

**Ecological Assessment of the Low Level
Waste Depository, Andrews County, Texas**

Final Report

May 1997

From: Ecology Group

Compiled and Edited by I.M. Ortega, Ph.D. F.C. Bryant, Ph.D.,
R.D. Pettit, Ph.D., and K. Rylander, Ph.D.

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PREFACE

This environmental and ecological survey was conducted at the request of Waste Control Specialists (WCS). Our group was asked to provide an unbiased assessment of the native flora and fauna immediately surrounding the core area. While our mammal, insect, reptile, amphibian surveys were restricted to within 1 mile of the core area, bird surveys extended out much further from this core area.

Because our task was only to provide data on flora and fauna, we do not endorse or reject the WCS disposal project based on our findings. We only provide the information for others to use in the future.

Fred C. Bryant

Fred C. Bryant, Ph.D.
May 15, 1997

The research was conducted between May 2, 1996 to May 1, 1997. A general survey of the area was conducted in May 1996 to determine what needed to be done in order to prepare a research proposal for WCS. Drs. Bryant, Pettit, Rylander and Ortega participated in this first trip to the WCS Ranch, in which plant specimens were collected, birds were censused, and small mammals were trapped.

Dr. Rylander conducted bird censuses on May, July, September, October 1996, and April 1997. The need for this number of censuses was to determine the migrant and resident birds in the area. No birds were captured, only observed and counted.

Dr. Ortega was in charge of the mammal survey. A preliminary small mammal collection was done in May 1996 (only 40 trap nights). Three complete trapping of small mammal was carried out on August and December 1996, and April 1997 (total of 4,870 trap nights).

Reptiles and amphibians were observed by Dr. Rylander and any other researcher while in the area. No collections were conducted on these animals.

Since many insects, especially ants, were observed in the area we decided to do an insect collection. This was carried out by Ms. Camille Landry, entomologist, in August and September 1996.

Drs. Bryant, Pettit, Ortega, and Mr. Lloyd conducted a series of plant collections and recorded data for describing vegetation communities. These surveys were done in May, August, September 1996, and March and April-May 1997.

SOILS

This information is based in the “Soil Survey of Andrews County, Texas” by the Soil Conservation Service (1974). The most common soils in the county are sandy, but the soils are loamy and clayey in some areas. Andrews county has a cool-temperature, dry steppe climate and mild winters. Average yearly rainfall is 13.39 inches.

The WCS Ranch sites have the following soil associations: Blakeney and Conger (BCB), Ratliff soils (RAB), Faskin and Douro (FDB), Kimbrough (KMB), Jalmar-Penwell association (JPC), and the Triomas and Wickett (TWB). A brief description of these soils associations is provided.

Blakeney and Conger association: This association consists of nearly level to gently undulating soils that are mostly on uplands. The surface layer of Blakeney soils is brown fine sandy loam about seven inches thick. The next layer is about 11 inches of brown sandy loam and is underlain by a layer of white, strongly cemented caliche.

Conger soils are less sloping and are in areas slightly below Blakeney soils. The surface layer is grayish-brown loam about six inches thick. The next layer is pale-brown clay loam about 11 inches thick. It is underlain by a layer of white caliche plates that are strongly to weakly cemented.

This association is tied to rangelands rather than farmlands. The hazard of soil blowing is moderate.

Ratliff association: This association consists of nearly level to gently undulating soils that are mostly on uplands. Ratliff soils have a grayish-brown loam surface layer about 10 inches thick. The next layer is about 15 inches of light-brown clay loam, 42 inches of clay loam that is pink in the upper part and reddish yellow in the lower part, and 13 inches of pinkish-gray clay loam.

Faskin and Douro association: This association consists of nearly level to gently undulating soils on uplands. It occupies broad areas throughout the county. Faskin soils have a surface layer of brown fine sandy loam about 8 inches thick. The next layer is sandy clay loam to

a depth of 80 inches. It is reddish brown in the upper part, yellowish red and red in the middle part, and reddish yellow in the lower part.

Douro soils have a surface layer of reddish-brown fine sandy loam about 9 inches thick. The next layer is about 21 inches of sandy clay loam that is reddish brown in the upper part and red in the lower part. It is underlain by a layer of indurated caliche.

Most of this association is found on rangelands. A few areas are cultivated to cotton and grain sorghum. The erosion hazard of soil is moderate.

Jalmar-Penwell association: This association consists of nearly level to undulating soils on uplands. Jalmar soils are nearly level to gently undulating and occupy uplands. The surface layer is fine sand about 26 inches thick. It is brown in the upper part and reddish brown in the lower part. The next layer is red sandy clay loam in the upper 38 inches. Below this, to a depth of 80 inches, it is reddish-yellow sandy clay loam.

Penwell soils generally are undulating. The surface layer is pale-brown fine sand about 13 inches thick. The underlying material is fine sand that is very pale brown in the upper part and reddish yellow in the lower part. It extends to a depth of about 85 inches.

Most of this association is found on rangelands. There is a severe hazard of soil blowing.

Triomas and Wickett association: these soils are on uplands. Triomas soils make up about 78 % of the total acreage, and Wickett soils, about 16%. Soils of this undifferentiated unit do not occur together in regular patterns but it is not feasible to separate them in mapping because their use and management are similar.

The hazard of soil blowing is severe on these soils. Most acreage is with rangelands. These soils are not suited for dry farming but are suited to irrigated farming.

FLORA

A list of plant species found on the study site was developed from several visits to the area. Plant specimens were collected, mounted and will be transferred to WCS. Synecologists have many tools available to quantify vegetation attributes. Density or number of plants in a specific area, is a good indicator of a species importance in a plant community. However, actual counts of each plant are often labor intensive and tedious.

Numerical scales can be used with a high degree of accuracy to assess a species importance. A value is subjectively assigned to all species in the community by layer. For example, at the WCS ranch sites we found only a shrub and a herb layer. The dominant shrub would be assigned a high score, i.e. a 5. A rare or hard to find shrub would receive a 1 rating. If two shrubs appeared to be somewhat equally important, both would get a 4 rating. The same rating system is then used on the herb layer. This technique was used in the month of September 1996.

A different technique was used the Spring 1997 to obtain species cover. Plant species composition of the different vegetation communities was determined by the toe-point method at 10 meter stops along a 3-100m transects. A total of 1500 "stops" were recorded, 300 in each site. Since the area had a high percentage of bare ground (over 62% in any of the sites), the nearest plant species to the point was recorded to be able to describe the vegetation of each site.

Five sites were surveyed at the WCS Ranch (Figure 1). These sites were characterized based upon the unique vegetation found in each site.

DESCRIPTION OF THE SITES

SITE 1. This site was located just to the north of the core area (Figure 1). Most of its soils are from the Blakeney and Conger soil series (Figure 2). Only 6% of the basal area is covered with vegetation, another 6% is covered by litter and 88% is bare ground or rock covered areas (Figure 3). This site was characterized by the presence over 30 plant species, including scarlet globe mallow (*Sphaeralcea coccinea*), scarlet gaura (*Gaura coccinia*), mallow (*Sphaera*

angustifolia), grouncherry (Physalis viscosa), and primrose (Oenothera spp.). Among the 14 species of grasses, tumblegrass (Schedonnardus paniculatus), vine mesquite (Panicum obtusum), Halls panicum (Panicum hallii), and burrograss (Scleropogon brevialius) were dominants (see Table 1).

According to the late summer survey, the most important grasses were slim tridens (Tridens muticus) and black grama (Bouteloua eriopoda), both with an abundance rating of 4 (Table 2). Among the forbs primrose, bladderpod (Lesquerella gordonii), verbena (Verbena spp.), and scarlet globe mallow were the most dominant, with a rating of 3. Mesquite (Prosopis glandulosa) was the dominant shrub with a rating of 5 (Table 2).

This site had a high percentage of grasses (83%) compared to forbs (16%) and shrubs (Figure 4, Table 3). Among the forbs, bladderpod (14%) was the predominant species. Black grama had the highest frequency (38%) along with slim tridens (31%)(Figure 5, Table 4).

SITE 2. This site was located in the west of the core area (Figure 1). Most of its soils are from the Blakeney and Conger soil series, however there is also some of the Ratliff, and Kimbrough soil series (Figure 2). Only one attempt was made to survey the New Mexico side, however it was decided to study only the Texas area. This area was the most modified since the road was built in the middle of it on the west fence of its boundary (Figure 1). This area had a basal cover of 9%, with a litter cover of 21% (Figure 3). It was characterized by 29 forb species, including among the dominants, Indian blanket (Gallardia pinnatifida), wooly loco (Astragalus mollisimus), primrose (Oenothera spp.), and germander (Teucrium lacinatum). There were 6 grass species, including mesa dropseed (Sporobolus flexuosa), slim tridens, and buffalograss (Buchloe dactyloides) (Table 1).

During the summer 1996, Portulaca spp. was a dominant forb receiving an abundance rating of 3 (Table 2). Among the grasses, black grama was the most dominant with a rating of 5, followed by sand dropseed (Sporobolus crytandrus). Mesquite was the most abundant shrub species with a rating of 5 (Table 2).

Once again the grasses had the highest frequency (79%), and we found more shrubs in this area (5%) compared to Site 1 (Figure 4, Table 3). The forb with highest frequency was blackfoot (Melamposium leucanthum)(8%). Black grama (38%) had the highest frequency among the grasses along with sand dropseed (16%)(Figure 5, Table 4).

SITE 3. Twenty-one forbs were located at this site located south of the core area. Most of its soils are from the Ratliff series (Figure 2). Larkspur (Delphinium spp.), spiny daisy (Machaeranthera pinnatifida), and baby white aster (Leucelene gordonii) were important forbs at this site. The main shrub was mesquite. This area was dominated by black grama and sand dropseed out of 8 grass species present.

During the summer 1996, only one forb had a high abundance rating, Verbena spp. (abundance rating of 5; Table 2). Mesquite also had an abundance rating of 5. At this site several grasses had a high abundance rating, including black grama (5), purple three-awn (4), hooded windmillgrass (3), and sand dropseed (Sporobolus cryptandrus) (3) (Table 2).

In the spring of 1997, we determined that the basal cover shrubs (7%) was higher than on sites 1 and 2, but the cover of grasses was still similar (80%) (Figure 4, Table 3). The forbs with highest frequency was blackfoot (7%) (Table 4), while the grasses with highest frequency were black grama (25%), purple three-awn (20%), and hooded windmillgrass (18%) (Figure 5, Table 4).

SITE 4. This site was located to the east of the core area. Most of its soils are from the Blakeney and Conger soil series (Figure 2). In our May 1996 survey we determined that this site was dominated by buffalograss (Buchloe dactyloides) and that there were only six forb species, including two Chenopodium spp. and some Euphorbia spp.

In the summer 1996, three forbs received high abundance rating, Portulaca spp. (5), Aphanostephus spp. (3), and Verbena spp. (3). Among the grasses, black grama (4) and blue grama (Bouteloua gracilis)(4) had the highest abundance rating, followed by purple three-awn, hooded windmillgrass, and sand dropseed, all of them with a rating of 3 (Table 2).

In May 1997, grasses had the highest basal cover of all sites (92%)(Table 3). Slim tridens (23%) had the highest frequency, followed by blue grama (20%), sand dropseed (18%), and hairy grama (Bouteloua hirsuta)(14%) (Figure 5, Table 4).

SITE 5. Site 5 was located in the sandy area north of the core area. Most of its soils are from the and Jalmar-Penwell association and the Triomas and Wickett soil series (Figure 2). The most dominant species was the shrub, sand shin oak (Quercus havardii). Among the 20 forb species, woollywhite (Hymenopappus flavencens), western ragweed (Ambrosia psilostachya), groundsel (Senecio longilobus), and perennial broomweed (Gutierrezia sarothrac) were the dominants. Many grass species were present (13 species). Hooded windmillgrass (Chloris cucullata), red lovegrass (Eragrostis oxypelis), mesa dropseed (Sporobolus flexuosa), and purple-three-awn (Aristida purpurea) were dominants.

By the summer 1996, eleven forbs species had a high abundance rating (3) (Table 2). Sand shin oak was the shrub with highest abundance rating (5)(Table 2). Sand dropseed (4) had the highest abundance among the grasses, followed by seven other species (Table 2).

In the May, 1997 survey, we determined that 35% of the basal cover of the site was by shrubs, and had the lowest of any of the sites for grasses (58%) (Table 3). Sand shin oak had a frequency of 32%, followed by Yucca spp. (3%) (Table 4). Among the grasses, fall witchgrass (Leptoloma cognatum) had the highest frequency (28%)(Table 4).

DIVERSITY OF THE SITES

This analysis was done using May 1997 data. Site 5 had the highest species richness with 21 species, followed by sites 1, 3, 2, and 4 (Table 5). The Shannon's diversity index (H') indicated that the lowest diversity was found in site 2 ($H'=1.629$), and the highest diversity was on site 1 ($H'=2.180$) (Table 5). However, when a comparison was made between the sites, we determined that site 2 diversity was significantly different ($P=0.001$) from any other site, while the other sites (1, 3, 4, and 5) were statistically similar in diversity among each other (Table 6).

FAUNA

INSECTS

Orders or Families observed or trapped during present study are presented in Tables 7 and 8. Two Orders and 11 Families were trapped by using pit traps and sweepnetting in August and September of 1996. The only insects that may be of concern are ants because their capabilities of boring or caving the soil profile.

REPTILES

Species observed during present study in bold-faced type

FAMILY CHELYDRIDAE: **Snapping Turtles**

Common Snapping Turtle *Chelydra serpentina serpentina*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. Records for this species in West Texas are widely scattered. It is unlikely that suitable habitat (permanent water) for this species occurs in Andrews County, with the possible exception of the Sewage Disposal Lake in Andrews.

FAMILY KINOSTERNIDAE: **Musk and Mud Turtles**

Yellow Mud Turtle *Kinosternon flavescens*. Andrews County lies within the published range of this species, which has been collected in the county. Possibly this species occurs from time to time in larger rains pools on the WCS Ranch, as well as near the Sewage Disposal Lake in Andrews.

FAMILY EMYDIDAE: **Box and Water Turtles**

River Cooter *Pseudemys concinna*. Andrews County lies one county north of the published range of this species, which has been reported from counties adjacent to the Pecos River and Rio Grande. The occurrence of this species on the WCS Ranch is improbable.

Ornate Box Turtle *Terrepenne ornata*. Andrews County lies within the published range of this species. One observed May 4, 1996 in pasture north of the Core Area. There are previous records of this species from Andrews County.

Red-eared Slider *Trachemys scripta elegans*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. It can from time to time be seen in temporary stock tanks.

FAMILY TRIONYCHIDAE: Softshell Turtles

Texas Spiny Softshell *Trionyx spiniferus*. Andrews County lies one county southwest of the published range of this species, which has been reported from Dawson County. Softshells are typically river turtles, and the occurrence of this species in Andrews County would not be expected.

FAMILY GEKKONIDAE (EUBLEPHARIDAE): Geckos

Texas Banded Gecko *Coleonyx brevis*. Andrews County lies one county north of the published range of this species, which prefers rocky areas, such as canyons. Of possible but not probable occurrence in Andrews County.

FAMILY CROTAPHYTIDAE (IGUANIDAE in part): Collared and Leopard Lizards.

Eastern Collared Lizard *Crotaphytacollaris collaris*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. Eastern Collared Lizards are seen infrequently on the plains, as they prefer rocky and hilly areas .

FAMILY PHRYNOSOMATIDAE (IGUANIDAE in part): **Earless, Tree, Side-blotched and Horned Lizards**

Greater Earless Lizard *Cophosaurus texanus*. Andrews County lies one county to the north and one county to the west of the published range of this species, which prefers streambeds, rocky areas and limestone outcroppings, habitats rarely found in Andrews County.

Plateau Earless Lizard *Holbrookialaceratalacerata*. Andrews County lies one county to the north of the published range of this species. This subspecies is found mostly in arid, mesquite-prickly pear associations.

Northern Earless Lizard *Holbrookia maculata maculata*. Andrews County lies within the published range of this species, which has been collected in the county. This species could be expected in sandy areas, grasslands, cultivated fields, etc.

Texas Horned Lizard *Phrynosoma cornutum*. Andrews County lies within the published range of this species, and specimens have been reported from the county. An immature was observed north of core area May 4 and another immature along Transect 3 September 1. This species is widespread in Texas and has been reported from all but a few East Texas counties. Its numbers are diminishing in many parts of the state, but it is frequently encountered in suitable habitat in much of West Texas. Because it probably occurs throughout the extensive grasslands that characterize many parts of West Texas, it is unlikely that relatively small, local disturbances in this habitat will significantly affect its numbers. It is listed as a Threatened Species by Texas Parks and Wildlife.

Roundtail Horned Lizard *Phrynosoma modestum*. Andrews County lies within the published range of this species, which could be expected in arid flats, washes, etc. This species has been collected in Andrews County.

Dune Sagebrush Lizard *Sceloporus graciosus arenicolus*. Andrews County lies within the published range of this species, which could be expected in sand dunes and sandy areas, habitats that are not frequent on the WCS Ranch. This species has been collected in Andrews County.

Merriam's Canyon Lizard *Sceloporus merriami merriami*. Reported from adjacent (to the south) Winkler County. Possible but not likely to occur in Andrews County as it prefers rocky canyons, boulders, etc.

Southern Prairie Lizard *Sceloporus undulatus consobrinus*. Andrews County lies within the published range of this species, which could be expected in grasslands, open areas, etc. This species has been collected in Andrews County.

Eastern Tree Lizard *Urosaurus ornatus schmidti*. Reported from adjacent (to the south) Winkler. Possible in Andrews County, where it might be encountered on rocks, in trees, etc.

Desert Side-blotched Lizard *Uta stansburiana stejnegeri*. Andrews County lies within the published range of this species, which was observed along roads within the WCS Ranch. Numerous immature specimens were observed on the ranch September 1, adjacent to the road at the west entrance. This species has been collected in Andrews County.

FAMILY SCINCIDAE: **Skinks**

Great Plains Skink *Eumeces obsoletus*. Andrews County lies within the published range of this species, which could be expected in grasslands that has fine soil for burrowing. This species has been collected in Andrews County.

FAMILY TEIIDAE: **Whiptails**

Texas Spotted Whiptail *Cnemidophorus gularis gularis*. Andrews County lies within the published range of this common Texas species, which was seen in grassy areas and near roads throughout most of the WCS Ranch. This species has been collected in Andrews County.

Trans-Pecos Striped Whiptail *Cnemidophorus inornatus heptagrammus*. One specimen observed on dirt road near Disposal Pit. This species was not listed for Andrews County by Dixon (1987), who reported it for Winkler and Ector Counties (which are adjacent to Andrews County to the South). This species has been collected in Andrews County.

Prairie Racerunner (Prairie-lined Racerunner) *Cnemidophorus sexlineatus viridis*. Andrews County lies within the published range of this species, which could be expected in a variety of habitats. This species has been collected in Andrews County.

(Colorado) Checkered Whiptail *Cnemidophorus tesselatus* This species was not listed for Andrews County by Dixon (1987), who reported it for Winkler and Ector Counties (which are adjacent to Andrews County to the South).

Marbled Whiptail *Cnemidophorus marmoratus*. Andrews County lies within the published range of this species, but as it seems to prefer sand and desert habitats. Although Marbled Whiptails

have been collected in Andrews County, their occurrence on the WCS Ranch grasslands would not be expected.

FAMILY LEPTOTYPHLOPIDAE: **Blind Snakes**

New Mexico Blind Snake *Leptotyphlops dulcis dulcis*. Andrews County lies within the published range of this species, which could be expected in moist areas. This species has been collected in Andrews County.

