking as ever. Some flowers, lots of fruits.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 76.6 cm	Mean Height: 41.9 cm
Mean Flowers: 10	Mean Fruits: 669
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 74.6 cm	Mean Height: 40.8 cm
Mean Flowers: 1.3	Mean Fruits: 712

Photo-point: Z-25

Topographic Map: Arroyo Clareno	Time: 11:30 am
Ranch: M. Alexander's Ranch	GPS Point: Rover file
Conservation Agreement: Yes	Location: Down in the Valley
View 1: Hgt. 130 cm; Angle 170°	Category: Remote
	View 2: Hgt. 130 cm; Angle 135°

Photos for Z25 are located in Appendix C, pages 77-80.

2000 Field Notes: November 10
Plants Everywhere! Millions! Plants are green and robust, and covered with flowers and fruits. Although this site has had its share of impacts, mostly from gas pipelines, seismics and pad sites, it is still the most phenomenal site. There were some cows here and there in the mid-90's, but I haven't seen cows down here in years. Mr. Alexander died in the late 90's, and now his son Ben manages all of his properties.

2001 Field Notes: May 19
Looks exactly the same. Great.

2002 Field Notes: October 25
Ernesto Reyes said something to me about the possibility of another pipeline going through this area (along that fence line I think). So, it will be interesting to see if in the future this photo-point and this valley gets blown up. Otherwise, looks great. Raining.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 68.1 cm	Mean Height: 40.4 cm
Mean Flowers: 1	Mean Fruits: 1,197
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 71.7 cm	Mean Height: 40 cm
Mean Flowers: 0	Mean Fruits: 41.5

STARR COUNTY

Photo-point: S-26

Topographic Map: Salineno
Ranch: U. S. Fish and Wildlife
Conservation Agreement: Federal Property
View 1: Hgt. 130 cm; Angle 150°

Time: 10:00 am
GPS Point: Rover file
Location: Chapeno Tract
Category: At Risk
View 2: Hgt. 130 cm; Angle 260°

Photos for S26 are located in Appendix C, pages 81-84.

2000 Field Notes: November 10
Plants green and vibrant, and covered with flowers and fruits. I noticed mortality in about five older individuals.

2001 Field Notes: May 18
Plants look nice and robust. Just a few flowers and fruits here and there. My compass like to spin when I'm up on hills. I'm having a hard time realigning my photo. Note to self: simply recording "cenizo" as a center point, when there are 100 cenizos here, was a bad decision.

2002 Field Notes: October 24
It's seems very dry here compared to how wet it's been in Webb and Zapata. There's just a few flowers and fruits. No change.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 70.3 cm	Mean Height: 41.7 cm
Mean Flowers: 2	Mean Fruits: 3.5
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 70.4 cm	Mean Height: 41.3 cm
Mean Flowers: 1.5	Mean Fruits: 253

Photo-point: S-27

Topographic Map: El Sauz
Ranch: Gilberto Resendez's Ranch
Conservation Agreement: Yes
View 1: Hgt. 130 cm; Angle 230°

Time: 10:15 am
GPS Point: Rover file
Location: El Sauz
Category: At Risk
View 2: Hgt. 130 cm; Angle 280°

Photos for S27 are located in Appendix C, pages 85-88.

2000 Field Notes: November 11
This site looks better than ever. Plants looking bigger and covered with flowers and fruits.

2001 Field Notes: May 18

No change. I can't believe how much better this site looks now than in the 90's. Of course, that was during the severe drought. Plants in flower and fruit. Note to self: Never EVER use "mesquite" or "prickly pear" as center points again. Geez, WHAT was I thinking?

2002 Field Notes: October 24

Plants look great. Lots of grass in Los Olmos this year. Boy, that's the first time I've seen that. Plants in flower and fruit.