FAMILY COLUBRIDAE: **Colubrids**

Kansas Glossy Snake *Arizona elegans elegans*. Andrews County lies within the published range of this species, which could be expected in sandy habitats. This species has been collected in Andrews County.

Regal Ringneck Snake *Diadophis punctatus regalis*. Andrews County lies within the published range of this species, but this species prefers more moist habitats than the county generally provides. There are no county records for the species.

Great Plains Rat Snake *Elaphe guttata emoryi*. Andrews County lies within the published range of this species, although there are no published records for the county. It prefers rocky canyons to flat grasslands, so encountering it in Andrews County would not be expected (although it has been reported from adjacent Dawson County).

Dusky Hognose Snake *Heterodon nasicus gloydi*. Andrews County lies within the published range of this species, which could be expected in dry, sandy grasslands. This species has been collected in Andrews County.

Texas Night Snake *Hypsiglena torquata jani*. Andrews County lies within the published range of this species, which could be expected in rocky or sandy habitats. This species has been collected in Andrews County.

Desert King Snake *Lampropeltis getulus splendida*. Andrews County lies within the published range of this species, which could be expected near streams and hence not so likely on the WCS Ranch. This species has been collected in Andrews County.

New Mexico Milk Snake *Lampropeltis triangulum celaenops*. Andrews County lies within the published range of this species. This species has been collected in Andrews County.

Western Coachwhip *Masticophis flagellum*. One seen on road by west entrance to WCS Ranch. Andrews County lies within the published range of this species, which could be expected in grassland habitats on the WCS Ranch. This species has been collected in Andrews County.

Bull Snake *Pituophis melanoleucus saya*. Andrews County lies within the published range of this species, which could be expected throughout most of the WCS Ranch. This species has been collected in Andrews County.

Texas Longnose Snake *Rhinocheilus lecontei tessellatus*. Andrews County lies within the published range of this species, which could be expected in dry, grassy habitats. This species has been collected in Andrews County.

Ground Snake *Sonora semiannulata semiannulata*. Andrews County lies within the published range of this species, which possibly could be found beneath rocks and debris in open areas. It has not been reported from the county.

Plains Blackhead Snake *Tantilla nigiceps nigriceps*. Andrews County lies within the published range of this species, which may be located by turning over rocks and debris. This species has been collected in Andrews County.

Checkered Garter Snake *Thamnophis marcianus marcianus*. Andrews County lies within the published range of this species, but as it tends to stay near water (such as streams, irrigation ditches, etc.), its occurrence on the WCS Ranch would be somewhat unexpected. This species has been collected in Andrews County.

Arid Land Ribbon Snake *Thamnophis proximus diabolicus*. [subspecies of Western Ribbon Snake] Andrews County lies within the published range of this species, although there are no records for the county. It may be possible to find this species in Andrews County around permanent and semi-permanent bodies of water such as larger stock tanks. It has a disjunct distribution in West Texas.

FAMILY VIPERIDAE: **Vipers**

Western Diamondback Rattlesnake. *Crotalus atrox*.

Prairie Rattlesnake. *Crotalus viridis viridis*.

Andrews County lies within the published range of both of these species, although only the Western Diamondback Rattlesnake has been collected in the county. On the other hand, Prairie Rattlesnakes have been collected in several adjacent counties, and it is likely that this species has been among the specimens observed by WCS. Many casual observers do not distinguish

between these closely related species, as their distinguishing characteristics can be easily overlooked unless viewed closely. Both species occur in broken, rocky habitats as well as open grassland areas, but the Prairie Rattlesnake generally prefers the latter.

Desert Massasauga *Sistrurus catenatus edwardsi*. Andrews County lies within the published range of this species; however, since the preferred habitat of this relatively small rattlesnake is wet prairies, its occurrence on the WCS Ranch would not be expected. This species has been collected in Andrews County.

AMPHIBIANS

Species observed during present study in bold-faced type

FAMILY AMBYSTOMATIDAE: **Mole Salamanders**

Tiger Salamander *Ambystoma tigrinum mavortium*. Andrews County lies within the published range of this species, which has been reported for the county and could be found in stock tanks, playa lakes, etc.

FAMILY PELOBATIDAE: **Spadefoots**

Plains Spadefoot *Scaphiopus bombifrons*. Andrews County lies within the published range of this species, which has been reported for the county and could be found in stock tanks, playa lakes, etc.

Couch's Spadefoot *Scaphiopus couchi*. Andrews County lies within the published range of this species, which has been reported for the county and could be found in stock tanks, playa lakes, etc.

New Mexico Spadefoot *Scaphiopus multiplicatus* (= *S. hammondi*) Numerous young in buffalo wallow between Sites 4 and 5 on July 28. However, on September 1 no specimens were observed when the site was visited, even though considerable water remained. Possibly the numbers were reduced by predation. Andrews County lies within the published range of this species, although this record is the first report of this species for the county. It has been recorded from Ector County, which borders Andrews County on the south.

FAMILY HYLIDAE: Treefrogs, Cricket Frogs, etc.

Blanchard's Cricket Frog *Acris crepitans crepitans*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. This species has been recorded from adjacent Dawson County.

Spotted Chorus Frog *Pseudacris clarki*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county.

FAMILY BUFONIDAE: Toads

Great Plains Toad *Bufo cognatus*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. Its preferred habitat is open water in grasslands, such as irrigation ditches and streams.

Western Green Toad *Bufo debilis insidiosus*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. It might be encountered in most habitats on the WCS Ranch after heavy rains.

Red-spotted Toad *Bufo punctatus*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. Found in grasslands as well as rocky regions and possibly occurs on the WCS Ranch.

Texas Toad *Bufo speciosus*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. Most frequently encountered in sandy grasslands.

Woodhouse's Toad *Bufo woodhousei*. Andrews County lies one county to the north, and three counties to the south, of the published range of this species. The curious gap in the distribution of this species (between *B. w. woodhousei* to the north and east and *B. w. australis* to the south and west) is of interest ecologically. Although this species is found in a variety of habitats, it usually prefers areas that have more permanent water than is found on the WCS Ranch.

FAMILY RANIDAE: True Frogs

Rio Grande Leopard Frog *Rana berlandieri*. Andrews County lies one county north of the published range of this species.

Plains Leopard Frog *Rana blairi*. Andrews County lies within the published range of this species. Characteristically found on plains and prairies and to be expected in the county after rains. This species has been collected in Andrews County.

Bullfrog *Rana catesbiana*. Although this species has been recorded in adjacent Dawson County, it is infrequently found in West Texas and would be considered rare in Andrews County. It prefers larger bodies of water than are found in this county.

FAMILY MICROHYLIDAE: Narrowmouth Toads

Great Plains Narrowmouth Toad *Gastrophryne olivacea*. Andrews County lies within the published range of this species, although to date there are no published records of this species for the county. Careful search could reveal the presence of this species in almost any of the habitats on the WCS Ranch.

BIRDS

Species observed in Andrews County in bold-faced type

FAMILY GAVIIDAE: Loons

Common Loon *Gavia immer*. Andrews Uncommon migrant and winter resident in this part of Texas. Because it typically inhabits deep and large lakes in the region, it is unlikely to be seen in Andrews County.

FAMILY PODICIPEDIDAE: Grebes

Pied-billed Grebe *Podilymbus podiceps*. Common migrant and winter resident, and less frequent summer resident, in West Texas. Several were observed in October and in April at the Sewage Disposal Lake in Andrews. This grebe would be expected occasionally on the WCS Lake.

Horned Grebe *Podiceps auritus*. An uncommon migrant and winter resident in West Texas. This species might be seen occasionally on the few permanent lakes in Andrews County.

Eared Grebe *Podilymbus nigricollis*. A fairly common migrant and winter resident in West Texas. Several were observed in October and in April in the Sewage Disposal Lake in Andrews. This species would be expected occasionally on the WCS Lake.

Western Grebe *Aechmophus occidentalis*. Although Andrews County lies within the published range of this rare (in West Texas) migratory species and winter resident, Western Grebes typically inhabit larger lakes than are found in Andrews County.

Clark's Grebe *Aechmorphus clarkii*, was recently separated as a different species from the Western Grebe. It has been reported from Midland, Tom Green and Hudspeth County in West Texas, but "many accounts of 'Western Grebe' prior to the separation of the two species have insufficient detail to discern the specific identity" (TOS, 1995, p. 13). As in the case of the Western Grebe, its occurrence in Andrews County would be considered unusual.

FAMILY PELECANIDAE: **Pelicans**

American White Pelican *Pelecanus erythrorhynchos*. An uncommon migrant and rare winter resident in West Texas, occasionally on lakes or flying overhead. Its occurrence in Andrews County would be considered unusual.

FAMILY PHALACROCORACIDAE: **Cormorants**

Double-crested Cormorant *Phalacrocorax auritus*. Uncommon migrant in West Texas, possibly occurring irregularly on the few permanent bodies of water in Andrews County. There are breeding records for Midland and Hudspeth Counties.

FAMILY ARDEIDAE: **Hérons, Egrets and Bitterns**

American Bittern *Botaurus lentiginosus*. Rare migrant in West Texas, whose occurrence in Andrews County would be unusual.

Great Blue Heron *Ardea herodias*. A fairly common resident in West Texas and observed in December near the Sewage Disposal Lake in Andrews. This species would be expected on an irregular basis on any stock tank in Andrews County.

Great Egret *Casmerodius albus*. Even though this species has been reported from (and even nested in) isolated localities in West Texas, it is typically found in areas having considerable surface water, so its occurrence in Andrews County would be considered unusual.

Snowy Egret *Egretta thula*. Even though this species has been reported from (and even nested in) isolated localities in West Texas, it is typically found in areas having considerable surface water, so its occurrence in Andrews County would be considered unusual.

Little Blue Heron *Egretta coerulea*. Even though this species has been reported from (and even nested in) isolated localities in West Texas, it is typically found in areas having considerable surface water, so its occurrence in Andrews County would be considered unusual.

Cattle Egret *Bubulcus ibis*. Even though this species has been observed as a post-breeding visitor to isolated localities in West Texas (and even bred locally in Howard, Lubbock, Midland and Parmer Counties), it prefers savanna and grassland habitats, especially in East Texas. Its occurrence in Andrews County, while unlikely, would certainly be possible. Cattle Egrets, which are native to Africa, appeared in South America near the turn of the century, and spread to Texas in 1955. They are common in East and Coastal Texas.

Green Heron *Butorides virescens*. [Green-backed Heron *Burorides striatus*.] Uncommon resident in West Texas, but its occurrence in Andrews County, especially near water bordered by vegetation, would be expected. One individual observed in the marshy areas around the Sewage Disposal Lake in April.

Black-crowned Night Heron *Nycticorax nycticorax*. Uncommon resident in West Texas, where it has bred locally. Five adults were seen in April in the marshy areas around the Sewage Disposal Lake, suggesting that they may breed near the lake.

Yellow-crowned Night Heron *Nyctanassa violacea*. Uncommon resident in West Texas, where it has bred locally. Possibly occurs in Andrews County.

FAMILY THRESKIORNITHIDAE: Ibises and Spoonbills

White-faced Ibis *Plegadis chihi*. Rare summer resident and uncommon migrant in West Texas, where it has bred locally in Crosby, Hale and Midland Counties. Possibly occurs in Andrews County, especially during migration when it could be seen flying overhead in small flocks.

FAMILY ANATIDAE: Swans, Geese and Ducks

Tundra Swan *Cygnus columbianus*. Irregular, rare visitor in West Texas, possibly occurring very rarely in Andrews County.

Greater White-fronted Goose *Anser albifrons*. Uncommon migrant in West Texas, possibly occurring rarely in Andrews County.

Snow Goose *Chen caerulescens*. Uncommon migrant in this part of West Texas, possibly occurring rarely in Andrews County.

Ross's *Chen rossii*. Rare migrant and winter resident in West Texas, possibly occurring very rarely in Andrews County.

Canada Goose *Branta canadensis*. Common to abundant migrant and winter resident in West Texas, probably of regular occurrence in Andrews County around the few permanent lakes in the county, and in cultivated fields.

Wood Duck *Aix sponsa*. Rare and irregular winter resident in West Texas, expected only rarely in Andrews County.

Mallard *Anas platyrhynchos*. Common migrant and winter resident in West Texas. One was observed in October in the Sewage Disposal Lake in Andrews, and it would be expected occasionally on the WCS Lake. Although this species breeds in scattered areas in the Panhandle and South Plains, Andrews County is probably too far south and west for breeding to occur.

Northern Pintail *Anas acuta*. Common migrant and winter resident in West Texas, probably occurring in Andrews County around the few permanent lakes in the county. Several observed on the Sewage Disposal Lake in Andrews in April.

Blue-winged Teal *Anas discors*. Common migrant in West Texas, probably occurring in Andrews County on temporary and permanent ponds and stock tanks. Several observed on the Sewage Disposal Lake in Andrews in April.

Cinnamon Teal *Anas cyanoptera*. Common migrant in West Texas and to be expected in Andrews County on temporary and permanent ponds and stock tanks. Several observed on the Sewage Disposal Lake in Andrews in April.

Northern Shoveler *Anas clypeata*. Common migrant and winter resident in West Texas. Several were observed in October in the Sewage Disposal Lake in Andrews; and several hundred in April on the same lake. This species would be expected occasionally on temporary and permanent ponds and stock tanks in the county, including the WCS Lake.

Gadwall *Anas strepera*. Common migrant and winter resident in West Texas. Several were observed in October (and April) in the Sewage Disposal Lake in Andrews, and it would be expected occasionally on temporary and permanent ponds and stock tanks in the county, including the WCS Lake.

Eurasian Wigeon *Anas crecca*. Occasional sight records of this European species exist in West Texas, but be expected very rarely in Andrews County.

American Wigeon *Anas americana*. Common migrant and winter resident in West Texas and to be expected in Andrews County on temporary and permanent ponds and stock tanks. Several observed on the Sewage Disposal Lake in Andrews in April.

Canvasback *Aythya valisineria*. Uncommon migrant and winter resident in West Texas and to be expected occasionally in Andrews County on temporary and permanent ponds and stock tanks. Several observed on the Sewage Disposal Lake in Andrews in April.

Redhead *Aythya americana*. Uncommon migrant and winter resident in West Texas and to be expected occasionally in Andrews County on temporary and permanent ponds and stock tanks. Several observed on the Sewage Disposal Lake in Andrews in April.

Ring-necked Duck *Aythya collaris*. Uncommon migrant and winter resident in West Texas and to be expected occasionally in Andrews County on temporary and permanent ponds and stock tanks. A pair observed on the Sewage Disposal Lake in Andrews in April.

Greater Scaup *Aythya marila*. Uncommon to rare migrant in West Texas and to be expected on rare occasions in Andrews County, most likely on the Sewage Disposal Lake in Andrews.

Lesser Scaup *Aythya affinis*. Common migrant and winter resident in West Texas and to be expected occasionally in Andrews County, probably on the Sewage Disposal Lake in Andrews. Several observed on the Sewage Disposal Lake in Andrews in April.

Oldsquaw *Clangula hyemalis*. Rare migrant and winter resident in West Texas and probably extremely rare in Andrews County, although there are scattered records for this part of the state.

Common Goldeneye *Bucephala clangula*. Uncommon migrant and winter resident in West Texas and to be expected only occasionally in Andrews County, most likely on the Sewage Disposal Lake in Andrews.

Bufflehead *Bucephala albeola*. Common migrant and winter resident in West Texas and to be expected in Andrews County in deeper bodies of water. Several observed on the Sewage Disposal Lake in Andrews in April.

Hooded Merganser *Lophodytes cucullatus*. Uncommon migrant and winter resident in West Texas and to be expected rarely in Andrews County. One individual observed on the Sewage Disposal Lake in Andrews in April.

Common Merganser *Mergus merganser*. Rare migrant and winter resident in West Texas and expected very rarely in Andrews County.

Red-breasted Merganser *Mergus serrator*. Rare migrant and winter resident in West Texas and expected very rarely in Andrews County.

Ruddy Duck *Oxyura jamaicensis*. Common migrant and winter resident in West Texas. Several were observed in October (and in April) in the Sewage Disposal Lake in Andrews. This species would be expected occasionally on temporary and permanent bodies of water in Andrews County, including the WCS Lake.

FAMILY CATHARTIDAE: **New World Vultures**

Black Vulture *Coragyps atratus*. Uncommon in summer in this part of Texas, but possible in Andrews County.

Turkey Vulture *Cathartes aura*. Common summer resident and to be expected throughout Andrews County. Possibly nests in the vicinity of the WCS Ranch (where several were seen flying overhead), although it prefers more broken terrain. Winter observations would be expected only occasionally, as this species typically withdraws southward during the colder months.

FAMILY ACCIPITRIDAE: **Hawks, Harriers and Eagles**

Osprey *Pandion haliaetus* Uncommon migrant in West Texas, but possibly could be seen around the Sewage Disposal Lake in Andrews.

Mississippi Kite *Ictinia mississippiensis*. Common summer resident in West Texas, probably nesting in Andrews County.

Bald Eagle *Haliaeetus leucocephalus*. Uncommon to rare migrant in this part of Texas, and would be expected in Andrews County on rare occasions.

Northern Harrier *Circus cyaneus*. Common winter resident in West Texas; several observed flying low over pastures on WCS Ranch, as well as around the Sewage Disposal Lake in Andrews.

Sharp-shinned Hawk *Accipiter striatus*. Fairly common winter resident in wooded and residential areas in West Texas. This species might occasionally be seen around the residence on the WCS Ranch, as well as in the town of Andrews.

Cooper's Hawk *Accipiter cooperi*. Uncommon migrant in West Texas, and where found, usually in wooded and residential. This species might occasionally be seen around the residence on the WCS Ranch, as well as in the town of Andrews, but less commonly (especially during migration) than the similarly plumaged Sharp-shinned Hawk.

Harris' Hawk *Parabuteo unicinctus*. Uncommon resident in this part of West Texas, but of possible occurrence in Andrews County.

Red-shouldered Hawk *Buteo lineatus*. Rare in this part of Texas; possible but not likely in Andrews County.

Broad-winged Hawk *Buteo platypterus*. Rare in this part of Texas; possible but not likely in Andrews County.

Swainson's Hawk *Buteo swainsonii*. Common summer resident in West Texas; several regularly observed on WCS Ranch, and one pair nested on the ranch in 1996 between the core area and the ranch house.

Red-tailed Hawk *Buteo jamaicensis*. Common resident in West Texas; several observed flying over WCS Ranch. This species possibly nested nearby.

Ferruginous Hawk *Buteo regalis*. Fairly common winter resident in West Texas and to be expected from time to time in Andrews County and flying over or near the WCS Ranch.

Rough-legged Hawk *Buteo lagopus*. Uncommon winter resident in West Texas; of possible occurrence in Andrews County.

Golden Eagle *Aquila chrysaetos*. Uncommon resident in West Texas in the more mountainous regions. In Andrews County this species is more likely to be seen in winter or during migration.

FAMILY FALCONIDAE: **Falcons and Caracaras**

American Kestrel *Falco sparverius*. Common winter resident in West Texas and undoubtedly common in most parts of Andrews County, possibly nesting. Observed regularly on WCS Ranch.

Merlin (Pigeon Hawk) *Falco columbarius*. Rare migrant in this part of West Texas and to be expected rarely in Andrews County.

Aplomado Falcon *Falco femoralis*. Although this species was formerly a summer resident in a number of West Texas counties, including Ector, Midland and Pecos Counties, it no longer occurs in the area.