2001 Randomized Vigor Sample (N=10):	
Mean Diameter: 62.2 cm	Mean Height: 37.6 cm
Mean Flowers: 19.1	Mean Fruits: 28.5
2002 Randomized Vigor Sample (N=10):	
Mean Diameter: 82.8 cm	Mean Height: 46.3 cm
Mean Flowers: 9.1	Mean Fruits: 705

Photo-point: W1-246º-1999 ***The Galvan***

Photo-point: W1-246º-2000 ***The Galvan***

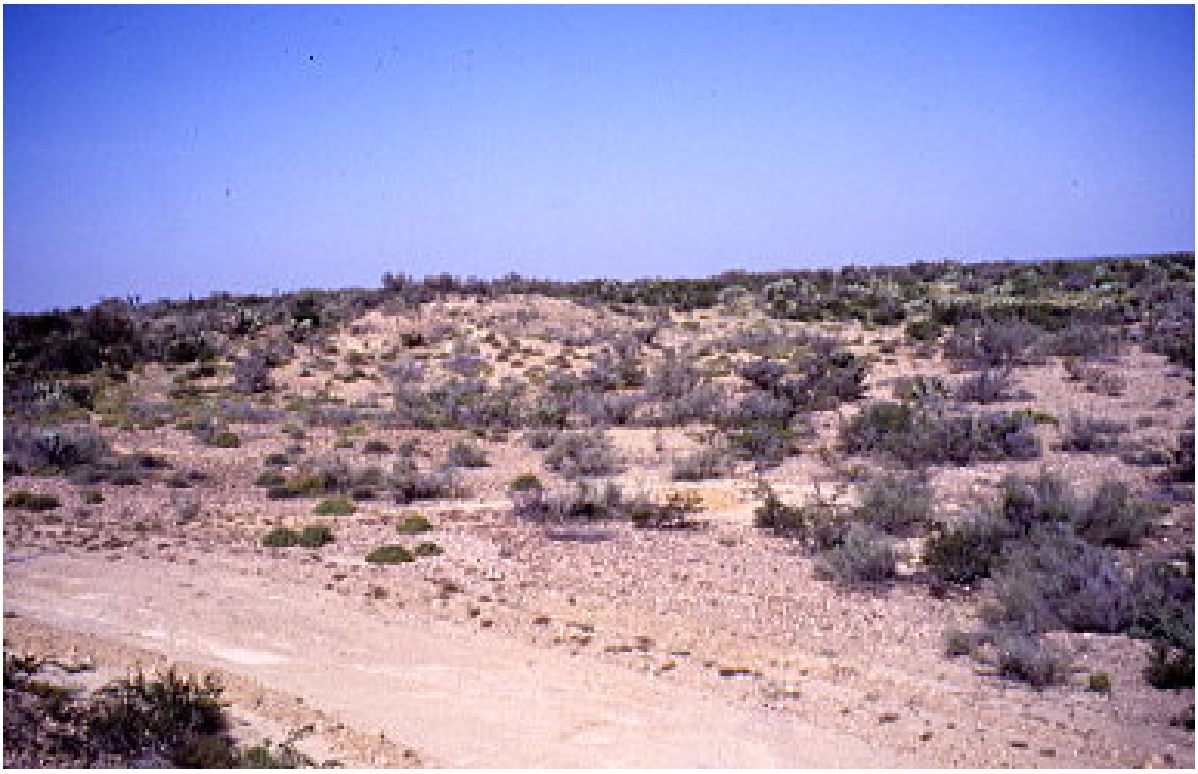

Photo-point: W1-246º-2001 ***The Galvan***

Photo-point: W1-246º-2002 ***The Galvan***

Photo-point: W1-Telephoto-246º-2002 ***The Galvan***

Photo-point: W1-333º-1999 ***The Galvan***

Photo-point: W1-333º-2000 ***The Galvan***

Photo-point: W1-333º-2001 ***The Galvan***

Photo-point: W1-333º-2002 ***The Galvan***

Photo-point: W1-Telephoto-333º-2002 ***The Galvan***

Photo-point: W2-1999 ***The Ortiz***

Photo-point: W2-2000 ***The Ortiz***

Photo-point: W2-2001 ***The Ortiz***

Photo-point: W2-2002 ***The Ortiz***

Photo-point: W2-Telephoto-2002 ***The Ortiz***

Photo-point: W3-2000 ***The Dump***

Photo-point: W3-2001 ***The Dump***

Photo-point: W3-2002 ***The Dump***

Photo-point: W3-Telephoto-2002 ***The Dump***

Photo-point: W4-85º-1999 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W4-85º-2000 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W4-85º-2001 ***The San Antonio Ranch, Capones Pasture***

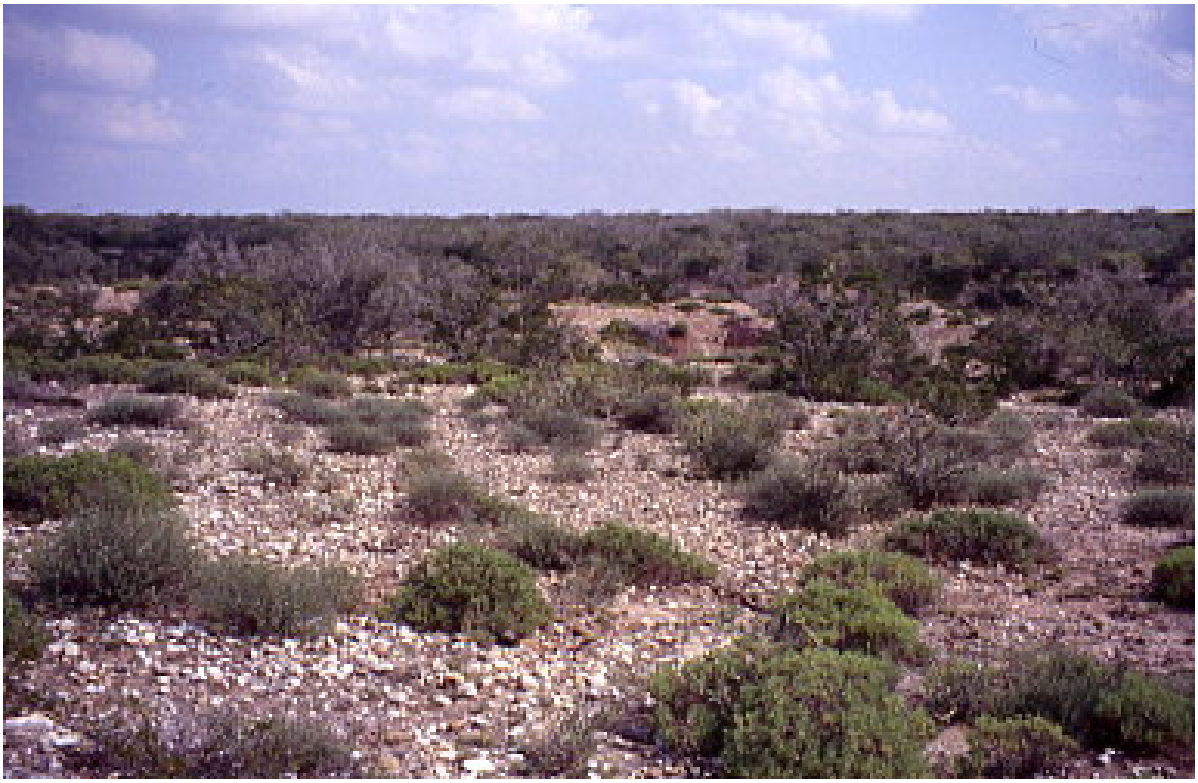

Photo-point: W4-85º-2002 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W4-Telephoto-85º-2002 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W4-100º-2000 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W4-100º-2001 ***The San Antonio Ranch, Capones Pasture***