Prairie Falcon *Falco mexicanus*. Nests rarely and locally in this part of West Texas, so expected rarely in Andrews County in summer. Migrants and winter visitors are more likely.

Peregrine Falcon (Duck Hawk) *Falco peregrinus*. An uncommon migrant that would be expected only occasionally in Andrews County. This species has been seen only occasionally even in Lubbock and surrounding counties, where numerous observers are on the alert for rare birds.

FAMILY PHASIANIDAE: Pheasants, Quails and Allies

Ring-necked Pheasant *Phasianus colchicus* An introduced game bird that typically nests farther north than Andrews County, although a small population exists in Reeves County (to the southwest). This species would be possible but unexpected in Andrews County.

Lesser Prairie Chicken *Tympanuchus pallidicinctus*. Andrews County lies at the very southern part of this species' range, where it possibly nests in its typical habitat: shortgrass prairie and shinnery oak. Local residents have reported the occurrence of this species in Andrews County.

Wild Turkey *Meleagris gallopavo*. Possibly occurs uncommonly in Andrews County in scattered areas. The range of this species is increasing in many parts of Texas because individuals are being released in new areas.

Northern Bobwhite *Colinus virginianus*. A common species in Andrews County; several individuals were seen on the WCS Ranch.

Scaled Quail *Callipepla squamata*. A common species in Andrews County; several individuals were seen on the WCS Ranch.

FAMILY RALLIDAE: Rails, Gallinules and Coots

Virginia Rail *Rallus virginianus*. An uncommon migrant in West Texas, and possibly occurring rarely in the marshy areas by the Sewage Disposal Lake in Andrews.

Sora *Porzana carolina*. An uncommon migrant in West Texas, and possibly occurring rarely in the marshy areas by the Sewage Disposal Lake in Andrews.

Common Moorhen *Gallinula chloropus*. An uncommon to rare migrant in West Texas, and possibly occurring rarely in the marshy areas by the Sewage Disposal Lake in Andrews. Although nesting has been reported for most of Texas, Andrews County probably lacks sufficient suitable habitat to support a nesting population.

American Coot *Fulica americana*. A common resident in most of West Texas, more common in winter. Several were observed in October (and in April) in the Sewage Disposal Lake in Andrews, and it would be expected occasionally on the WCS Lake, especially during migration. Possibly nests on the Sewage Disposal Lake in Andrews.

FAMILY GRUIDAE: Cranes

Sandhill Crane *Grus canadensis*. Common migrant and winter resident in West Texas, and to be expected in Andrews County on larger stock tanks, perhaps Whalen and Shafter Lakes, and in cultivated fields. Most likely would be seen flying overhead on the WCS Ranch.

FAMILY CHARADRIIDAE: **Plovers**

Black-bellied Plover *Pluvialis squatarola*. Uncommon migrant in West Texas, expected occasionally in Andrews County along muddy shores of permanent and temporary water.

Golden Plover *Pluvialis dominicus*. Rare migrant in West Texas, expected very rarely in Andrews County along muddy shores of permanent and temporary water.

Snowy Plover *Charadrius alexandrinus*. Rare migrant and summer resident in this part of West Texas, expected occasionally in Andrews County along muddy shores of permanent and temporary water.

Semipalmated Plover *Charadrius semipalmatus*. Rare migrant in this part of West Texas, expected occasionally in Andrews County along muddy shores of permanent and temporary water.

Killdeer *Charadrius vociferus*. Common resident in West Texas and Andrews County, found frequently near water and often away from water, such as in pastures and along highways. Heard once flying above WCS Ranch. This species possibly nests on the WCS Ranch or adjoining properties.

FAMILY RECURVIROSTRIDAE: **Stilts and Avocets**

Black-necked Stilt *Himantopus mexicanus*. Uncommon migrant and summer resident in this part of West Texas, expected occasionally in Andrews County wading in shallow water in temporary or permanent stock tanks. Several migrating individuals were observed on the Sewage Disposal Lake in Andrews in April.

American Avocet *Recurvirostra americana*. Common migrant and uncommon summer resident in this part of West Texas, expected in Andrews County wading in shallow water in temporary or permanent stock tanks. Several migrating individuals were observed on the Sewage Disposal Lake in Andrews in April.

FAMILY SCOLOPACIDAE: **Sandpipers and Allies**

Greater Yellowlegs *Tringa melanoleuca*. Common migrant, especially in fall, and uncommon winter resident West Texas. This species is to be expected in Andrews County wading in shallow water in temporary or permanent stock tanks.

Lesser Yellowlegs *Tringa flavipes*. Common migrant, especially in fall, and uncommon winter resident West Texas. This species is to be expected in Andrews County wading in shallow water in temporary or permanent stock tanks.

Solitary Sandpiper *Tringa solitaria*. Uncommon migrant in West Texas. This species may be found occasionally on the muddy shores of stock tanks in Andrews County.

Willet *Catoptrophorus semipalmatus*. Rare migrant in West Texas. This species may be found very rarely on the muddy shores of stock tanks in Andrews County.

Spotted Sandpiper *Tringa macularia*. Uncommon migrant in West Texas, and to be expected occasionally on lakes in Andrews County.

Upland Sandpiper *Bartramia longicauda*. Uncommon migrant in this part of West Texas, and probably occurring in Andrews County only rarely.

Long-billed Curlew *Numenius americanus*. Although this species breeds in the northwest Panhandle, it is usually reported from the South Plains as an uncommon migrant. It would be expected on lake shores and in wet pastures in Andrews County on very rare occasions.

Semipalmated Sandpiper *Calidris pusilla*. Uncommon to common migrant in this part of West Texas, especially in fall, and to be expected occasionally on the muddy shores of stock tanks in Andrews County.

Western Sandpiper *Calidris mauri*. Uncommon to common migrant in this part of West Texas, especially in fall, and to be expected occasionally on the muddy shores of stock tanks in Andrews County.

Least Sandpiper *Calidris minutilla*. Uncommon to common migrant in this part of West Texas, especially in fall, and to be expected occasionally on the muddy shores of stock tanks in Andrews County.

Baird's Sandpiper *Calidris bairdii*. Uncommon migrant in this part of West Texas, especially in fall, and to be expected occasionally on the muddy shores of stock tanks in Andrews County.

Pectoral Sandpiper *Calidris bairdii*. Uncommon migrant in this part of West Texas, and to be expected rarely on the muddy shores of stock tanks in Andrews County.

Dunlin *Calidris alpina*. Rare migrant in this part of West Texas, and to be expected very rarely on the muddy shores of stock tanks in Andrews County. There are rare winter records for Midland, Reeves and Pecos Counties.

Stilt Sandpiper *Calidris himantopus*. Uncommon migrant in this part of West Texas, and to be expected occasionally on the muddy shores of stock tanks in Andrews County.

Short-billed Dowitcher *Limnodromus griseus*. Rare migrant in most of West Texas, and to be expected very rarely on stock tanks in Andrews County, where it would feed in shallow water.

Long-billed Dowitcher *Limnodromus scolopaceus*. Uncommon migrant in West Texas, and to be expected occasionally on stock tanks in Andrews County, where it would feed in shallow water.

Common Snipe *Gallinago gallinago*. Uncommon migrant and winter resident in most of West Texas, probably occurring in vegetation around lakes in Andrews County, especially in the marshy areas around the Sewage Disposal Lake in Andrews.

Wilson's Phalarope *Phalaropus tricolor*. Common to abundant migrant in most of West Texas. Several migrating individuals were observed on the Sewage Disposal Lake in Andrews in April. There are winter records for Midland County.

FAMILY LARIDAE: Gulls, Terns and Allies

Franklin's Gull *Larus atricilla*. Common migrant in most of West Texas, and to be expected occasionally on lakes, following plows in fields, etc. in Andrews County. Not likely on the WCS Ranch.

Ring-billed Gull *Larus delewarensis*. Common migrant and winter resident in most of West Texas. This is the most likely gull to be seen in Andrews County, more likely in the town of Andrews, if at all, and not very likely on the WCS Ranch.

Herring Gull *Larus argentatus*. Uncommon migrant and winter resident in most of West Texas.

One immature was observed on the Sewage Disposal Lake in Andrews in April.

Forster's Tern *Sterna forsteri*. Uncommon migrant in West Texas, and probably very rare in Andrews County.

Black Tern *Chilidonias niger* Common migrant in most of West Texas, and to be expected near lakes in Andrews County. Might be seen occasionally flying over the WCS Ranch. Most of the records for the South Plains are from May through September, indicating a staggered migration, as this species does not nest in the area.

FAMILY COLUMBIDAE: Pigeons and Doves

Rock Dove *Columba livia*. This Old World species was domesticated and brought to the United States several centuries ago. Feral populations now exist around virtually all human habitations, including the WCS Ranch. It is common around the ranch house and the waste disposal buildings and pits.

White-winged Dove *Columba asiatica*. Although uncommon in this part of Texas, this species probably nests locally in Andrews County. During the past few decades the distribution of this species has been spreading in Texas.

Mourning Dove *Zenaidamacroura*. An abundant resident in Texas, commonly seen on the WCS Ranch, where nests were observed in July.

Inca Dove *Scardafella inca*. A common species in the area, most frequently found in urban areas and undoubtedly occurring in the town of Andrews.

Ground Dove *Columbina passerina*. A South Texas species found occasionally in this part of Texas; possibly occurs rarely in Andrews County.

FAMILY CUCULLIDAE: **Cuckoos, Roadrunners and Anis**

Yellow-billed Cuckoo *Coccyzus americanus*. Common resident in Texas and undoubtedly nesting in Andrews County, possibly on the WCS Ranch.

Greater Roadrunner *Geococcyx californicus*. Common resident in Texas and undoubtedly nesting in Andrews County. This species probably nests on the WCS Ranch as pairs were regularly observed on the ranch.

FAMILY TYTONIDAE: **Barn Owls**

Barn Owl *Coccyzus americanus*. Uncommon resident in Texas and possibly nesting in Andrews County in barns, silos, abandoned houses, etc. There appear to be very few suitable nesting sites on the WCS Ranch.

FAMILY STRIGIDAE: **Typical Owls**

Eastern Screech Owl *Otus asio*. Uncommon resident in the region and possibly nesting in Andrews County.

Western Screech Owl *Otus kennicottii* Uncommon and local in Trans-Pecos Texas, possibly occurring very rarely in Andrews County.

Great Horned Owl *Bubo virginianus*. Uncommon resident in the region but possibly nesting in Andrews County.

Burrowing Owl *Speotyto cunicularia*. Uncommon resident in the region but usually seen around prairie dog towns. Although there are no published reports for the Black-tailed Prairie Dog in Andrews County, the county lies within the range of this species, and there are local reports of colonies in the county.

Long-eared Owl *Asio otus*. Uncommon winter resident in the region and probably occurring occasionally in Andrews County.

Short-eared Owl *Asio flammeus*. Uncommon winter resident in the region and probably occurring occasionally in Andrews County.

FAMILY CAPRIMULGIDAE: **Goatsuckers**

Common Nighthawk *Chordeiles minor*. Common summer resident in the region and undoubtedly nesting in Andrews County, and probably on the WCS Ranch.

Common Poorwill *Phalaenoptilus nuttallii*. Common summer resident in the region and undoubtedly nesting in Andrews County, and probably on the WCS Ranch.

FAMILY APODIDAE: **Swifts**

Chimney Swift *Chaeturapelagica*. Common summer resident in the region and undoubtedly nesting in chimneys in Andrews County. Probably does not nest on the WCS Ranch.

FAMILY TROCHILIDAE: Hummingbirds

Ruby-throated Hummingbird *Archilochus colibris*. Uncommon migrant in the region and expected only occasionally in Andrews.

Black-chinned Hummingbird *Archilochus alexandri*. Common migrant in the region, and the most likely of the hummingbird species to be seen in Andrews County.

Broad-tailed Hummingbird *Selasphorus platycercus*. Uncommon migrant and summer resident in the region and expected only rarely in Andrews County.

Rufous Hummingbird *Selasphorus rufus*. Uncommon migrant and summer resident in the region and expected only rarely in Andrews County.

FAMILY ALCEDINIDAE: Kingfishers

Belted Kingfisher *Ceryle alcyon*. Uncommon resident in this part of Texas. If found in Andrews County it would most likely be seen around the Sewage Disposal Lake in Andrews, as it requires perches next to the water in which it feeds.

FAMILY PICIDAE: Woodpeckers

Golden-fronted Woodpecker *Melanerpes aurifrons*. Uncommon to locally common resident in this part of Texas that probably nests in small numbers on the WCS Ranch. Several regularly seen on the ranch, especially in low areas where there are numerous trees.

Yellow-bellied Sapsucker *Sphyrapicus varius*. Uncommon migrant and winter resident in the region. Individuals observed in Andrews County will probably be seen in the town of Andrews.

Ladder-backed Woodpecker *Picoides scalaris*. Common resident in Andrews County that probably nests in small numbers on the WCS Ranch. One or two individuals seen or heard on each trip to the ranch.

Northern Flicker *Colaptes auratus*. Common to uncommon resident in the region that probably nests in small numbers in Andrews County. There may be too few suitable nesting sites (e.g. old barns and other buildings) to allow nesting on the WCS Ranch, but individuals would be expected during the winter. One was heard and seen on the WCS Ranch in December.

FAMILY TYRANNIDAE: Tyrant Flycatchers

Olive-sided Flycatcher *Contopus borealis*. Uncommon migrant in the region, probably occurring occasionally on the WCS Ranch.

Western Wood Pewee *Contopus sordidus*. Uncommon to rare migrant in the region, probably occurring occasionally on the WCS Ranch.

Eastern Wood Pewee *Contopus virens*. Rare migrant in the region, probably occurring very rarely on the WCS Ranch, as it prefers more wooded areas with open water.

"Empidonax" flycatchers *Empidonax* spp. Uncommon migrants in the region, probably occurring occasionally on the WCS Ranch. Reference here is made to several species in the genus *Empidonax*. These species are generally very difficult, if not impossible, to separate in

the field during migration. On their breeding grounds they are separable on the basis of song and habitat. Most observers in Texas identify migratory individuals to genus. The most likely member of the genus to occur in Andrews County is the Least Flycatcher, *E. minimus*. One member of this genus was observed in April but not identified to species.

Black Phoebe *Sayornis nigricans*. Rare winter resident in this part of West Texas, possibly occurring very rarely in Andrews County.

Eastern Phoebe *Sayornis phoebe*. Uncommon summer resident in the region, where it typically nests near barns, houses, etc. Possibly nest in such habitats on the WCS Ranch.

Say's Phoebe *Sayornis saya*. Uncommon resident in this part of Texas, more common during winter and migration than during summer. Probably occurs occasionally on the WCS Ranch.

Vermilion Flycatcher *Pyrocephalus rubinus*. Rare visitor to the region, probably occurring very rarely in Andrews County.

Ash-throated Flycatcher *Myiarchus cinerascens*. Uncommon summer resident in this part of Texas, probably nesting on the WCS Ranch, as several were observed in April.

Great Crested Flycatcher *Myiarchus crinitus*. Rare migrant in this part of Texas, possibly occurring very rarely in Andrews County.

Cassin's Kingbird *Tyrannus vociferans*. Rare visitor to the region, probably occurring very rarely in Andrews County, as it prefers higher elevations.

Western Kingbird *Tyrannus verticalis*. Common summer resident in the area. Nested on the WCS Ranch, near the ranch house, during Summer, 1996.

Scissor-tailed Flycatcher *Tyrannus forficata*. Common summer resident in the area. Nested on the WCS Ranch during Summer, 1996.

FAMILY ALAUDIDAE: **Larks**

Horned Lark *Eremophila alpestris*. Uncommon resident in the area, more common during winter. Probably nests in Andrews County, and possibly on the WCS Ranch. Several seen in fall and spring on the Ranch.

FAMILY HIRUNDINIDAE: **Swallows**

Purple Martin *Progne subis*. Uncommon summer resident in the most of this part of Texas.

Nesting is local and sporadic in West Texas and depends on the availability of nest boxes.

Even when nest boxes are available, they are not always utilized by these birds. Possibly a few individuals of this species nest in Andrews if nest boxes are available.

Tree Swallow *Tachycineta bicolor*. Uncommon migrant in the area, probably found occasionally in Andrews County and possibly on the WCS Ranch.

Violet-green Swallow *Tachycineta thalassina* Rare migrant in the area, possibly seen occasionally in Andrews County.

Northern Rough-winged Swallow *Stelgidopteryx serripennis*. Common migrant in the area, to be expected in Andrews County, including the WCS Ranch. Because this species nests rarely in this part of Texas, it is unlikely that individuals nest in Andrews County.

Bank Swallow *Ripariariparia*. Uncommon migrant in the area, probably found regularly in Andrews County, including the WCS Ranch when surface water is available.

Cliff Swallow *Hirundo pyrrhonota* Common summer resident in the area, where it builds mud nests under bridges and similar structures. Undoubtedly nests in Andrews County. Several seen flying over WCS Ranch.

Barn Swallow *Hirundo rustica*. Uncommon summer resident in the area, probably found locally in appropriate habitat throughout Andrews County. Nests under eaves of buildings. Nest found near ranch house in Summer, 1996.

FAMILY CORVIDAE: Jays and Crows

Blue Jay *Cyanocitta cristata*. Uncommon resident in this part of Texas, probably occurring in Andrews County only in the town of Andrews.

American Crow *Corvus brachyrhynchos*. Rare winter visitor in this part of Texas, the common "crow" of the area being the Chihuahuan Raven. Possibly seen occasionally in Andrews County.

Chihuahuan Raven *Corvus cryptoleucus*. Common resident in Andrews County that nests on the WCS Ranch. Usually three or four individuals can always be seen on the ranch.

FAMILY REMIZIDAE: **Verdins**

Verdin *Auriparus flaviceps*. Uncommon resident in this part of Texas, possibly nesting in small numbers on the WCS Ranch, as one was seen and heard regularly around the ranch house.

FAMILY SITTIDAE: **Nuthatches**

Red-breasted Nuthatch *Sitta canadensis*. Rare migrant and winter resident in this part of Texas, probably occurring occasionally in larger trees in the town of Andrews.

FAMILY CERTHIIDAE: **Creepers**

Brown Creeper *Certhia americana*. Rare migrant and winter resident in this part of Texas, probably occurring occasionally in larger trees in the town of Andrews.

FAMILY TROGLODYTIDAE: **Wrens**

Cactus Wren *Campylorhynchus brunneicapillus*. Uncommon resident in this part of Texas, probably nesting in the more arid regions of Andrews County, perhaps rarely on the WCS Ranch.

Rock Wren *Salpinctes obsoletus*. Uncommon resident in this part of Texas, probably nesting in Andrews County (possibly on the WCS Ranch). This species was seen or heard during Summer and Autumn, 1996 near the Core Area and near the ranch house.

Canyon Wren *Catherpes mexicanus*. Uncommon resident in this part of Texas, possibly found rarely in Andrews County, although it typically prefers canyons, rocky bluffs, etc.

Carolina Wren *Thryothorus ludovicianus*. Uncommon resident in this part of Texas, but because it prefers wooded streams and similar habitats, would be rarely encountered in Andrews County except during migration.

Bewick's Wren *Thryomanes bewickii*. Common resident in this part of Texas. This common wren frequents barns, old houses, corrals, etc., and should be expected near such structures throughout Andrews County, including WCS Ranch, where it was heard once near the ranch house.

House Wren *Troglodytes aedon*. Uncommon migrant in this part of Texas, possibly found rarely in Andrews County.

Winter Wren *Troglodytes troglodytes*. Uncommon migrant in this part of Texas, possibly found rarely in Andrews County.