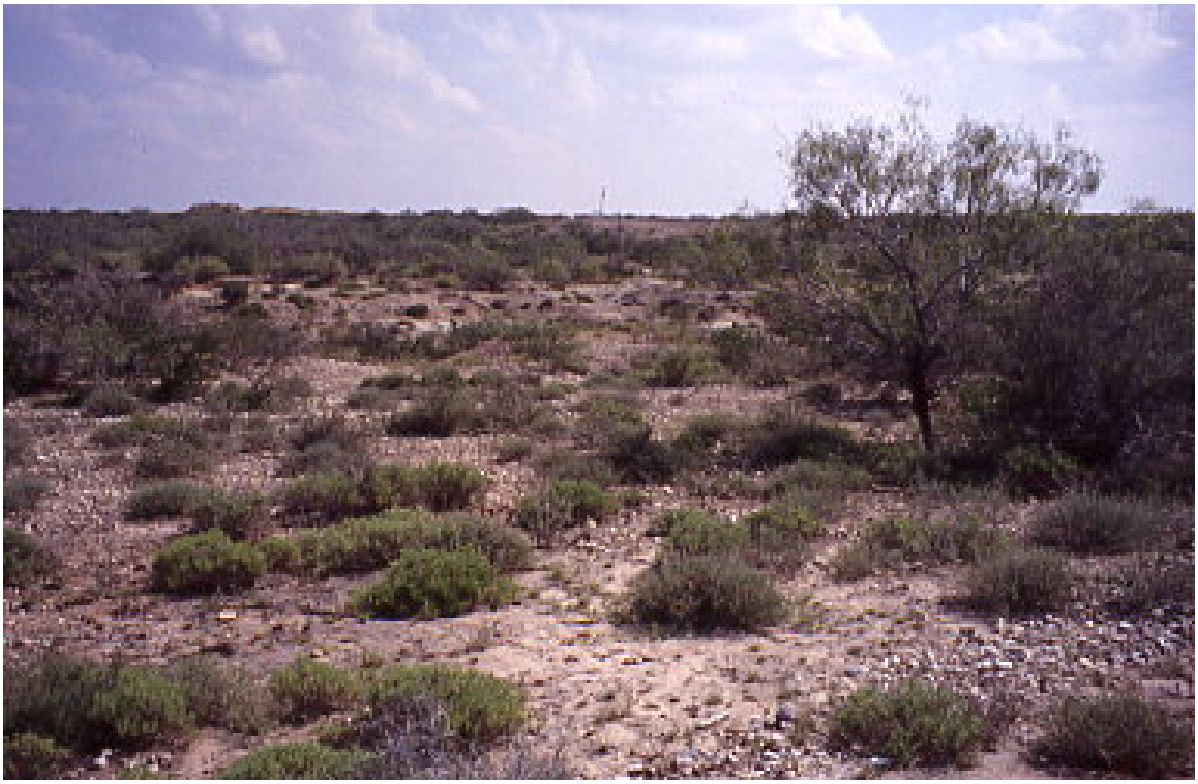

Photo-point: W4-100º-2002 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W4-Telephoto-100º-2002 ***The San Antonio Ranch, Capones Pasture***