Marsh Wren *Troglodytes aedon*. Rare migrant in this part of Texas, possibly found rarely in Andrews County in the marshy areas by the Sewage Disposal Lake in Andrews.

FAMILY MUSCICAPIDAE: **Kinglets, Gnatcatchers, Thrushes and Allies**

Golden-crowned Kinglet *Regulus satrapa*. Uncommon migrant and winter resident in this part of Texas, possibly found occasionally in Andrews County.

Ruby-crowned Kinglet *Regulus calendula*. Common migrant and winter resident in this part of Texas, to be expected regularly on the WCS Ranch in virtually all habitats in winter.

Blue-gray Gnatcatcher *Poliophtilacaerulea*. Uncommon resident in this part of Texas, observed in mesquites on the WCS Ranch, where it probably nests.

Mountain Bluebird *Sialia currucoides*. Uncommon to rare winter resident in this part of Texas, possibly found occasionally in Andrews County in open areas.

Townsend's Solitaire *Myadestes townsendi*. Uncommon to rare winter resident in this part of Texas, possibly found occasionally in Andrews County.

Swainson's Thrush *Catharus ustulatus*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County.

Hermit Thrush *Catharus guttata*. Uncommon migrant and winter resident in this part of Texas, probably found occasionally in Andrews County, such as in gardens and parks in the town of Andrews.

Wood Thrush *Hylocichla mustelina*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County.

American Robin *Turdus migratorius*. Uncommon summer resident and common to abundant winter resident in this part of Texas, probably nesting in the town of Andrews. Probably occurs from time to time during winter on WCS Ranch. One individual was observed on the ranch in October.

Swainson's Thrush *Catharus ustulatus*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County.

FAMILY MIMIDAE: Mockingbirds and Thrashers

Northern Mockingbird *Mimus polyglossos*. Common resident in Andrews County, nesting on the WCS Ranch.

Sage Thrasher *Oreoscoptes montanus*. Rare migrant in this part of Texas. One individual was observed on the WCS Ranch in October.

Brown Thrasher *Toxostoma rufum*. Rare migrant and winter resident in this part of Texas, possibly found occasionally in Andrews County, but unlikely on the WCS Ranch.

Curve-billed Thrasher *Toxostoma rufum*. Common resident in this part of Texas, commonly nesting on the WCS Ranch.

FAMILY MOTACILLIDAE: Pipits

American Pipit *Anthus rubescens*. Uncommon migrant and winter resident in the region, probably occurring in Andrews County near stock tanks. Four or five migrating individuals were observed on the WCS Ranch in April.

FAMILY BOMBYCILLIDAE: Waxwings

Cedar Waxwing *Bombycilla cedrorum*. Common winter resident in this part of Texas, most individuals typically arriving later than other winter residents (even as late as January, so as to benefit from the berry crop in their northern nesting grounds). Several individuals were observed in the town of Andrews in December.

FAMILY LANIIDAE: **Shrikes**

Loggerhead Shrike *Lanius ludovicianus*. Uncommon resident in this part of Texas, undoubtedly nesting on the WCS Ranch, as it was seen regularly during the summer.

FAMILY STURNIDAE: **Starlings**

European Starling *Sturnus vulgaris*. This European species, introduced into North America during the last century, is a locally abundant resident in this part of Texas, especially in urban areas. Individuals are seen regularly on the WCS Ranch, especially near the ranch house, where they probably nest.

FAMILY VIREONIDAE: **Vireos**

Bell's Vireo *Vireo bellii*. Rare summer resident in this part of Texas, possibly found occasionally in Andrews County where heavy vegetation exists.

Solitary Vireo *Vireo solitarius*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Yellow-throated Vireo *Vireo flavifrons*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Warbling Vireo *Vireo gilvus*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Philadelphia Vireo *Vireo philadelphica*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Red-eyed Vireo *Vireo olivaceus* Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

FAMILY EMBERIZIDAE: **Emberizids**

Warblers

Blue-winged Warbler *Vermivora pinus*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Tennessee Warbler *Vermivora peregrina*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Orange-crowned Warbler *Vermivora celata*. Uncommon migrant and winter resident in this part of Texas, to be expected in wooded and brushy areas.

Nashville Warbler *Vermivora ruficapilla*. Uncommon migrant in this part of Texas, probably occurring most frequently in Andrews County where there are tall trees.

Virginia's Warbler *Vermivora virginiae*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Northern Parula Warbler *Parula americana*. Rare migrant in this part of Texas, possibly found occasionally in Andrews County where there are tall trees.

Yellow Warbler *Dendroica petechia*. Common migrant in this part of Texas, to be expected in Andrews County in shrubby habitats and where there are trees.

Chestnut-sided Warbler *Dendroica pensylvanica*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Magnolia Warbler *Dendroica magnolia*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Black-throated Blue Warbler *Dendroica caerulescens*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Yellow-rumped Warbler *Dendroica coronata*. Common migrant and winter resident in the area, of which two subspecies are possible in Andrews County: Audubon's Warbler, *D. c. auduboni* or *D. c. memorabilis*, the more common subspecies in the county; and Myrtle Warbler, *D. c. coronata*, which is rare to uncommon in the county. This species is more likely to be encountered in parks and gardens than in pastureland.

Black-throated Gray Warbler *Dendroica nigrescens*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Townsend's Warbler *Dendroica townsendi*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Black-throated Green Warbler *Dendroica virens*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Blackburnian Warbler *Dendroica fusca*. Rare migrant in this part of Texas, possibly occurring in Andrews County in habitats where there are tall trees.

Pine Warbler *Dendroica pinus*. Rare migrant in this part of Texas, possibly occurring occasionally in Andrews County.

Palm Warbler *Dendroica palmarum* Rare migrant in this part of Texas, possibly occurring occasionally in Andrews County.

Blackpoll Warbler *Dendroica striata*. Rare migrant in this part of Texas, possibly occurring occasionally in Andrews County.

Black-and-White Warbler *Mniotilta varia*. Uncommon migrant in this part of Texas, probably occurring in Andrews County where there are medium-sized to tall trees.

American Redstart *Setophaga ruticilla*. Uncommon migrant in this part of Texas, probably occurring in Andrews County where there is sufficient vegetation, including the WCS Ranch.

Prothonotary Warbler *Protonotaria citrea*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there are medium-sized to tall trees.

Ovenbird *Seiurus aurocapillus*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there are medium-sized to tall trees.

Northern Waterthrush *Seiurus novaboracensis*. Uncommon migrant in this part of Texas, probably occurring in Andrews County, usually near open water, including the WCS Ranch.

Louisiana Waterthrush *Seiurus motacilla*. Rare migrant in this part of Texas, possibly occurring in Andrews County very rarely near open water.

MacGillivray's Warbler *Oporornis tolmei*. Uncommon migrant in this part of Texas, probably occurring in Andrews County where there is sufficient vegetation, possibly including the WCS Ranch.

Common Yellowthroat *Geothlypis trichas*. Uncommon migrant in this part of Texas, probably occurring in Andrews County where there is sufficient vegetation, including the WCS Ranch.

Hooded Warbler *Wilsonia citrina*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there are tall trees.

Wilson's Warbler *Wilsonia pusilla*. Common migrant in this part of Texas, probably occurring in Andrews County where there is sufficient vegetation, including the WCS Ranch.

Yellow-breasted Chat *Icteria virens*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there is sufficient vegetation. Possibly breeds in the county.

Tanagers

Summer Tanager *Piranga rubra*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there are tall trees.

Scarlet Tanager *Piranga olivacea*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there are tall trees.

Western Tanager *Piranga ludoviciana*. Rare migrant in this part of Texas, possibly occurring in Andrews County where there are tall trees.

New World Grosbeaks and Buntings

Northern Cardinal *Cardinalis cardinalis*. Common resident in the area and should be expected near residential areas, open water, especially where dense vegetation exists. Two individuals were observed on the Sewage Disposal Lake in Andrews in April, where they probably nest.

Pyrrhuloxia *Cardinalis sinuatus*. Common resident in the area and should be expected in drier habitats than its close relative, the Northern Cardinal, is typically found (though both species can coexist in the same habitat). This species was found throughout the WCS Ranch.

Rose-breasted Grosbeak *Pheucticus ludovicianus*. Rare migrant in the area, probably occurring occasionally in Andrews County, though not likely on the WCS Ranch.

Black-headed Grosbeak *Pheucticus melanocephalus* Rare migrant in the area, probably occurring occasionally in Andrews County, and very rarely on the WCS Ranch.

Blue Grosbeak *Guiracacaerulea*. Common summer resident in Andrews County. Summer observations on the WCS Ranch suggest that they nested on the ranch.

Lazuli Bunting *Passerina amoena*. Rare migrant in the area, probably occurring occasionally in Andrews County, though not likely on the WCS Ranch.

Indigo Bunting *Passerina cyanea*. Rare migrant in the area, probably occurring occasionally in Andrews County, though not likely on the WCS Ranch.

Painted Bunting *Passerina ciris*. Uncommon summer resident in the area, probably nesting in Andrews County and possibly on the WCS Ranch.

Dickcissel *Spiza americana*. Uncommon summer resident in the area, probably nesting in Andrews County and possibly on the WCS Ranch.

New World Sparrows

Green-tailed Towhee *Pipilo chlorurus*. Rare migrant in the area, probably occurring occasionally in Andrews County, though not likely on the WCS Ranch.

Rufous-sided Towhee *Pipilo erythrophthalmus*. Common winter resident in the area, and likely to be seen in brushy areas, especially under trees.

Canyon Towhee *Pipilo fuscus*. Uncommon resident in the area, undoubtedly nesting in Andrews County and possibly on the WCS Ranch.

Cassin's Sparrow *Aimophila cassinii* Common resident in the area, probably nesting on the WCS Ranch as individuals were heard during breeding season. Rare in winter in this part of Texas.

Rufous-crowned Sparrow *Aimophila ruficeps*. Uncommon resident in the area, possibly nesting in Andrews County and possibly on the WCS Ranch, although it typically prefers brushy bluffs and canyons for nesting.

American Tree Sparrow *Spizella arborea*. Uncommon to rare winter resident in the area, possibly occurring in Andrews County but not likely on the WCS Ranch.

Chipping Sparrow *Spizella passerina*. Uncommon migrant and winter resident in the area, and nesting locally in parts of West Texas. In Andrews County and on the WCS Ranch most individuals observed will probably be migrants.

Clay-colored Sparrow *Spizella pallida*. Uncommon migrant and possible rare winter resident. In Andrews County and on the WCS Ranch, migrants should be heard during spring migration. Several migrating individuals were heard on the WCS Ranch in April.

Brewer's Sparrow *Spizella breweri*. Uncommon to rare migrant and rare winter resident in the area, to be expected on rare occasions in Andrews County and possibly on the WCS Ranch.

Field Sparrow *Spizella pusilla*. Uncommon migrant and winter resident in the area, possibly nesting locally. Several migrating individuals were heard on the WCS Ranch in April.

Vesper Sparrow *Pooecetes gramineus*. Uncommon migrant and winter resident in the area, but sometimes seen in large numbers, especially during migration. Several flocks of up to 20 individuals were observed on the WCS Ranch in October.

Lark Sparrow *Chondestes grammacus*. Common migrant and summer resident in the area, and rare winter resident. This is the most common sparrow that nests on the WCS Ranch.

Black-throated Sparrow *Amphispiza bilineata*. Common resident in the area. Numerous pairs nest on the WCS Ranch.

Lark Bunting *Calamospiza melanocorys*. Abundant migrant and fairly common summer resident in the area, and rare winter resident. This is probably the most common sparrow sparrow seen in migration on the WCS Ranch, where flocks up to 100 have been seen.

Savannah Sparrow *Passerculus sandwichensis*. Common migrant and uncommon winter resident in the area. Most individuals observed in Andrews County and on the WCS Ranch will probably be migrants.

Baird's Sparrow *Ammodramus bairdii*. Very rare migrant in West Texas, possible though unlikely in Andrews County.

Grasshopper Sparrow *Ammodramus savannarum*. Uncommon to rare migrant and rare summer resident in the area. Probably occurs rarely in Andrews County during migration.

Fox Sparrow *Passerella iliaca*. Rare migrant and winter resident in the area, to be expected only occasionally in Andrews County, more likely in urban areas rather than on the WCS Ranch.

Song Sparrow *Melospiza melodia*. Common winter resident in the area, more likely to be encountered in less xeric habitats such as in the town of Andrews, especially near the Sewage Disposal Lake.

Lincoln Sparrow *Melospiza lincolni*. Uncommon winter resident in the area, more common during migration.

Swamp Sparrow *Melospiza georgiana*. Rare winter resident in the area, whose geographic range includes Andrews County, but unlikely to occur on the WCS Ranch as it prefers wetland.

White-throated Sparrow *Zonotrichia albicollis*. Rare winter resident in the area that probably occurs only occasionally in Andrews County.

White-crowned Sparrow *Zonotrichia albicollis*. Common to abundant winter resident in the area. In Andrews County, this is the most common New World Sparrow that is found in winter. Numerous migrating individuals were seen and heard on the WCS Ranch in April.

Harris' Sparrow Sparrow *Zonotrichia querula*. Rare winter resident in the area that probably occurs only occasionally in Andrews County.

Dark-eyed Junco *Junco hyemalis*. Abundant winter resident in the area. Although probably more common in urban areas, this species can be expected on the WCS Ranch, especially near the ranch house. Andrews County lies in the published range of several subspecies of Dark-eyed Junco.

McCown's Longspur *Calcarius mccownii*. Although an abundant winter resident in the prairies of the Panhandle, this species would be expected only occasionally in Andrews County.

Lapland Longspur *Calcarius lapponicus*. Although an abundant winter resident in the prairies of the Panhandle, this species would be expected only occasionally in Andrews County.

Chestnut-collared Longspur *Calcarius ornatus*. A rare winter resident in this part of Texas, expected only occasionally in Andrews County.

Blackbirds, Meadowlarks and Orioles

Red-winged Blackbird *Agelaius phoeniceus*. Abundant resident throughout Texas, observed flying overhead on the WCS Ranch and undoubtedly nesting in Andrews County in vegetation near open water (e.g. the Sewage Disposal Lake). This species forms large flocks in winter.

Eastern Meadowlark *Sturnella magna*. Common resident on the WCS Ranch, where several are seen regularly, and where it undoubtedly nests.

Western Meadowlark *Sturnella neglecta*. Common resident on the WCS Ranch, where several are seen regularly, and where it undoubtedly nests. Probably more common in winter.
Numerous meadowlarks

Yellow-headed Blackbird *Xanthocephalus xanthocephalus*. Common migrant in this part of Texas, and uncommon summer resident. Although possibly nesting in Andrews County, it is more likely to be seen during migration in flocks up to 100 or more individuals. In April, about 15 individuals were seen on the WCS Ranch near corrals and water troughs.

Brewer's Blackbird *Euphagus cyanocephalus*. Abundant winter resident in this part of Texas, and expected in Andrews County, especially in urban areas and around man-made structures. Several individuals were seen on the WCS Ranch in April, feeding with cowbirds near livestock.

Great-tailed Grackle *Quiscalus mexicanus*. Common resident in this part of Texas, undoubtedly nesting in Andrews County, especially in urban areas and around man-made structures. Possibly nests on the WCS Ranch, where it can be seen commonly.

Common Grackle *Quiscala quiscula*. Common resident in this part of Texas, and expected in Andrews County, especially in urban areas and around man-made structures.

Brown-headed Cowbird *Molothrus ater*. Abundant resident in this part of Texas, where it is commonly seen around livestock, corrals, etc. This species does not build a nest, but lay eggs in the nests of other species, which raise the young cowbirds. Brown-headed Cowbirds undoubtedly parasitize flycatchers and other species of Andrew County birds.

Orchard Oriole *Icterus spurius*. Uncommon summer resident in the area, probably nesting in Andrews County in the town of Andrews.

Northern Oriole *Icterus galbula* Common summer resident in the area, probably nesting in Andrews County and on the WCS Ranch. Several individuals were seen during the nesting season.

FAMILY FRINGILLIDAE: Old World Finches, Buntings and Grosbeaks

House Finch *Carpodacus mexicanus*. Very common resident in the area, nesting on the WCS Ranch near the ranch house and other man-made structures.

Pine Siskin *Carduelis pinus*. Common winter resident in the area, in Andrews County probably more frequently encountered in the town of Andrews. Probably occurs on the WCS Ranch most frequently during migration (when several were observed during spring).

Lesser Goldfinch *Carduelis psaltria*. Rare resident in the area, probably occurring only occasionally in Andrews County, most likely in the town of Andrews.

American Goldfinch *Carduelis tristis*. Common winter resident in the area. In Andrews County this species is probably common in the town of Andrews but it also occurs on the WCS Ranch, where several were observed during winter.

FAMILY PASSERIDAE: **Old World Sparrows**

House Sparrow *Passer domesticus*. Abundant resident in the area, found virtually everywhere in Andrews County in areas of human disturbance. This bird, brought over from Europe during the last century, was formerly called the "English Sparrow." It is most likely the most numerous species of bird in Andrews County.

MAMMALS

The first trapping was done with 30 traps, second trapping with 100 traps, third with 560 traps and the fourth trapping effort was done with 500 traps. This constitutes a total of 4910 trap nights. See Tables 9 and 10 for list of animals collected.

Species in bold-faced type were collected and/or observed during present study.

FAMILY DIDELPHIDAE: **Opossums**

Virginia Opossum *Didelphis virginiana*. Andrews County lies within the published range of this species, but there are no published records for the county. Since opossums are typically found in woodlands, farmlands and marshes, they are probably only occasionally and locally found in Andrews County. The species is much more common in eastern Texas than in western Texas.

FAMILY SORICIDAE: **Shrews**

Desert Shrew *Sorex crawfordi*. Andrews County lies within the published range of this species, but there are no published records for the county. If this species occurs in Andrews County, it would be expected to be uncommon and local.

FAMILY VESPERTILIONIDAE: **Vespertilionid Bats**

Cave Myotis *Myotis velifer*. The published estimated range of this species includes Winkler and Ector Counties ((which are adjacent to Andrews County to the south) but there are no published records of this species for these two counties. The species has been recorded from

Garza County, two counties to the northeast of Andrews County. The inclusion of this species here is based on the possibility that it may occur outside its published range.

Silver-haired Bat *Lasionycteris noctivagans*. Andrews County lies within the published range of this species, but there are no published records the county. Most of the Silver-haired Bats in Texas are migratory, so this species might occur as a migrant in Andrews County during spring or fall.

Western Pipistrelle *Pipistrellus hesperus*. Andrews County lies within the published range of this species, but there are no published records for the county. If this species occurs in Andrews County, it would probably be rare and local.

Big Brown Bat *Eptesicus fuscus*. Andrews County lies within the published range of this species, but there are no published records for the county. If this species occurs in Andrews, it would be expected to be rare and local.

Eastern Red Bat *Lasiurus borealis*. Andrews County lies within the published range of this species, but there are no published records for the county. If Eastern Red Bats occur in Andrews, they would be very rare, as this is a solitary species that lives in forests and roosts in trees.

Hoary Bat *Lasiurus cinereus*. Andrews County lies within the published range of this migratory species. There are no published records for the county, but it has been recorded from adjacent Gaines County. Hoary Bats would be uncommon in Andrews County, as they prefer wooded habitats.

Townsend's Big-eared Bat *Plecotus townsendii*. Andrews County lies within the published range of this species, but it is unlikely to be found in the county other than rarely, as it prefers rocky areas with caves, mine tunnels, etc. There are no published records for Andrews County, but the species has been recorded from adjacent Hockley County.