Photo-point: W5-2000 ***The San Antonio Ranch, Hermanas Pasture***

Photo-point: W5-2001 ***The San Antonio Ranch, Hermanas Pasture***

Photo-point: W5-2002 ***The San Antonio Ranch, Hermanas Pasture***

Photo-point: W5-Telephoto-2002 ***The San Antonio Ranch, Hermanas Pasture***

Photo-point: Z6-1999 ***The Barrocito, Canal Site***

Photo-point: Z6-2000 ***The Barrocito, Canal Site***

Photo-point: Z6-2001 ***The Barrocito, Canal Site***

Photo-point: Z6-Telephoto-2001 ***The Barrocito, Canal Site***

Photo-point: Z7-94º-1999 ***The Barrocito, East Pasture***

Photo-point: Z7-94º-2000 ***The Barrocito, East Pasture***

Photo-point: Z7-94º-2001 ***The Barrocito, East Pasture***

Photo-point: Z7-Telephoto-94º-2001 ***The Barrocito, East Pasture***

Photo-point: Z7-170º-2000 ***The Barrocito, East Pasture***

Photo-point: Z7-170º-2001 ***The Barrocito, East Pasture***

Photo-point: Z7-Telephoto-170º-2001 ***The Barrocito, East Pasture***

Photo-point: Z8-210º-2000 ***The Tejon***

Photo-point: Z8-210º-2001 ***The Tejon***

Photo-point: Z8-210º-2002 ***The Tejon***

Photo-point: Z8-Telephoto-210º-2002 ***The Tejon***

Photo-point: Z8-270º-2000 ***The Tejon***

Photo-point: Z8-270º-2001 ***The Tejon***

Photo-point: Z8-270º-2002 ***The Tejon***

Photo-point: Z8-Telephoto-270º-2002 ***The Tejon***

Photo-point: Z9-270º-2000 ***La Perla Farms***

Photo-point: Z9-270º-2001 ***La Perla Farms***

Photo-point: Z9-270º-2002 ***La Perla Farms***

Photo-point: Z9-Telephoto-270º-2002 ***La Perla Farms***

Photo-point: Z9-310º-2000 ***La Perla Farms***

Photo-point: Z9-310º-2001 ***La Perla Farms***

Photo-point: Z9-310º-2002 ***La Perla Farms***

Photo-point: Z9-Telephoto-310º-2002 ***La Perla Farms***

Photo-point: Z10-10º-2000 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-10º-2001 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-10º-2002 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-Telephoto-10º-2002 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-60º-2000 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-60º-2001 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-60º-2002 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z10-Telephoto-60º-2002 ***Hancock Ranch, Jaral Pasture***

Photo-point: Z11-20º-2000 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-20º-2001 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-20º-2002 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-Telephoto-20º-2002 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-340º-2000 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-340º-2001 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-340º-2002 ***Hancock Ranch, Canales Pasture***