Pallid Bat *Antrozous pallidus*. Although this is a common West Texas species, its preference for rocky areas probably explains why it has not been reported from Andrews County. However, since its published range includes adjacent Winkler and Ector Counties, its rare occurrence in Andrews County is possible.

FAMILY MOLOSSIDAE: **Free-tailed Bats**

Brazilian Free-tailed Bat *Tadarida brasiliensis*. Andrews County lies within the published range of this species. There are no published records for the county, but it has been recorded from adjacent Winkler and Ector Counties. In some parts of Texas and New Mexico this species roosts in colonies of up to several million individuals, the colony in Carlsbad Caverns, N.M. being the best known.

Big Free-tailed Bat *Tadarida macrotis*. Although Andrews County lies within the published range of this species, it has been reported from only a few localities within its range in Texas. The closest of these localities is Reeves County, three counties to the southwest.

FAMILY DASYPODIDAE: **Armadillos**

Nine-banded Armadillo *Dasypus novemcinctus*. Andrews County lies within the published range of this species. There are no published records for the county, as in most of the counties of the region, probably because soil texture suitable for digging is not common in the area.

FAMILY LEPORIDAE: Hares and Rabbits

Desert Cottontail *Sylvilagus audubonii*. Andrews County lies within the published range of this species. See entry for Eastern Cottontail (below).

Eastern Cottontail *Sylvilagus floridanus*. Andrews County lies within the published range of this species. Both the Eastern Cottontail and the Desert Cottontail have been reported from Andrews County, and either species could occur on the WCS Ranch. The most reliable way to distinguish the two species is by comparing skull characteristics (tympanic bulla) and external measurements, such as ear length, neither of which is a useful field character. Although the Eastern Cottontail is more likely to be found at the brushy edges of cultivated fields, near urban areas, etc., than in the more xeric habitats characteristic of the Desert Cottontail, both species may occupy a variety of habitats. Individuals observed on the WCS Ranch have not been determined to species except for one individual of *S. floridanus* that was collected in April.

Black-tailed Jackrabbit *Lepus californicus*. Andrews County lies within the published range of this species, which is common in the county and on the WCS Ranch.

FAMILY SCIURIDAE: Squirrels and Allies

Mexican Ground Squirrel *Spermophilus mexicanus*. Andrews County lies within the published range of this species, which has been reported from the county. This species would be expected in grassy and brushy areas in the county. Two specimens were collected on the WCS Ranch in April, 1997 and deposited as study skins in the Museum at Texas Tech University.

Spotted Ground Squirrel *Spermophilus spilosoma*. Andrews County lies within the published range of this species, which has been reported from the county. This species would be expected in sandy, brushy areas in the county and possibly on the WCS Ranch.

Thirteen-lined Ground Squirrel *Spermophilus tridecemlineatus*. Andrews County lies at the edge of the published range of this species, which has been reported from adjacent Gaines and Dawson Counties. Possibly this species occurs locally in short-grass prairie habitat in Andrews County.

Black-tailed Prairie Dog *Cynomys ludovicianus*. Andrews County lies within the published range of this species. There are no published records for the county, although the species has been reported from adjacent Yoakum, Dawson, Martin and Ector Counties. Black-tailed Prairie Dog colonies probably occur locally in Andrews County but their presence needs confirmation.

Eastern Gray Squirrel *Sciurus carolinensis*. A species native to East Texas that has been introduced in a number of urban areas in West Texas. It might occur locally in Andrews County. In Lubbock this species is more common than the Eastern Fox Squirrel.

Eastern Fox Squirrel *Sciurus niger*. Eastern Fox Squirrels occur in the eastern two-thirds of Texas, but have been introduced in a number of urban areas in West Texas. It might occur locally in Andrews County.

FAMILY GEOMYIDAE: **Pocket Gophers**

Jones' Pocket Gopher *Geomys knoxjonesi*. Andrews County lies within the published range of this species, which has been reported from the county. "This is a cryptic species of the plains pocket gopher, *G. bursarius*. Morphologically, Jones' pocket gopher appears to be slightly

smaller.....than the plains pocket gopher but careful study of genetic characters is required before the two may be distinguished." (Schmidly, 1994, p. 127) Found in deep sandy soils and to be expected in Andrews County where suitable habitat exists. See discussion under Yellow-faced Pocket Gopher.

Yellow-faced Pocket Gopher *Cratogeomys castanops*. Andrews County lies within the published range of this species, which has been reported from adjacent Gaines, Martin, Midland and Winkler Counties. "These large gophers are partial to deep, mellow soils that are relatively free from rocks. Where the three genera -- *Cratogeomys*, *Geomys* and *Thomomys* -- occur in the same general area, as in western Texas, *Thomomys* usually occupies the shallower, rocky soils in the mountains, *Geomys* lives in the deep sands along the rivers, and *Cratogeomys* utilizes the areas in between. However, the sandy areas in which no *Geomys* occur are likely to be occupied by *Cratogeomys*. The three genera are usually mutually exclusively in their distribution." (Schmidly, 1994, p. 130) Hence, *Thomomys* is not expected in Andrews County (and in fact its the northern edge of its range is approximately two counties to the south of Andrews County), yet either Jones' Pocket Gopher or the Yellow-faced Pocket Gopher should be expected in the county. The distribution and habitat associations of these two species in the county is of sufficient interest to warrant additional study.

FAMILY HETEROMYIDAE: **Pocket Mice and Kangaroo Rats**

Plains Pocket Mouse *Perognathus flavescens*. Andrews County lies within the published range of this species, which has been reported from the county. This species would be expected in sparsely vegetated sandy soils in the county and possibly on the WCS Ranch.

Silky Pocket Mouse *Perognathus flavus*. Andrews County lies outside the published range of this species; however, several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

Merriams' Pocket Mouse *Perognathus merriami*. Andrews County lies within the published range of this species, which has been reported from the county. This species would be expected in sparsely vegetated sandy soils or gravelly soils in the county. Several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

Hispid Pocket Mouse *Chaetodipus hispidus*. Andrews County lies within the published range of this species, which has been reported from the county. This species prefers sandy or loose soils that support scattered herbaceous vegetation. Several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

Desert Pocket Mouse *Chaetodipus penicillatus*. Andrews County lies at the northern edge of the published range of this species. The Desert Pocket Mouse seems to prefer soft or sandy soils along stream bottoms in most of western Texas, and its occurrence in Andrews County would not be expected.

Merriam's Kangaroo Rat *Dipodomys merriami*. Andrews County lies within the published range of this species, which has been reported from all adjacent counties. It undoubtedly occurs in Andrews County and quite likely on the WCS Ranch, although we trapped only *D. ordii* on there. *D. merriami* is usually found in sandy, gravelly and clayey soils, habitats characteristic of much of the WCS Ranch.

Ord's Kangaroo Rat *Dipodomys ordii*. Andrews County lies within the published range of this species, which has been reported from the county. It is generally found in sandy (rarely gravelly) soils. Several specimens were trapped on the WCS Ranch, where this species was found to be common. Several specimens were prepared as museum skins and deposited in the Museum at Texas Tech University.

Banner-tailed Kangaroo Rat *Dipodomys spectabilis*. Although Andrews County lies within the published range of this species, and the species has been collected in the county, its occurrence on the WCS Ranch was not expected, as it prefers brush-covered slopes and low hills. However, several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

FAMILY MURIDAE: **Mice and Rats**

Western Harvest Mouse *Reithrodontomys megalotis*. Andrews County lies within the published range of this species, which has been reported from the county. It is generally found in grassy areas near water, so would be expected rarely and locally, if at all, on the WCS Ranch.

Plains Harvest Mouse *Reithrodontomys montanus*. Andrews County lies within the published range of this species, which has been reported from the county. It appears to prefer "climax, or nearly climax, well-drained grassland," (Schmidly, 1994, p. 162) so could be expected locally on the WCS Ranch. Several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

White-footed Mouse *Peromyscus leucopus*. Andrews County lies within the published range of this species, which has been reported from the county. It probably occurs rarely, if at all, on the WCS Ranch, as in western Texas it is usually restricted to riverbottoms and creek beds.

Deer Mouse *Peromyscus maniculatus*. This species is undoubtedly the most common member of the the genus in Andrews County, as it inhabits a variety of habitats, including grasslands, fence rows and waste areas. It has been collected in the county. Several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

Northern Pigmy Mouse *Baiomys taylori*. Andrews County lies at the very western edge of the published range of this species, which has been reported from adjacent Martin and Gaines Counties. The species prefers grassy habitats.

Mearn's Grasshopper Mouse *Onychomys arenicola*. Andrews County lies at the very eastern edge of the published range of this species, which has been reported from adjacent Winkler County. The species prefers the xeric, sparsely vegetated sandy or gravelly soils of western Texas, so would not likely to be found on the WCS Ranch.

Northern Grasshopper Mouse *Onychomys leucogaster*. Andrews County lies within the published range of this widely-distributed (although not particularly common) species, which has been reported from the county. Several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

Hispid Cotton Rat *Sigmodon hispidus*. Andrews County lies within the published range of this species, which has been reported from the county. It was trapped in only one site on the WCS Ranch, in a depressed area where standing water after rains has produced a stand of very tall grasses and forbs. Several specimens were trapped there, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

White-throated Woodrat *Neotoma albigula*. Andrews County lies within the published range of this species, which has been reported from adjacent Winkler County. This species prefers more desert-like habitats in western Texas, so would probably occur in Andrews County only locally.

South Plains Woodrat *Neotoma micropus*. Andrews County lies within the published range of this species, which has been reported from adjacent Winkler County. The species prefers brushy areas, such as mesquite-cactus associations, and would be expected in Andrews County and on the WCS Ranch. Several specimens were trapped on the WCS Ranch, some of which were prepared as museum skins and deposited in the Museum at Texas Tech University.

Norway Rat *Rattus norvegicus*. A common species throughout Texas and to be expected in any appropriate urban habitat and possibly elsewhere.

Roof Rat *Rattus rattus*. A common species throughout Texas and to be expected in any appropriate urban habitat and possibly elsewhere.

House Mouse *Mus musculus*. A common species throughout Texas and to be expected in any appropriate urban habitat and possibly elsewhere. One specimen was trapped on the WCS Ranch about 30 m from the highway (near considerable litter), which may account for its presence where there are no people. The specimen was prepared as a museum skin and deposited in the Museum at Texas Tech University.

FAMILY ERETHIZONTIDAE: Porcupines

Porcupine *Erethizon dorsatum*. Andrews County lies within the published range of this species, which has been reported from the county. The species is found in a variety of habitats, and could be expected occasionally in Andrews County and on the WCS Ranch.

FAMILY CANIDAE: Canids

Coyote *Canis latrans*. Andrews County lies within the published range of this species, which has been heard frequently on the WCS Ranch.

Swift or Kit Fox *Vulpes velox*. Andrews County lies within the published range of this species, which has been reported from the county. The species prefers grasslands and other open areas and might possibly be encountered in Andrews County and the WCS Ranch. The Swift Fox (formerly *Vulpes velox*) and the Kit Fox (formerly *Vulpes macrotis*) are now designated as subspecies of *V. velox* (*V. velox velox* and *V. velox macrotis*, respectively).

Red Fox *Vulpes vulpes*. An introduced species found in most of Texas. This species has been reported from Andrews County and could be found on the WCS Ranch.

Common Gray Fox *Vulpes cinereoargenteus*. Andrews County lies within the published range of this species, which has been reported from the county. The species prefers wooded areas, where it climbs trees, and would not likely to be encountered on the WCS Ranch.

FAMILY PROCYONIDAE: **Procyonids**

Ringtail *Bassariscus astutus*. The published range of this species includes all of Texas, but it has been reported only occasionally from the Southern Plains. There are no records from Andrews County.

Raccoon *Procyon lotor*. The published range of this species includes all of Texas, but it has been reported only occasionally from the Southern Plains. Although there are no published records from Andrews County, it certainly could be expected anywhere in the county, especially in the vicinity of human habitations. Tracks were observed in muddy areas in December.

FAMILY MUSTELIDAE: **Mustelids**

Long-tailed Weasel *Mustela frenata*. The published range of this species includes Andrews County, but there are no records from the county. The species may be found in the vicinity of prey species such as ground squirrels and pocket gophers.

American Badger *Taxidea taxus*. The published range of this species includes Andrews County, from which it has been reported. It may be encountered in a variety of habitats, including those on the WCS Ranch.

Western Spotted Skunk *Spilogale gracilis*. The published range of this species includes Andrews County, but there are no records from the county. Since this species prefers rocky areas, cliffs, bluffs, etc. its occurrence in Andrews County would be considered unusual.

Striped Skunk *Mephitis mephitis*. The published range of this species includes Andrews County, and there are records from the county. Probably occurs regularly on the WCS Ranch.

Common Hog-nosed Skunk *Conepatus mesoleucus*. The published range of this species includes Andrews County, but there are no records from the county. The nearest county where it has been collected is Dawson County, adjacent to Andrews County on the northeast.

FAMILY FELIDAE: **Cats**

Mountain Lion *Felis concolor*. The published range of this species includes Andrews County, but there are no records from the county. Since this species is found most frequently in mountainous areas, its occurrence in Andrews County would be considered unlikely but certainly not impossible. It has been recorded from Winkler and Ector Counties, which border on Andrews County to the south.

Bobcat *Lynx rufus*. The published range of this species includes Andrews County, and the species has been recorded from the county. Most likely bobcats frequently occur on the WCS Ranch.

FAMILY SUIDAE: **Pigs**

Feral Pig *Sus scrofa*. Feral pigs occur in many parts of Texas, and quite possibly are found in Andrews County.

FAMILY DICOTYLIDAE: **Peccaries**

Collared Peccary *Tayassu tajacu*. The former range of this species included the southwestern part of Andrews County (Schmidly, 1994, p. 269), but there are no current records from the county. Its occurrence on the WCS Ranch would be unlikely.

FAMILY CERVIDAE: **Cervids**

Mule Deer *Odocoileus hemionus*. The published range of this species includes a small part of southwestern Andrews County, but there are no published records from the county. Its occurrence on the WCS Ranch would be likely in the sand shin oak habitats.

White-tailed Deer *Odocoileus virginianus*. This species occurs in "suitable brushy or wooded country throughout the state" (Schmidly, 1994, p. 280). Since this species has been reported from almost all counties in Texas, its presence in Andrews County would be expected. Several people have reported a herd of 20-30 deer for the WCS Ranch that apparently are this species, even though this species prefers more wooded areas than are generally found in this area.

CONCERNS

THREATENED AND ENDANGERED SPECIES

The Web Site for the Texas Parks and Wildlife Department contains a current list of vertebrates of Texas, with threatened or endangered species indicated. Pertinent sections from this list are included at the end of this report. The only species likely to occur in Andrews County are the following.

Texas Horned Lizard *Phrynosoma cornutum* . Andrews County lies within the published range of this species, and specimens have been reported from the county. An immature was observed north of core area May 4 and another immature along Transect 3 September 1. This species is widespread in Texas and has been reported from all but a few East Texas counties. Its numbers are diminishing in many parts of the state, but it is frequently encountered in suitable habitat in much of West Texas. Because it probably occurs throughout the extensive grasslands that characterize many parts of West Texas, it is unlikely that relatively small, local disturbances in this habitat will affect its numbers.

Swallow-tailed Kite *Elanoides forficatus*. Possible but unlikely to be seen flying over during migration.

Bald Eagle *Haliaeetus leucocephalus*. It is possible that migrating individuals fly over Andrews County from time to time.

Peregrine Falcon *Haliaeetus leucocephalus*. It is possible that migrating individuals fly over Andrews County from time to time.

Southwestern Willow Flycatcher *Empidonax traillii eximius*. Although this species (and perhaps subspecies) is listed as possible throughout Texas during migration, it is highly unlikely that migrating individuals pass through Andrews County.

DEPTH OF ROOTS AND ANIMAL CAVING

Many plants and animals will invade the first few layers of the soil. The depth of the roots or animal caving will vary with plant and animal species, and soil characteristics.

Root Depths

Little information is available on root depth of grasses. The only species considered in the literature and found in the study site are little bluestem (*Schyzachyrium scoparium*), blue grama (*Bouteloua gracilis*) and buffalograss (*Buchloe dactyloides*). In little bluestem some roots extend laterally near the surface soil. The bulk of the roots run nearly vertically downward to depths of 4.5 to about 5.5 feet. Despite the low stature of blue grama and buffalograss (4-10 inches tall) the root system is extremely well developed, penetrating vertically downward 1.5 to 3.0 feet, depending on the soil.

The information on root depth in forbs is also scarce. No forbs in the study site have been considered for studies of their root depth. Here is some information of other species of the prairie, i.e. stiff sunflower (*Helianthus laetiflorus*). This forb propagates by means of rhizomes. Its roots are very fine reaching vertical depths of 7 to 8 feet. Dotted button snakeroot (*Liatris punctata*) has a very strong taproot that can penetrate to a depth of 7 feet in heavy clay soil, but in lighter soil they can reach depths of 12 to 16 feet. Some shrubs seeking water may grow their root system down to 10-20 feet, however, this information is mostly anecdotal.

Caving done by Ants

Ant nests, such as harvester ants found in the study site, can be extremely complicated structures. A mature colony is usually very large, ranging into the tens of thousands. A full census has not been taken, because no one has succeeded in excavating a complete nest.

Caving done by Mammals

Most of the caving done by mammals is not below the two feet, with exception of the prairie dogs (*Cynomys ludovicianus*) that can construct large galleries under ground. However no prairie dog colony was observed near the core area.

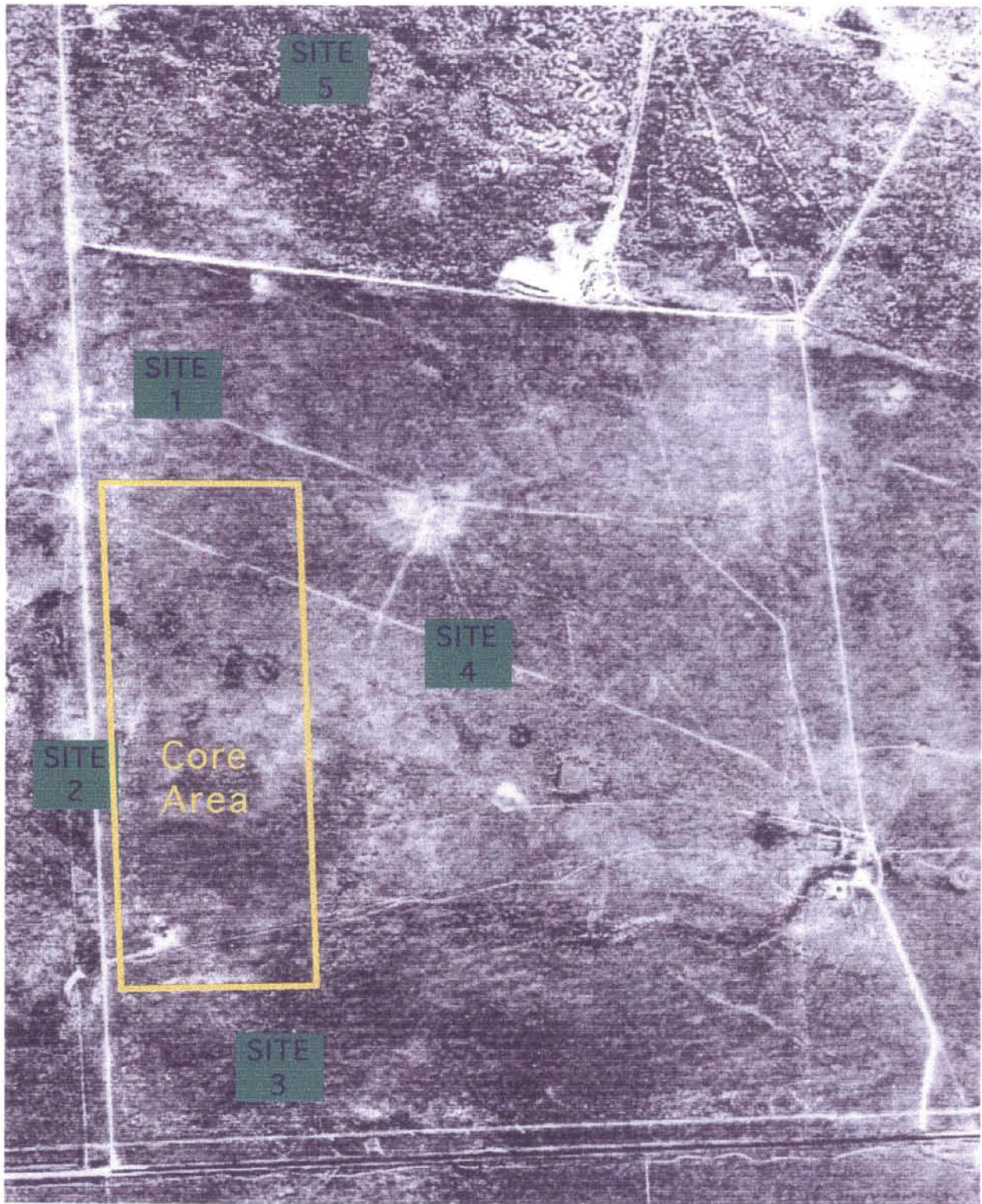


Figure 1. Sampling sites at the WCS Ranch, Andrews Co., Texas, 1996-1997.

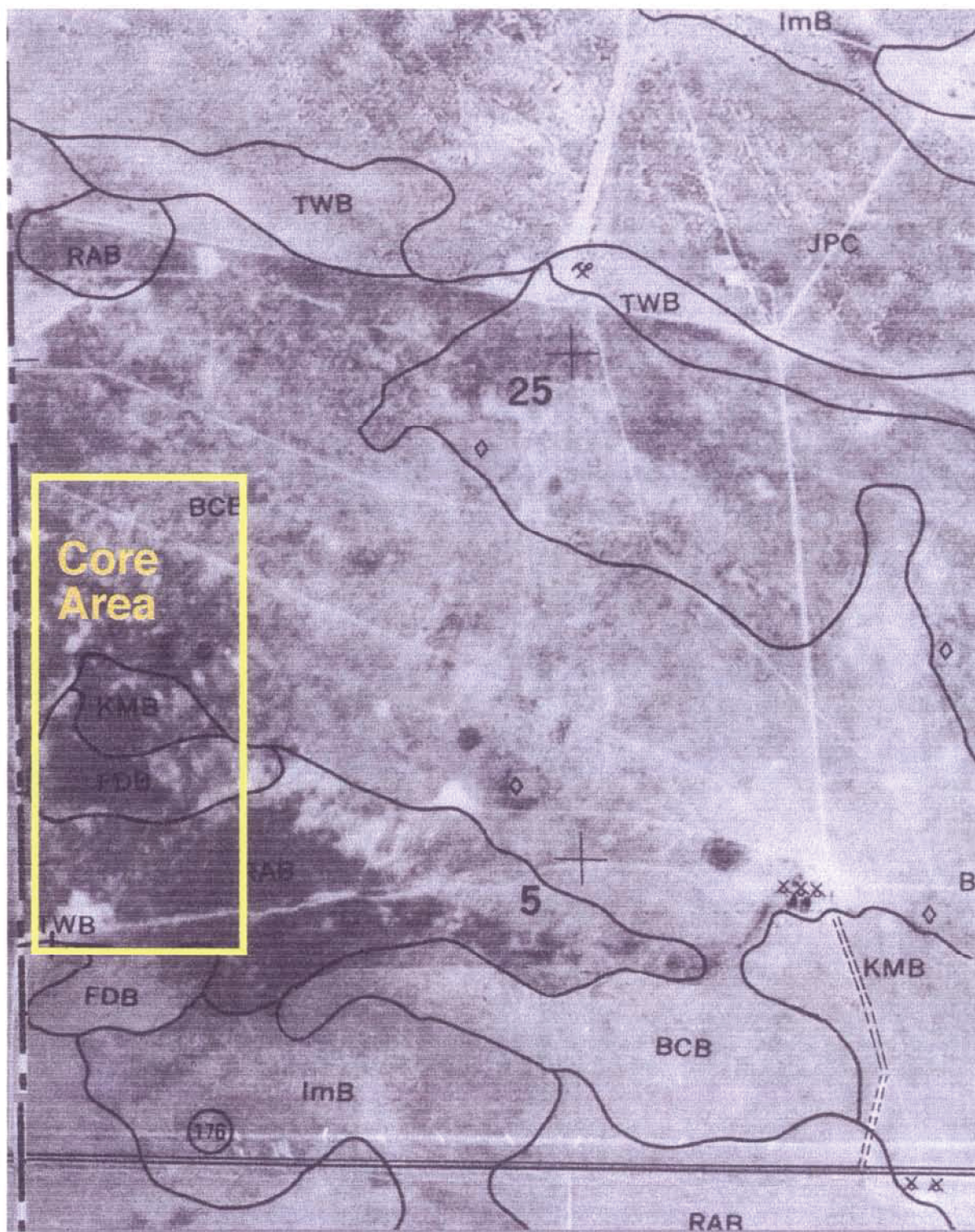


Figure 2. Soils associations at the WCS Ranch, Andrews Co., Texas. Based on Soil survey of Andrews County done by the Soil Conservation Service 1974.

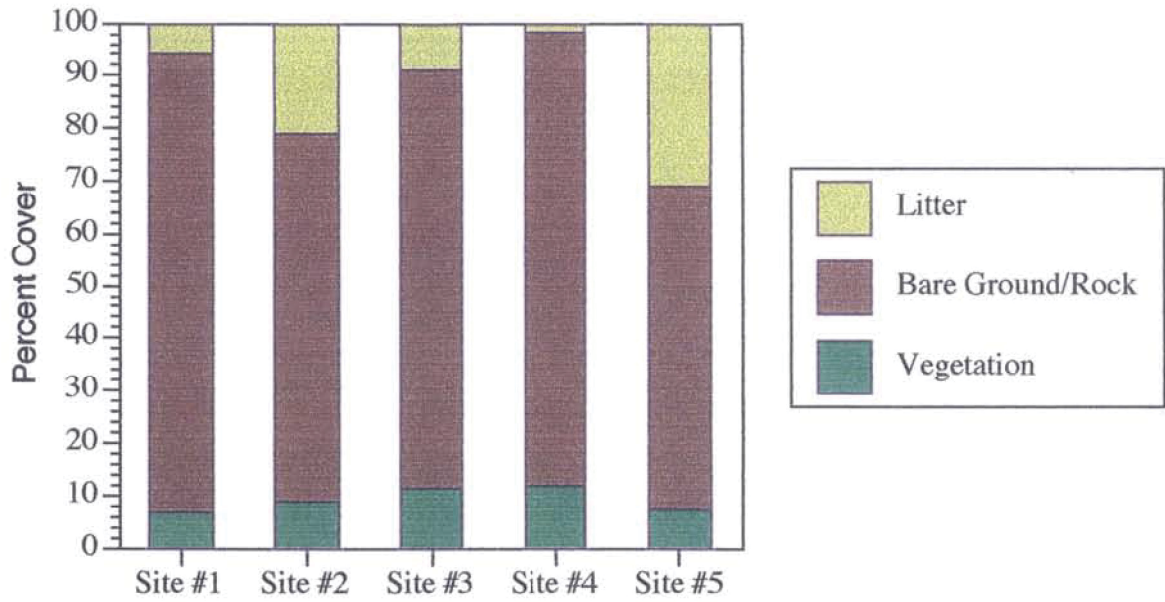


Figure 3. Percent cover of vegetation, bare ground/rock, and litter in the different sites at the WCS Ranch, Andrews Co., Texas, May 1997.

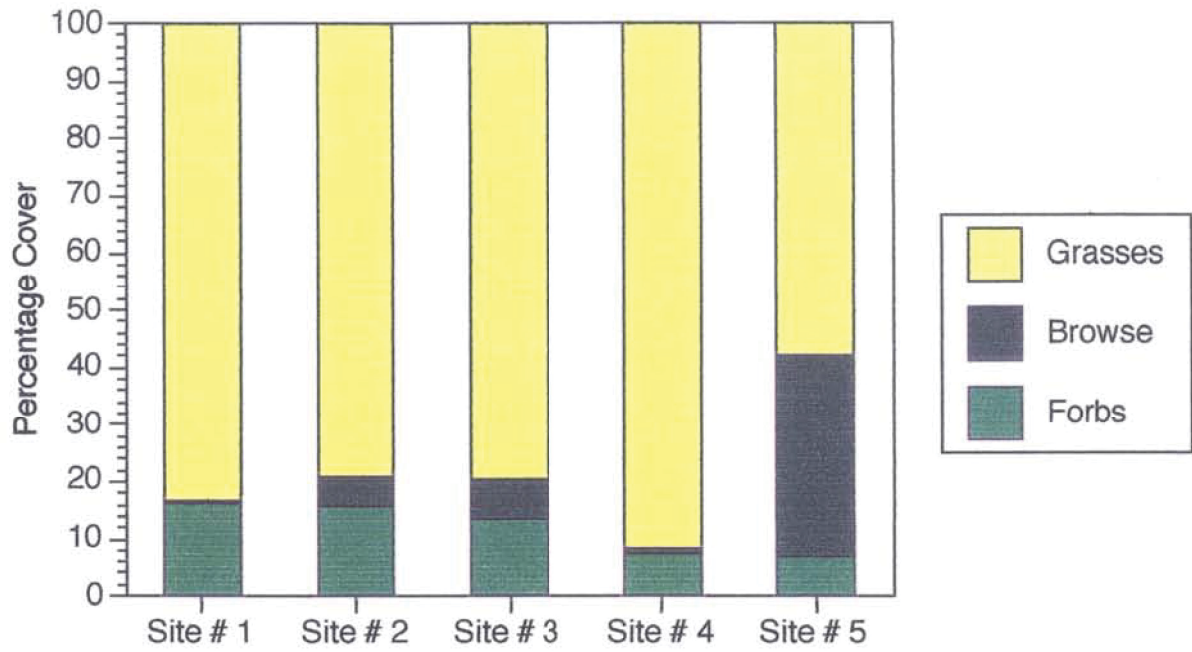


Figure 4. Percent cover of the herb and shrub layers in the different sites. WCS Ranch, Andrews Co., Texas, May 1997.

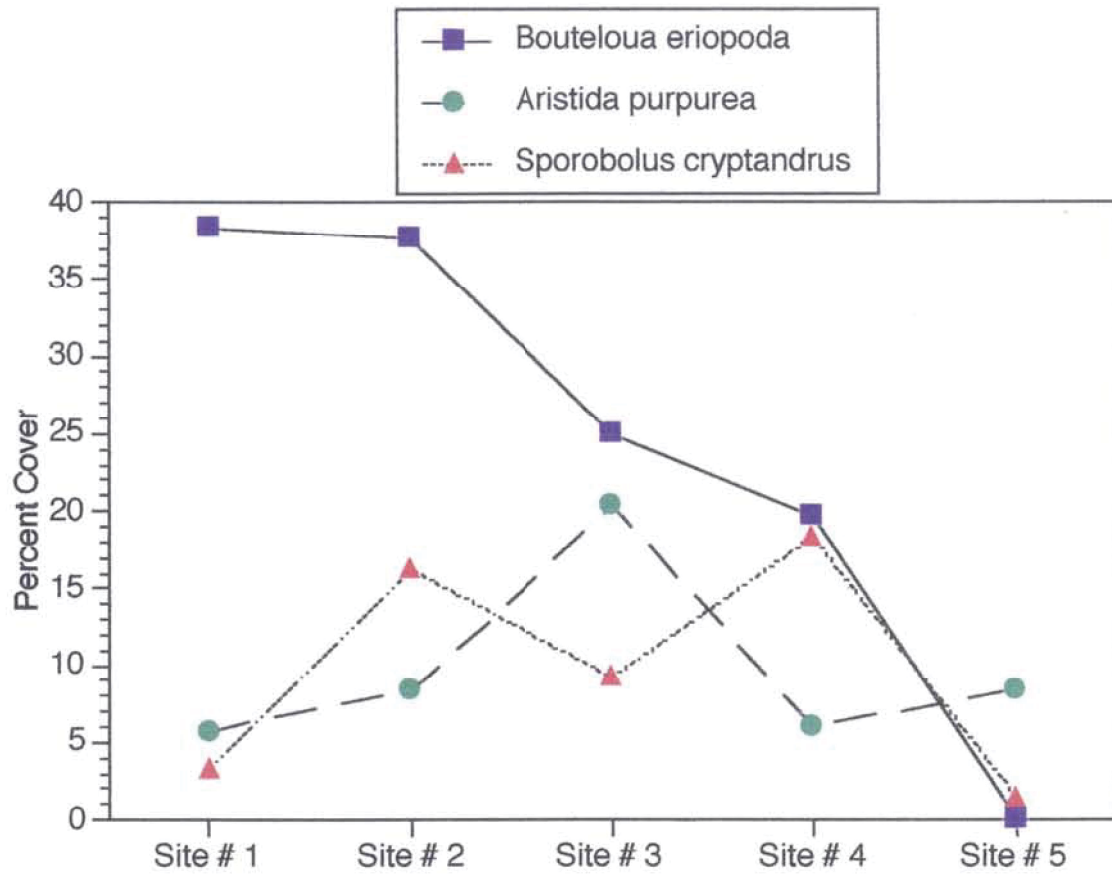


Figure 5. Percent cover of the most dominant types of grasses in the different sites. WCS Ranch, Andrews Co., Texas, May 1997.

Table 1. Plant species found at the WCS Ranch, Andrews Co., Texas, May 1996.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
FORBS						
Milkweed	<i>Aeclepias sp.</i>		X			
Western ragweed	<i>Ambrosia psilostachya</i>					X
Sagewort	<i>Artemisia dracunculoides</i>		X			
Wooly loco	<i>Astragalus mollisimus</i>		X			
Green eyes	<i>Berlandieralyrata</i>	X	X	X		
Sundrop	<i>Calylophus hartwegii</i>	X				
Sundrop	<i>Calylophus serralatus</i>		X			X
Senna	<i>Cassiaroemeriana</i>		X			
Lambsquarter	<i>Chenopodium incanum</i>				X	
Lambsquarter	<i>Chenopodium leptophyllum</i>				X	
Thistle	<i>Cirsium sp.</i>		X			
Day flower	<i>Commelina erecta</i>					X
Bindweed	<i>Convolvulus equitans</i>		X			
Marestail	<i>Conyza coulteri</i>				X	
Croton	<i>Croton dioicus</i>	X	X	X		
Cryptantha	<i>Cryptantha minima</i>	X	X			
Buffalo gourd	<i>Cucurbita sp.</i>		X			
Dalea	<i>Daleanana</i>					X
Larkspur	<i>Delphinium sp.</i>			X		
Tansy mustard	<i>Descurainiapinnata</i>				X	
Spectacle pod	<i>Dythyrea wiseni</i>	X				
Fleabane	<i>Erigeron modestus</i>	X		X		
Fleabane	<i>Erigeron sp.</i>		X			
Annual buckwheat	<i>Eriogonum annuum</i>					X
Mat spurge	<i>Euphorbia sp.</i>		X	X		
Spurge	<i>Euphorbia sp.</i>	X				
Leafy spurge	<i>Euphorbia sp.</i>				X	
Indian blanket	<i>Gallardiapinnatifida</i>		X	X		

Table 1. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
Indian blanket	<i>Gallardia pulchelus</i>	x	x	x		
Gaura	<i>Gaura villosa</i>			x		x
Scarlet gaura	<i>Guaracoccinia</i>	x	x			
Perennial broomweed	<i>Gutierrezia sarothrae</i>	x	x			x
Bluet	<i>Hedyotis humifusa</i>			x		x
	<i>Heliothophum sp.</i>		x			
Whitlow wart	<i>Hoffman seggia jamessi</i>					x
Rushpea	<i>Hoffman seggia densiflora</i>	x				
	<i>Hydrophalaceae sp.</i>	x				
Whoolywhite	<i>Hymenopappus flavescens</i>					x
Ratany	<i>Krameria sp.</i>					x
Pepperweed	<i>Lepidium densiflorum</i>	x				
Bladderpod	<i>Lesquerella gordonii</i>	x	x	x		
Baby white aster	<i>Leucelene ericoides</i>		x	x		
Flax	<i>Linum rigidum</i>					x
Spinny daisy	<i>Machaeranthera pinnatifida</i>	x		x		x
Tahoka daisy	<i>Machaeranthera tanacetifolia</i>	x		x		
Blackfoot	<i>Melampodium leucanthum</i>					x
Stick leaf	<i>Mentzelia sp.</i>	x				x
Four O'clock	<i>Mirabilis linearis</i>		x			x
Rough nama	<i>Nama hispida</i>	x	x			
Primrose	<i>Oenothera laciniata</i>	x				
Primrose	<i>Oenothera speciosa</i>		x			
Cactus	<i>Opuntia</i>		x	x		
Penstemon	<i>Penstemon fendleri</i>					x
Leaf flower	<i>Phyllanthus abnormis</i>					x
Groundcherry	<i>Physalis sp.</i>	x	x	x		
Ground cherry	<i>Physalis viscosa</i>	x				
Plantain	<i>Plantago patagonica</i>			x		
Redstem plantain	<i>Plantago rhodosperma</i>	x				

Table 1. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
Hairy paperflower	<i>Psilostrophe villosa</i>			X		
Prairie coneflower	<i>Ratibida columnaris</i>	X				
Russian thistle	<i>Salsola iberica</i>	X				
Groundsel	<i>Senecio longilobus</i>			X		
Riddell's groundsel	<i>Senecio riddellii</i>	X				X
Silverleaf nightshade	<i>Solanum eleagnifolium</i>	X			X	
Buffalo bur	<i>Solanum rostratum</i>	X				
Silky sophora	<i>Sophora nuttalianus</i>		X			
Mallow	<i>Sphaera angustifolia</i>	X	X			
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	X				
Germander	<i>Teucrium laciniatum</i>		X			
Greenthread	<i>Thelesperma megapotamicum</i>			X		X
Nosebrn	<i>Tragiaramosa</i>	X				
Wooly tidestromia	<i>Tridestromia lanuginosa</i>	X				
Verbena	<i>Verbenaplicata</i>	X				
Sleepdaisy	<i>Xanthisma texanum</i>			X		
Annual broomweed	<i>Xanthocephalum dracunculoides</i>	X		X		
Unknown forb #1		X				
Unknown forb #2			X			

Table 1. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
SHRUBS						
Acacia	<i>Acacia sp.</i>	x				
Sand sagebrush	<i>Artemisia filifolia</i>					x
Rabbit brush	<i>Chrysothamnus pulchellus</i>					x
	<i>Echinocactus texensis</i>	x				
Cholla	<i>Opuntia imbricata</i>	x				
Prickly pear	<i>Opuntia sp.</i>	x				
mesquite	<i>Prosopis glandulosa</i>	x	x		x	x
Sand shin oak	<i>Quercus havardii</i>					x
Soapweed	<i>Yucca sp.</i>			x		x
Unknown woody #1			x			