Photo-point: Z11-Telephoto-340º-2002 ***Hancock Ranch, Canales Pasture***

Photo-point: Z12-230º-2000 ***Higinio's Ranch***

Photo-point: Z12-230º-2001 ***Higinio's Ranch***

Photo-point: Z12-Telephoto-230º-2001 ***Higinio's Ranch***

Photo-point: Z12-230º-2002 ***Higinio's Ranch***

Photo-point: Z12-270º-2000 ***Higinio's Ranch***

Photo-point: Z12-270º-2001 ***Higinio's Ranch***

Photo-point: Z12-270º-2002 ***Higinio's Ranch***

Photo-point: Z13-2000 ***Pete Villareal's Ranch***

Photo-point: Z13-2001 ***Pete Villareal's Ranch***

Photo-point: Z13-2002 ***Pete Villareal's Ranch***

Photo-point: Z13-Telephoto-2002 ***Pete Villareal's Ranch***

Photo-point: Z14-2000 ***The Haynes Ranch***

Photo-point: Z14-2001 ***The Haynes Ranch***

Photo-point: Z14-2002 ***The Haynes Ranch***

Photo-point: Z14-Telephoto-2002 ***The Haynes Ranch***

Photo-point: Z15-340º-2000 ***Rafa's Ranch, Pad Site***

Photo-point: Z15-340º-2001 ***Rafa's Ranch, Pad Site***

Photo-point: Z15-340º-2002 ***Rafa's Ranch, Pad Site***

Photo-point: Z15-Telephoto-340º-2002 ***Rafa's Ranch, Pad Site***

Photo-point: Z15-190º-2000 ***Rafa's Ranch, The Pad***

Photo-point: Z15-190º-2001 ***Rafa's Ranch, The Pad***

Photo-point: Z15-190º-2002 ***Rafa's Ranch, The Pad***

Photo-point: Z16-165º-2000 ***Rafa's Ranch, Central***

Photo-point: Z16-165º-2001 ***Rafa's Ranch, Central***

Photo-point: Z16-165º-2002 ***Rafa's Ranch, Central***

Photo-point: Z16-Telephoto-165º-2002 ***Rafa's Ranch, Central***

Photo-point: Z16-330º-2000 ***Rafa's Ranch, Central***

Photo-point: Z16-330º-2001 ***Rafa's Ranch, Central***

Photo-point: Z16-330º-2002 ***Rafa's Ranch, Central***

Photo-point: Z16-Telephoto-330º-2002 ***Rafa's Ranch, Central***

Photo-point: Z17-2000 ***Joe's Ranch, Tank Dam Overlook***

Photo-point: Z17-2001 ***Joe's Ranch, Tank Dam Overlook***

Photo-point: Z17-2002 ***Joe's Ranch, Tank Dam Overlook***