Table 1. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
<i>Grasses</i>						
Sand bluestem	<i>Andropogon hallii</i>					X
Purple three-awn	<i>Aristida purpurea</i>		X	X		X
Black grama	<i>Bouteloua eriopoda</i>	X		X		X
Blue grama	<i>Bouteloua gracilis</i>	X		X		
Hairy grama	<i>Bouteloua hirsuta</i>					X
Buffalograss	<i>Buchloe dactyloides</i>		X		X	
Sandbur	<i>Cenchrus incertus</i>	X				
Hooded windmillgrass	<i>Chloris cucullata</i>			X		X
Arizona Cottontop	<i>Digitaria californica</i>	X				
	<i>Enneapogon desvauxii</i>	X				
Stinkgrass	<i>Eragrostis cillianensis</i>	X	X			
Gummy lovegrass	<i>Eragrostis curtispedicelata</i>					X
Red lovegrass	<i>Eragrostis oxylepis</i>					X
Fall witchgrass	<i>Leptoloma cognatum</i>					X
	<i>Lycurus phleoides</i>	X				
Muhly	<i>Mulhenbergia sp.</i>	X	X	X		
Halls panicum	<i>Panicum hallii</i>			X		
Vine mesquite	<i>Panicum obtusum</i>	X				
Sand paspalum	<i>Paspalum setaceum</i>					X
Tumblegrass	<i>Schedonnardus paniculatus</i>	X				
Little bluestem	<i>Schizachyrium scoparium</i>					X
Burrograss	<i>Scleropogon brevialius</i>	X				
Plains bristegrass	<i>Setaria leucophila</i>	X				
Sand dropseed	<i>Sporobolus cryptandrus</i>	X		X		X
Mesa dropseed	<i>Sporobolus flexuosa</i>		X	X		X
Giant dropseed	<i>Sporobolus giganticus</i>					X
Slim tridens	<i>Tridens muticus</i>		X			
Unknown grass #1		X				

Table 2. Plant species abundance rating at the WCS Ranch, Andrews Co., Texas, September 1996.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
FORBS						
	<i>Amaranthus sp.</i>				1	
Western ragweed	<i>Ambrosia psilostachya</i>					3
	<i>Aphanostephus sp.</i>				3	
	<i>Artemiacondata</i>					3
Sundrop	<i>Calylophus serralatus</i>					3
	<i>Cassia sp.</i>		1		1	
Lambsquarter	<i>Chenopodium leptophyllum</i>			1		
Day flower	<i>Commelina erecta</i>		1	1		1
	<i>Croton sp.</i>			1		
Dalea	<i>Daleanana</i>					2
Spectacle pod	<i>Dythyraea wilenzii</i>					3
Fleabane	<i>Erigeron sp.</i>	2				
Annual buckwheat	<i>Eriogonum annuum</i>					3
	<i>Erodium sp.</i>			1		
	<i>Euphorbia missourica</i>					2
	<i>Euphorbia sp.</i>	2	1			1
	<i>Froelichia floridiana</i>		1		1	3
	<i>Gallardia sp.</i>					1
Gaura	<i>Gaura villosa</i>					3
Scarlet gaura	<i>Guaracoccinia</i>			1		
	<i>Heliothropum sp.</i>					1
	<i>Heterotheca sp.</i>		1			
	<i>Hymenopappus sp.</i>					3
	<i>Kallestronia sp.</i>				1	
Bladderpod	<i>Lesquerella gordonii</i>	3				
Flax	<i>Linum rigidum</i>					2
	<i>Lygodesnia sp.</i>			1		
Spinny daisy	<i>Machaeranthera pinnatifida</i>	2		2		3
Tahoka daisy	<i>Machaeranthera tanacetifolia</i>					1
Blackfoot	<i>Melampodium leucanthum</i>	1		1		

Table 2. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
	<i>Mirabilis sp.</i>					2
	<i>Mollugo verticellata</i>				1	
	<i>Nothoscordum bivalve</i>	1				
Primrose	<i>Oenothera lacineata</i>	3				
Primrose	<i>Oenothera speciosa</i>	3				
	<i>Palafoxiasphacelata</i>			1		3
	<i>Parthenium sp.</i>		1	1		
Leaf flower	<i>Phyllanthus abnormis</i>					1
Groundcherry	<i>Physalis sp.</i>	1				
	<i>Portulaca sp.</i>	1	3		5	1
Hairy paperflower	<i>Psilostrophe villosa</i>			1		
Prairie coneflower	<i>Ratibida columnaris</i>				1	
Russian thistle	<i>Salsola iberica</i>		1			
Groundsel	<i>Senecio longilobus</i>				1	
Riddell's groundsel	<i>Senecio riddellii</i>					1
	<i>Sida sp.</i>	1			1	
Silverleaf nightshade	<i>Solanum eleagnifolium</i>	1	1	1	1	
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	3	1		1	
Greenthread	<i>Thelesperma megapotamicum</i>					3
Woolly tidestromia	<i>Tridestromia lanuginosa</i>	1	1		1	
	<i>Verbena sp.</i>	3	1	5	3	
	<i>Verbesina encelioides</i>		1			
Sleepdaisy	<i>Xanthisma texanum</i>			1		
Annual broomweed	<i>Xanthocephalum dracunculoides</i>	2		1		

Table 2. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
SHRUBS						
	<i>Ephedra sp.</i>			1		
Prickly pear	<i>Opuntia sp.</i>					2
mesquite	<i>Prosopis glandulosa</i>	5	5	5	5	
Sand shin oak	<i>Quercus havardii</i>					5
	<i>Xanthocephallum sarothrae</i>					1
Soapweed	<i>Yucca sp.</i>			1		3

Table 2. Cont.

Common Name	Scientific Name	Sites				
		1	2	3	4	5
<i>Grasses</i>						
	<i>Andropogon gerardii</i>					1
	<i>Aristida adscensionis</i>					2
Purple three-awn	<i>Aristida purpurea</i>	1	2	4	3	3
	<i>Bothriochloa barbinodis</i>					2
Black grama	<i>Bouteloua eriopoda</i>	4	5	5	4	
Blue grama	<i>Bouteloua gracilis</i>		1		4	
Hairy grama	<i>Bouteloua hirsuta</i>					3
	<i>Bouteloua sp.</i>				1	
Sandbur	<i>Cenchrus incertus</i>					3
Hd. windmillgrass	<i>Chloris cucullata</i>	3	2	3	3	3
	<i>Cyperus sp.</i>					3
Arizona Cottontop	<i>Digitaria californica</i>		1		1	
	<i>Enneapogon desvauxii</i>				1	
Gummy lovegrass	<i>Eragrostis curtispedicelata</i>					1
	<i>Eragrostis megastachya</i>				1	
Red lovegrass	<i>Eragrostis oxylepis</i>					3
	<i>Eragrostis sp.</i>		1			
	<i>Erioneuron pilosum</i>	1	1			
Fall witchgrass	<i>Leptoloma cognatum</i>					3
	<i>Mulhenbergia arenacea</i>		2	1	2	
	<i>Mulhenbergia porteri</i>			1		
Muhly	<i>Mulhenbergia sp.</i>	3				
	<i>Munroa squarrosa</i>				1	
Halls panicum	<i>Panicum hallii</i>	3	1	1	2	
Sand paspalum	<i>Paspalum setaceum</i>					1
Little bluestem	<i>Schizachyrium scoparium</i>					1
	<i>Scledomardus paniculatus</i>				1	
Plains bristegrass	<i>Setaria leucophila</i>		2		1	
Sand dropseed	<i>Sporobolus cryptandrus</i>	2	3	3	3	4
Mesa dropseed	<i>Sporobolus flexuosa</i>					2
Slim tridens	<i>Tridens muticus</i>	4	1			

Table 4. Plant frequency (percentage) of the most important plants in the different sites at the WCS Ranch, Andrews Co., Texas. May 1997.

Scientific Name	Sites					Average
	1	2	3	4	5	
Forbs						
<i>Ambrosia psilostachia</i>					3.33	3.33
<i>Atragalus mollisimus</i>					0.33	0.33
<i>Croton dioicus</i>		0.33		0.33		0.33
<i>Daleanana</i>		0.33			0.33	0.33
<i>Gutierreziasarothrae</i>	1.00	0.33	3.67	0.33	0.33	1.13
<i>Hymenopappus flavescens</i>			0.33		0.67	0.50
<i>Lesquerella gordonii</i>	14.33	5.33	1.33	3.67		6.17
<i>Melampodium leucanthum</i>		8.00	6.67			7.33
<i>Mirabilis linearis</i>					0.67	0.67
<i>Opuntia species</i>			0.33	0.33		0.33
<i>Psilostrophe villosa</i>	0.33		0.33			0.33
<i>Salsola iberica</i>			0.33			0.33
<i>Solanum eleagnifolium</i>		0.33				0.33
<i>Sphaeralceacoccinea</i>	0.33		0.33	2.67		1.11
<i>Stillingia sylvatica</i>					0.33	0.33
<i>Verbenaplicata</i>	0.33	1.00				0.67
<i>Xanthocephalus dracunculoides</i>		0.33			1.00	0.67

Table 4. Cont.

Scientific Name	Sites					Average
	1	2	3	4	5	
Shrubs						
<i>Prosopis glandulosa</i>	0.33	4.33	2.33	1.00		2.00
<i>Quercus harvardii</i>		0.33	4.67		32.00	12.33
<i>Yucca species</i>					3.00	3.00

Table 4. Cont.

Scientific Name	Sites					Average
	1	2	3	4	5	
Grasses						
<i>Andropogon gerardii</i>					1.67	1.67
<i>Aristida longiseta</i>	0.67		1.33			1.00
<i>Aristida purpurea</i>	5.67	8.33	20.33	6.00	8.33	9.73
<i>Bouteloua eriopoda</i>	38.33	37.67	25.00	19.67		30.17
<i>Bouteloua gracilis</i>				13.67		13.67
<i>Bouteloua hirsuta</i>			1.00		0.67	0.83
<i>Cenchrus insertus</i>	0.67				7.00	3.83
<i>Chloris cucullata</i>	0.33	8.67	18.33		0.67	7.00
<i>Cyperus uniloides</i>		1.00	2.00		2.67	1.89
<i>Eragostis oxylepis</i>					4.33	4.33
<i>Eragrostis curtipendicelata</i>	0.33	0.33				0.33
<i>Leptoloma cognatum</i>		3.00			28.33	15.67
<i>Mulhenbergia arenacea</i>	0.66					0.66
<i>Mulhenbergia porteri</i>		0.67	1.33			1.00
<i>Mulhenbergia torreyi</i>				2.00		2.00
<i>Panicum hallii</i>				1.33	0.33	0.83
<i>Panicum spp.</i>	2.00			2.67		2.33
<i>Schizachyrium scoparium</i>					2.67	2.67
<i>Scleropogon brevifolius</i>			0.67	3.67		2.17
<i>Setaria leucopila</i>		3.33	0.33	1.33		1.67
<i>Sporobolus cryptandrus</i>	3.33	16.33	9.33	18.33	1.33	9.73
<i>Tridens muticus</i>	31.33			23.00		27.17

Table 5. Species richness and Shannon's diversity index for the different sites at the WCS Ranch, Andrews Co., Texas. May 1997.

	Sites				
	1	2	3	4	5
Species Richness	20	17	19	16	21
Shannon's Diversity Index	2.180	1.629	2.054	2.142	2.064

Table 6. Test t-Student to test diversity when comparing sites. WCS Ranch, Andrews Co., Texas. May 1997.

t-Student	Site 1	Site 2	Site 3	Site 4	Site 5
Site 1	1	6.26	1.43	0.48	1.26
Site 2		1	4.67	6.15	4.55
Site 3			1	1.06	0.10
Site 4				1	0.89
Site 5					1

dF	Site 1	Site 2	Site 3	Site 4	Site 5
Site 1	1	497	512	748	410
Site 2		1	615	841	508
Site 3			1	827	492
Site 4				1	286
Site 5					1

Significance	Site 1	Site 2	Site 3	Site 4	Site 5
Site 1	1	***	NS	NS	NS
Site 2		1	***	***	***
Site 3			1	NS	NS
Site 4				1	NS
Site 5					1

Note: *** = diversity significantly ($P=0.001$) different between pair of sites; NS = diversity no significantly different ($P=0.001$) between pair of sites.

Table 7. Order and Families of insects collected by using a pit traps in the different sites at WCS Ranch, Andrews Co. Texas. August-September 1996.

		Sites				
		1	2	3	4	5
ORDER						
Scorpionida	scorpions	X				X
Solifugae	windscorpions		X			
FAMILY						
Anthophoridae	diggerbees				X	
Carabidae	groundbeetles	X	X	X	X	X
Cerambycidae	longhornbeetles			X		
Chalcidoidea	wasp		X	X		
Cicadellidae	leafhoppers		X			
Formicidae	ants	X	X	X	X	X
Meloidae	blisterbeetles					X
Orthoptera	grasshoppers	X	X	X	X	X
Pentatomidae	stinkbugs					X
Tenebrionidae	darklingbeetles	X	X	X	X	X
Vespidae	hornets					X

Table 8. Families of insects collected by sweepnetting over the entire area at WCS Ranch, Andrews Co. Texas. August-September 1996.

Family	Insect Type
Bostricidae	twig borers
Carabidae	ground beetles
Cerambycidae	longhorn beetles
Cicadidae	cicadas
Curculionidae	weevils
Mantidae	Praying Mantis
Orthoptera	grasshoppers & crickets
Otitidae	picturewing flies
Phasmidae	walking sticks
Reduviidae	ambush bugs
Scarabidae	June bugs
Scutellidae	Shield back bugs
Tenebrionidae	darkling beetles
Trombidiidae	velvet mites

Table 9. Small mammals collected at WCS Ranch, Andrews Co. Texas. May 1996.

		Sites					
		1	2	3	4	5	TOTAL
FAMILY HETEROMYIDAE: Pocket Mice and Kangaroo Rats							
Hispid Pocket Mouse	<i>Chaetodipus hispidus</i>			2		2	4
Ord's Kangaroo Rat	<i>Dipodomys ordii</i>					1	1
FAMILY MURIDAE: Mice and Rats							
Northern Grasshoper Mouse	<i>Onychomys leucogaster</i>	2	1	2	4	5	14
	<i>Peromyscus</i> spp.			3			3
TOTAL		2	1	7	4	8	22

Table 10. Small mammals captured / collected at WCS Ranch, Andrews Co. Texas.
December 1996.

		Sites					TOTAL*
		1	2	3	4	5	
FAMILY HETEROMYIDAE: Pocket Mice/Kangaroo Rats							
Hispid Pocket Mouse	<i>Chaetodipus hispidus</i>	2	1	1			4 / 4
Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	4	1	23	1	52	81 / 10
Banner-tailed Kangaroo Rat	<i>Dipodomis spectabilis</i>		1	3	1		5 / 2
Silky Pocket Mouse	<i>Perognatus flavus</i>	17	17	2	25	1	62 / 14
FAMILY MURIDAE: Mice and Rats							
Southern Plains Woodrat	<i>Neotoma micropus</i>	1	3	0	5	3	12 / 7
Hispid Cotton Rat	<i>Onychomys leucogaster</i>	22	9	10	44	37	122 / 4
South Plains Woodrat	<i>Peromyscus maniculatus</i>	3	13	4	5	4	29 / 15
Plains Harvest Mouse	<i>Reithrodontomys montanus</i>	3	3	5			11 / 3
TOTAL		52	48	48	81	97	326

* Animals captured / animals collected

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RESEARCHERS VITA

Dr. Fred Bryant, wildlife ecologist, has taught wildlife ecology and conducted research on wildlife for the past 19 years at Texas Tech University (1977 - present). He studied white-tailed deer while working on his Ph.D. at Texas A & M University (1974-1977). His Master's research was on wild turkeys in southern Utah and his degree was from Utah State University (1971-1974). In 1970, he was awarded the B.S. degree from the Department of Range and Wildlife Management, Texas Tech University. Dr. Bryant has directed Ph.D. student research on flora and fauna of Andrews County (1990-1992) and in the Chihuahuan Desert (1990-1992).

Dr. Russell D. Pettit, range ecologist, has been a practicing botany for over 30 years. He taught plant identification at Texas Tech University for 20 years. His Ph.D. was awarded from Oregon State University (1968) and his M.S. at Texas Tech University (1965). He is a native of Kansas and received his B.S. from Ft. Hays State University, Kansas (1963). Dr. Pettit has conducted floristic studies encompassing many counties in and around the site. For example, he and his colleagues did floristic studies on (1) vegetation damage from oil spills near Jal, NM--1972; (2) ranches in Andrews, Winkler, Gaines, Yoakum, Cochran, and Bailey Counties, TX--1974-75; (3) the Gissler Ranch near Artesia, NM--1977; (4) Ortero Mesa, Lea County, NM--1979; and (5) the Pantex Plant, Carson County, TX--1995. Thus, he has extensive experience with vegetation from Chihuahuan Desert, Sand Shin Oak, and Shortgrass Prairie habitats.

Dr. Kent Rylander, ornithologist, has taught ornithology at Texas Tech University since 1965. He received his Master's Degree in Biology from the University of North Texas, with a thesis on the birds of Denton County, Texas; and his Ph.D. from Tulane University in 1965, with a dissertation on the systematics of North American shorebirds. Since 1980, he has conducted ecological assessments for the Texas Low-level Radioactive Waste Disposal Authority in Hudspeth County, Texas; and for the Pantex Reservation in Carson County, Texas.

Dr. Morty Ortega, wildlife ecologist, has conducted field research for the past 20 years and taught at Texas Tech University for the past 6 years. He has worked with many species including small mammals in Bolivia and Chile, guanacos in Chile, prairie dogs in South Dakota, and white-tailed deer in Texas. He received his B.S. from the Ecology and Evolution Department at the Austral University of Chile (1973-1976), his Master's Degree from the Department of

Animal Ecology at Iowa State University (1979-1985), and his Ph.D. from the Department of Range and Wildlife at Texas Tech University (1985-1991). Conducted post-doctoral research in the panhandle of Texas.

Camille Landry, entomologist, has conducted research on insects for the past 4 years, including insect pest in the panhandle of Texas and fire ants in Louisiana. She had done extensive insect collection in Mexico. Ms. Landry received a B.S. from the University of Southwestern Louisiana (1989-1993), and her Master's Degree from the Department of Plant Soil Science at Texas Tech University (1993-1995) on a work related to the management of the red imported fire ant.

APPENDICES

Appendix 1. Plant scientific names and its abbreviation.