Photo-point: Z17-Telephoto-2001 ***Joe's Ranch, Tank Dam Overlook***

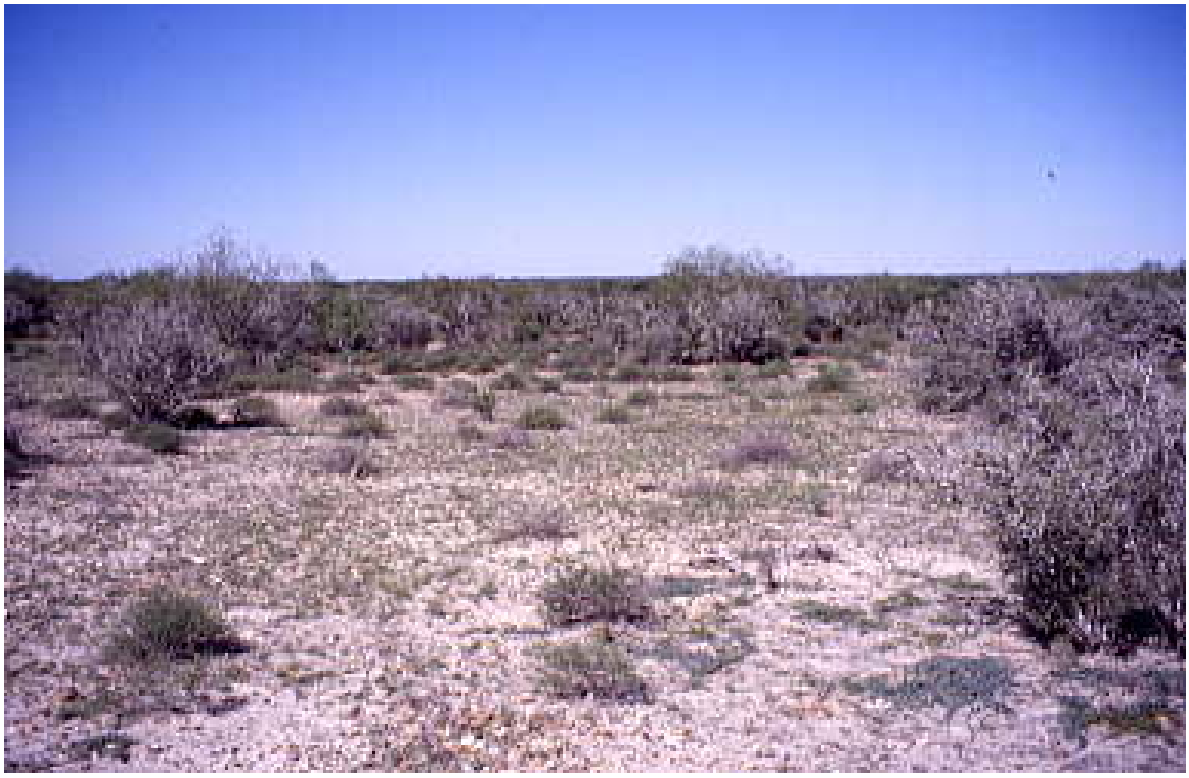

Photo-point: Z18-2000 ***Joe's Ranch, Central***

Photo-point: Z18-2001 ***Joe's Ranch, Central***

Photo-point: Z18-2002 ***Joe's Ranch, Central***

Photo-point: Z18-Telephoto-2001 ***Joe's Ranch, Central***

Photo-point: Z19-2000 ***Cabeza de Vaca Ranch, Deer Blind***

Photo-point: Z19-2001 ***Cabeza de Vaca Ranch, Deer Blind***

Photo-point: Z19-2002 ***Cabeza de Vaca Ranch, Deer Blind***

Photo-point: Z19-Telephoto-2002 ***Cabeza de Vaca Ranch, Deer Blind***

Photo-point: Z20-2000 ***Cabeza de Vaca Ranch, Patti's Backside***

Photo-point: Z20-2001 ***Cabeza de Vaca Ranch, Patti's Backside***

Photo-point: Z20-2002 ***Cabeza de Vaca Ranch, Patti's Backside***

Photo-point: Z20-Telephoto-2002 ***Cabeza de Vaca Ranch, Patti's Backside***

Photo-point: Z21-2000 ***Cabeza de Vaca Ranch, "†" Hilltop***

Photo-point: Z21-2001 ***Cabeza de Vaca Ranch, "†" Hilltop***

Photo-point: Z21-2002 ***Cabeza de Vaca Ranch, "†" Hilltop***

Photo-point: Z21-Telephoto-2001 ***Cabeza de Vaca Ranch, "†" Hilltop***

Photo-point: Z22-2000 ***Highway Right-of-Way***

Photo-point: Z22-2001 ***Highway Right-of-Way***

Photo-point: Z22-2002 ***Highway Right-of-Way***

Photo-point: Z22-Telephoto-2001 ***Highway Right-of-Way***

Photo-point: Z23-370º-2000 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-370º-2001 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-370º-2002 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-Telephoto-370º-2002 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-90º-2000 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-90º-2001 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-90º-2002 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z23-Telephoto-90º-2002 ***Cabeza de Vaca Ranch, Patti's Site***

Photo-point: Z24-170º-2000 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-170º-2001 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-170º-2002 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-Telephoto-170º-2002 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-210º-2000 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-210º-2001 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-210º-2002 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z24-Telephoto-210º-2002 ***Alexander Ranch, Tank Battery Lookout***

Photo-point: Z25-135º-2000 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-135º-2001 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-135º-2002 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-Telephoto-135º-2002 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-170º-2000 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-170º-2001 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-170º-2002 ***Alexander Ranch, Down in the Valley***

Photo-point: Z25-Telephoto-170º-2002 ***Alexander Ranch, Down in the Valley***

Photo-point: S26-150º-2000 **USFWS, Chapeno Tract**

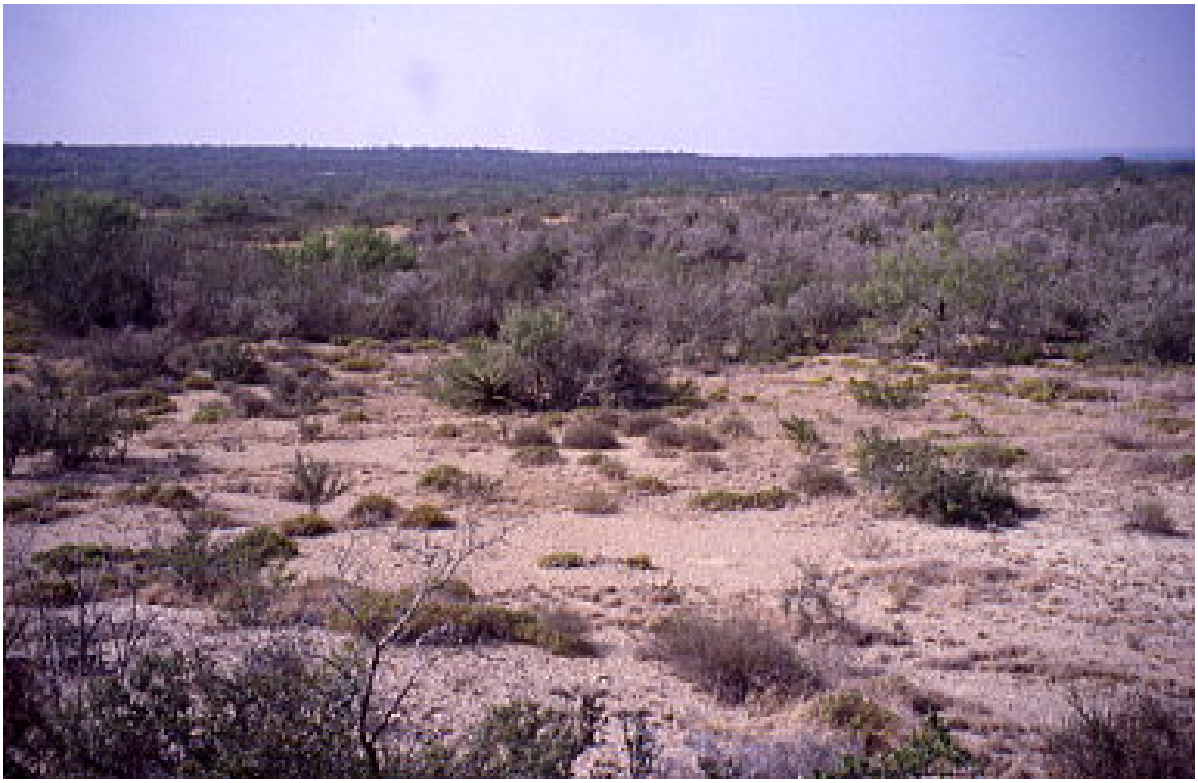

Photo-point: S26-150º-2001 **USFWS, Chapeno Tract**

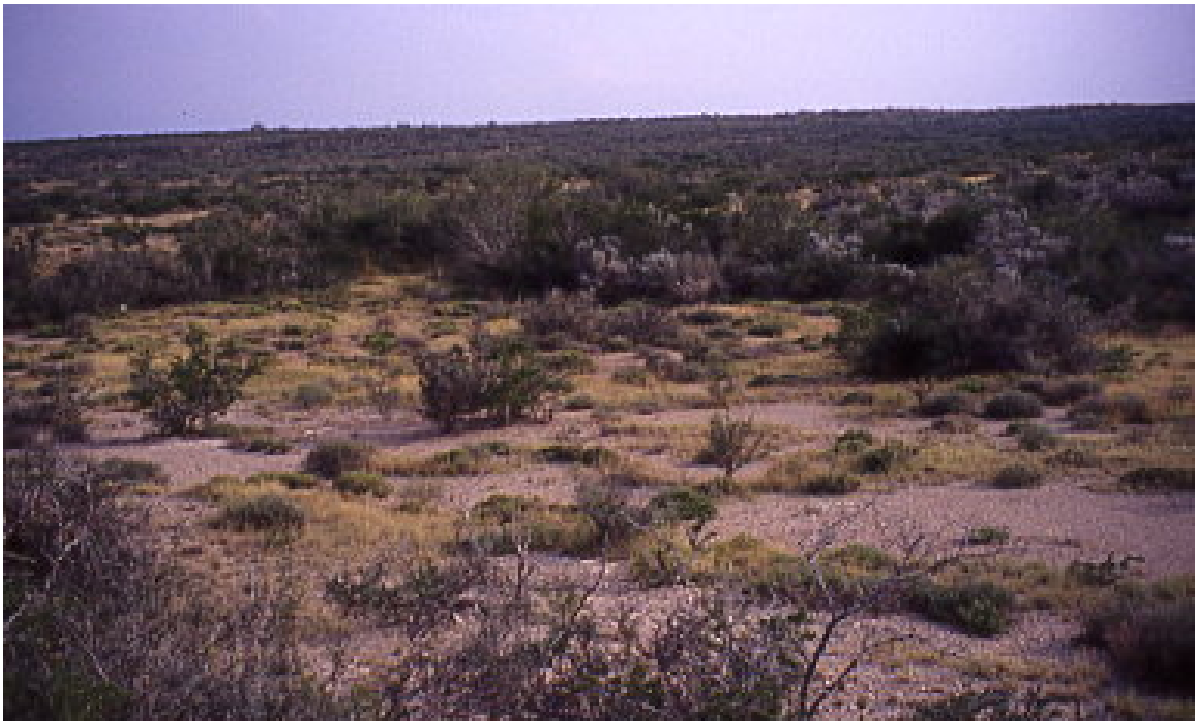

Photo-point: S26-150º-2002 **USFWS, Chapeno Tract**

Photo-point: S26-Telephoto-150º-2002 **USFWS, Chapeno Tract**

Photo-point: S26-260º-2000 **USFWS, Chapeno Tract**

Photo-point: S26-260º-2001 **USFWS, Chapeno Tract**

Photo-point: S26-260º-2002 **USFWS, Chapeno Tract**

Photo-point: S26-Telephoto-150º-2002 **USFWS, Chapeno Tract**

Photo-point: S27-230º-2000 ***Resendez Ranch, El Sauz***

Photo-point: S27-230º-2001 ***Resendez Ranch, El Sauz***

Photo-point: S27-230º-2002 ***Resendez Ranch, El Sauz***

Photo-point: S27-Telephoto-230º-2001 ***Resendez Ranch, El Sauz***

Photo-point: S27-280º-2000 ***Resendez Ranch, El Sauz***

Photo-point: S27-280º-2001 ***Resendez Ranch, El Sauz***

Photo-point: S27-280º-2002 ***Resendez Ranch, El Sauz***

Photo-point: S27-Telephoto-230º-2001 ***Resendez Ranch, El Sauz***