Abbreviation	Scientific Name
Amdr	<i>Amphiachyris dracunculoides</i>
Amps	<i>Ambrosia psilistachia</i>
Ange	<i>Andropogon gerardii</i>
Arlo	<i>Aristida longiseta</i>
Arpu	<i>Aristida purpurea</i>
Asmo	<i>Atragalus mollisimus</i>
Boer	<i>Bouteloua eriopoda</i>
Bogr	<i>Bouteloua gracilis</i>
Bohi	<i>Bouteloua hirsuta</i>
Cein	<i>Cenchrus insertus</i>
Cheu	<i>Chloris cucullata</i>
Crdi	<i>Croton dioicus</i>
Cyun	<i>Cyperus uniloides</i>
Dana	<i>Daleanana</i>
Dica	<i>Digitaria californica</i>
Ercu	<i>Eragrostis curtispendicelata</i>
Erpi	<i>Erioneurin pilosum</i>
Erox	<i>Eragrostis oxylepis</i>
Gusa	<i>Gutierrezia sarothrae</i>
Hyfl	<i>Hymenopappus flavescens</i>
Leco	<i>Leptoloma cognatum</i>
Lego	<i>Lasquerella gordonii</i>
Mele	<i>Melampodium leucanthum</i>
Mili	<i>Mirabilis linearis</i>
Muar	<i>Mulhenbergia arenacea</i>
Mupo	<i>Mulhenbergia porteri</i>
Muto	<i>Mulhenbergia torreyi</i>
Opps.	<i>Opuntia species</i>
Paha	<i>Panicum hallii</i>
Para	<i>Panicum ra</i>
Popi	<i>Portulaca pilosum</i>
Prgl	<i>Prosopis glandulosa</i>
Psvi	<i>Psilostrophe villosa</i>
Quha	<i>Quercus harvardii</i>
Saib	<i>Salsola iberica</i>
Scbr	<i>Scleropogon brevifolius</i>
Scsc	<i>Schizachyrium scoparium</i>
Sele	<i>Setaria leucopila</i>
Soel	<i>Solanum eleagnifolium</i>
Spc0	<i>Sphaeralcea coccinea</i>
Spcr	<i>Sporobolus cryptandrus</i>
Stsy	<i>Stillingia sylvatica</i>
Trnu	<i>Tridens muticus</i>
Vepl	<i>Verbenaplicata</i>
Yusp.	<i>Yucca species</i>

Appendix 2. Raw data of plant cover collected in Site 1 to 5.

Data Vegetation WCS - May97

Site #1 Date:30 April 97 Data Type:Step Pt.

Step	Hit	Near Plt.	Veg	BG	Ltr	Rock
1		Trmu		1		
2		Boer		1		
3		Trmu		1		
4		Trmu		1		
5		Trmu		1		
6		Trmu		1		
7		Trmu		1		
8		Trmu		1		
9		Trmu		1		
10		Trmu		1		
11		Boer		1		
12		Lego		1		
13		Boer		1		
14		Trmu		1		
15		Trmu			1	
16		Boer		1		
17		Trmu				1
18		Trmu		1		
19		Trmu		1		
20		Spcr		1		
21		Trmu		1		
22		Trmu		1		
23		Lego		1		
24		Spcr			1	
25		Spcr		1		
26		Trmu		1		
27	Trmu		1			
28		Lego		1		
29		Arpu		1		
30		Spcr			1	
31	Trmu		1			
32		Boer		1		
33		Lego		1		
34		Trmu			1	
35		Trmu			1	
36		Lego			1	
37		Boer		1		
38		Boer		1		
39		Trmu		1		
40		Boer			1	
41		Lego		1		
42		Trmu		1		
43		Trmu		1		
44		Boer		1		
45		Trmu		1		
46		Trmu		1		
47		Trmu		1		
48		Lego		1		
49		Lego		1		
50		Boer		1		
51		Trmu		1		
52		Boer		1		
53		Boer		1		
54		Boer		1		
55		Boer		1		
56		Trmu		1		
57		Trmu		1		
58		Boer		1		
59		Boer		1		
60		Boer		1		
61		Boer		1		

Data Vegetation WCS - May97

62	Boer	1		
63	Trmu	1		
64	Trmu	1		
65	Trmu	1		
66	Trmu	1		
67	Trmu	1		
68	Lego	1		
69	Lego	1		
70	Trmu	1		
71	Boer	1		
72	Lego	1	1	
73	Lego	1		
74	Boer	1		
75	Trmu	1		
76	Boer	1		
77	Boer	1		
78	Lego	1		
79	Lego	1		
80	Trmu	1		
81	Trmu	1		
82	Boer	1		
83	Trmu	1		
84	Boer	1		
85	Boer	1		
86	Trmu	1		
87	Spco	1		
88	Boer	1		
89	Arpu	1		
90	Boer	1		
91	Boer	1		
92	Boer	1		
93	Lego	1	1	
94	Trmu	1		1
95	Trmu	1		
96	Trmu	1		
97	Trmu	1		
98	Boer	1		
99	Lego	1		
100	Boer	1		
101	Boer	1	1	
102	Trmu	1		
103	Boer	1		
104	Trmu	1		
105	Trmu	1		
106	Trmu	1		
107	Boer	1		
108	Lego	1		
109	Boer	1		
110	Boer	1		
111	Trmu	1		
112	Arpu	1		
113	Boer	1		
114	Boer	1		
115	Boer	1		
116	Boer	1		
117	Boer	1		
118	Trmu	1		
119	Trmu	1		
120	Lego	1		
121	Lego	1		
122	Boer	1		
123	Trmu	1	1	
124	Lego	1	1	
125	Boer	1		

Data Vegetation WCS - May97

126		Boer		1
127		Chcu		1
128	Arpu		1	
129		Boer		1
130		Spcr		1
131		Boer		1
132		Boer		1
133		Boer		1
134		Boer		1
135		Gusa		1
136		Arpu		1
137		Para		1
138		Boer		1
139	Arpu		1	
140		Boer		1
141	Arpu		1	
142		Para		1
143		Para		1
144	Boer		1	
145		Boer		1
146	Arpu		1	
147		Para		1
148		Para		1
149		Boer		1
150		Lego		1
151		Boer		1
152		Lego		1
153	Lego		1	
154		Boer		1
155		Boer		1
156		Lego		1
157		Boer		1
158		Para		1
159		Boer		1
160		Boer		1
161	Trmu		1	
162		Lego		1
163		Boer		1
164		Trmu		1
165		Boer		1
166		Trmu		1
167		Boer		1
168		Lego		1
169		Trmu		1
170		Lego		1
171		Boer		1
172		Gusa		1
173		Trmu		1
174		Boer		1
175	Vepl		1	
176		Gusa		1
177		Lego		1
178		Lego		1
179		Boer		1
180		Lego		1
181		Spcr		1
182		Spcr		1
183	Lego		1	
184		Boer		1
185		Trmu		1
186		Lego		1
187		Psvi		1
188		Trmu		1
189		Trmu		1

Data Vegetation WCS - May97

190		Lego		1	
191		Boer		1	
192		Boer		1	
193		Lego		1	
194		Boer		1	
195		Trmu		1	
196		Trmu		1	
197		Boer			1
198		Trmu			1
199		Boer		1	
200	Trmu		1		
201		Trmu		1	
202		Trmu		1	
203	Boer		1		
204		Trmu		1	
205		Lego		1	
206		Trmu		1	
207		Boer		1	
208		Lego		1	
209	Lego		1		
210		Boer		1	
211		Trmu		1	
212		Trmu		1	
213		Lego		1	
214		Trmu		1	
215	Prgl		1		
216		Trmu		1	
217		Boer		1	
218		Boer		1	
219		Boer		1	
220	Trmu		1		
221		Ercu			1
222		Trmu			1
223		Trmu		1	
224		Trmu		1	
225		Boer		1	
226		Trmu		1	
227		Boer		1	
228		Trmu		1	
229		Boer		1	
230		Trmu		1	
231		Boer		1	
232		Boer		1	
233		Lego		1	
234		Boer		1	
235		Trmu		1	
236		Boer		1	
237	Muar		1		
238		Boer		1	
239		Trmu		1	
240		Trmu		1	
241		Trmu		1	
242		Lego		1	
243		Arpu		1	
244		Lego		1	
245		Lego		1	
246		Arpu		1	
247	Boer		1		
248		Lego		1	
249		Trmu		1	
250		Arlo		1	
251		Trmu		1	
252		Boer		1	
253		Muer		1	

Data Vegetation WCS - May97

254		Arlo		1				
255		Boer		1				
256		Boer		1				
257		Cein		1				
258		Boer		1				
259		Arpu		1				
260		Boer		1				
261		Boer		1				
262		Arpu		1				
263		Trmu		1				
264		Boer		1				
265		Arpu				1		
266		Boer		1				
267		Trmu		1				
268		Boer		1				
269		Boer		1				
270	Boer		1					
271		Arpu		1				
272		Boer		1				
273		Boer		1				
274		Boer		1				
275		Boer		1				
276		Boer		1				
277		Boer		1				
278		Boer		1				
279		Trmu		1				
280		Trmu		1				
281		Arpu		1				
282		Spcr		1				
283		Arpu		1				
284		Trmu		1				
285		Boer		1				
286		Spcr				1		
287		Boer		1				
288		Arpu		1				
289		Boer		1				
290		Boer		1				
291		Boer		1				
292		Boer		1				
293		Boer		1				
294		Spcr		1				
295		Boer		1				
296		Trmu		1				
297		Cein		1				
298	Trmu		1					
299		Boer		1				
300		Trmu		1				
		Total	20	260	18	2		300
		Percentage	6.67	86.67	6.00	0.67		

Site #2

Date: 1 May 1997

Data Type: Step Pt.

Step	Hit	NearPt.	Veg	BG	Ltr	Rock
1		Spcr			1	
2		Boer		1		
3		Boer		1		
4	Boer		1			
5		Boer		1		
6		Sele		1		
7	Spcr		1			
8		Spcr		1		
9		Spcr			1	
10		Boer		1		
11		Boer		1		
12		Leco		1		
13		Boer			1	
14	Boer		1			
15		Spcr			1	
16		Spcr		1		
17		Sele			1	
18		Boer		1		
19		Boer		1		
20		Boer		1		
21		Spcr		1		
22		Boer		1		
23		Sele			1	
24		Spcr			1	
25		Boer			1	
26		Boer			1	
27		Boer		1		
28		Boer			1	
29		Spcr			1	
30		Spcr			1	
31	Spcr		1			
32		Boer		1		
33		Prgl			1	
34		Sele			1	
35		Leco		1		
36		Spcr		1		
37		Boer			1	
38		Spcr		1		
39		Boer		1		
40		Spcr		1		
41		Spcr			1	
42		Spcr		1		
43		Gusa		1		
44		Prgl			1	
45		Prgl			1	
46		Spcr			1	
47		Boer		1		
48		Leco		1		
49		Arpu		1		
50		Boer			1	
51		Arpu		1		
52		Boer		1		
53		Chcu		1		
54		Boer		1		
55		Boer		1		
56	Boer		1			
57		Cytm		1		
58		Chcu		1		
59		Spcr		1		
60		Chcu		1		
61		Boer		1		

Data Vegetation WCS - May97

62		Citli		1	
63		Chcu		1	
64	Spcr		1		
65		Boer			1
66		Lego			1
67		Spcr		1	
68		Spcr		1	
69		Boer			1
70		Boer			1
71		Spcr			1
72		Spcr			1
73		Arpu			1
74		Boer		1	
75		Lego		1	
76		Soel		1	
77		Prgl			1
78		Boer			1
79		Spcr			1
80		Spcr		1	
81		Spcr			1
82		Prgl			1
83		Sele			1
84		Boer		1	
85	Boer		1		
86		Spcr		1	
87		Boer		1	
88		Spcr		1	
89		Spcr			1
90		Boer			1
91		Lego		1	
92		Spcr		1	
93		Boer		1	
94		Lego		1	
95	Spcr		1		
96		Mele		1	
97		Boer		1	
98		Lego		1	
99		Lego			1
100		Boer		1	
101		Chcu			1
102		Sele			1
103		Arpu		1	
104		Prgl			1
105		Spcr			1
106		Chcu		1	
107		Arpu		1	
108		Arpu		1	
109		Arpu		1	
110		Chcu		1	
111		Boer		1	
112		Arpu		1	
113	Spcr		1		
114		Chcu		1	
115		Boer		1	
116		Spcr		1	
117	Boer		1		
118		Boer		1	
119		Arpu		1	
120		Boer		1	
121		Boer		1	
122		Lego		1	
123		Boer		1	
124		Boer		1	
125	Spcr		1		

Data Vegetation WCS - May97

126	Spcr		1		
127		Boer			1
128		Boer		1	
129		Boer		1	
130		Boer		1	
131		Boer		1	
132		Boer		1	
133		Boer		1	
134		Boer			1
135		Boer		1	
136		Boer		1	
137		Boer		1	
138		Boer		1	
139		Boer		1	
140		Boer		1	
141		Boer		1	
142		Boer		1	
143		Boer		1	
144		Arpu		1	
145		Arpu		1	
146		Spcr		1	
147	Prgl		1		
148	Chcu		1		
149		Boer		1	
150		Boer		1	
151		Boer		1	
152		Boer		1	
153		Arpu		1	
154		Cyun		1	
155		Lego		1	
156		Arpu		1	
157		Spcr		1	
158		Vepl		1	
159		Boer		1	
160		Arpu		1	
161		Arpu		1	
162		Boer		1	
163		Vepl		1	
164		Lego			1
165		Boer		1	
166		Lego			1
167		Chcu			1
168	Prgl			1	
169		Sole			1
170		Spcr			1
171		Prgl			1
172		Prgl			1
173	Spcr			1	
174		Boer			1
175		Sole			1
176		Boer			1
177		Boer		1	
178		Lego		1	
179		Lego		1	
180		Boer		1	
181		Mele		1	
182		Boer		1	
183		Mele		1	
184		Mele		1	
185		Mele		1	
186		Mele		1	
187		Arpu		1	
188		Mele		1	
189	Chcu			1	

Data Vegetation WCS - May97

190		Boer		1	
191		Mele		1	
192		Mele		1	
193		Arpu		1	
194		Arpu		1	
195		Chcu		1	
196		Chcu		1	
197	Boer		1		
198		Pigl			1
199		Mupo			1
200		Vepl		1	
201		Mele		1	
202		Boer		1	
203	Spcr		1		
204		Mele			1
205		Sele			1
206		Arpu			1
207		Spcr			1
208	Boer		1		
209	Boer		1		
210		Mele		1	
211		Boer		1	
212		Boer		1	
213		Spcr		1	
214		Chcu		1	
215		Mupo			1
216		Sele		1	
217		Boer		1	
218	Boer		1		
219		Boer		1	
220		Leco		1	
221		Spcr		1	
222		Boer		1	
223		Spcr		1	
224		Mele		1	
225		Boer		1	
226		Mele		1	
227		Arpu		1	
228		Boer		1	
229		Chcu		1	
230		Mele		1	
231		Leco		1	
232		Spcr		1	
233		Leco		1	
234		Chcu		1	
235		Boer		1	
236		Boer		1	
237		Boer		1	
238		Pigl		1	
239		Amdr		1	
240		Boer		1	
241		Chcu		1	
242		Arpu		1	
243		Boer			1
244		Boer		1	
245		Boer		1	
246		Leco		1	
247		Mele		1	
248		Spcr		1	
249		Boer		1	
250		Mele		1	
251		Mele		1	
252		Boer		1	
253	Chcu			1	

Data Vegetation WCS - May97

254		Leco		1				
255		Leco		1				
256		Aipu		1				
257		Boer		1				
258		Aipu		1				
259		Chcu		1				
260		Chcu		1				
261		Boer		1				
262		Ercu		1				
263		Spcr		1				
264		Chcu		1				
265	Boer		1					
266		Lego		1				
267		Boer		1				
268		Mele				1		
269				1				
270	Boer		1					
271		Aipu		1				
272		Boer		1				
273		Boer		1				
274		Boer		1				
275		Cyun		1				
276		Leco		1				
277		Chcu		1				
278	Aipu		1					
279		Dara		1				
280		Spcr		1				
281		Boer		1				
282		Lego		1				
283	Lego		1					
284		Chcu		1				
285		Boer		1				
286		Boer		1				
287		Mele		1				
288		Prgl		1				
289		Mele		1				
290		Chcu		1				
291		Boer		1				
292		Mele		1				
293		Mele		1				
294		Mele		1				
295		Chcu		1				
296		Boer		1				
297		Boer				1		
298		Chcu		1				
299		Quha				1		
300		Boer		1				
		Total	27	210	63	0		300
		Percentage	9.00	70.00	21.00	0.00		

Site #3

Date:1 MAY 1997

Data Type:Step Pt.

Step	Hit	Near Plt.	veg	BG	Ltr	Rock
1		Arpu		1		
2		Spcr		1		
3		Boer		1		
4		Gusa		1		
5		Boer		1		
6		Chcu		1		
7		Arpu		1		
8		Spcr		1		
9		Arpu		1		
10		Gusa		1		
11		Arpu		1		
12		Arpu		1		
13		Arpu		1		
14		Gusa		1		
15		Chcu		1		
16		Boer		1		
17		Boer		1		
18		Boer		1		
19		Gusa		1		
20		Boer		1		
21		Arpu		1		
22		Prgl		1		
23		Boer		1		
24	Boer		1			
25		Mele		1		
26		Cyun		1		
27		Boer		1		
28		Chcu		1		
29		Cyun		1		
30		Arpu		1		
31	Boer		1			
32		Boer		1		
33		Boer		1		
34		Chcu		1		
35		Boer		1		
36		Mele		1		
37		Bohi		1		
38		Mele		1		
39		Chcu		1		
40	Boer		1			
41		Mele		1		
42	Arpu		1			
43		Arpu		1		
44		Arpu		1		
45		Arpu		1		
46		Scbr		1		
47		Prgl			1	
48		Spcr		1		
49		Scbr		1		
50		Arpu		1		
51		Arpu		1		
52		Chcu		1		
53		Chcu		1		
54		Chcu		1		
55		Chcu		1		
56	Chcu		1			
57		Chcu			1	
58		Mele		1		
59		Chcu		1		
60		Chcu		1		
61		Spcr		1		

Data Vegetation WCS - May97

62		Arpu		1	
63		Chcu		1	
64		Chcu		1	
65		Arpu			1
66		Boer		1	
67	Boer		1		
68		Arpu		1	
69		Boer		1	
70		Boer		1	
71		Mele		1	
72	Chcu		1		
73		Chcu		1	
74		Chcu		1	
75	Chcu		1		
76		Mele		1	
77		Chcu		1	
78		Chcu		1	
79		Spcr		1	
80		Mele		1	
81		Chcu		1	
82		Chcu		1	
83		Arpu			1
84		Chcu		1	
85		Gusa		1	
86	Arpu		1		
87		Quha		1	
88		Mele			1
89		Arpu		1	
90		Arpu		1	
91		Mele		1	
92		Arpu		1	
93	Gusa		1		
94	Chcu		1		
95	Boer		1		
96		Boer		1	
97		Mele		1	
98		Boer		1	
99		Boer			1
100		Arpu		1	
101	Boer		1		
102		Spcr		1	
103		Arpu		1	
104		Quha		1	
105		Chcu		1	
106		Chcu		1	
107		Mele		1	
108		Chcu			1
109		Quha			1
110	Chcu		1		
111		Arpu			1
112		Quha			1
113		Quha			1
114		Chcu			1
115		Chcu		1	
116	Prgl		1		
117		Chcu		1	
118		Arpu		1	
119	Arpu		1		
120		Quha		1	
121		Mele		1	
122		Cyun		1	
123		Spcr		1	
124		Arpu		1	
125		Chcu		1	

Data Vegetation WCS - May97

126		Saib		1	
127		Chcu		1	
128		Chcu		1	
129	Arpu		1		
130		Chcu		1	
131		Arpu		1	
132		Chcu		1	
133		Mupo		1	
134		Sele			1
135		Chcu		1	
136		Arpu		1	
137		Spcr		1	
138		Arpu		1	
139		Arpu		1	
140		Spcr		1	
141		Chcu			1
142	Quha		1		
143		Prgl			1
144		Spcr		1	
145		Spcr		1	
146		Spcr		1	
147		Spcr		1	
148		Arpu			1
149		Spcr		1	
150		Arpu		1	
151		Arpu		1	
152		Mele		1	
153		Arpu		1	
154		Spcr		1	
155		Boer		1	
156	Opsp.		1		
157		Spcr		1	
158		Arpu		1	
159		Boer		1	
160		Arpu		1	
161		Boer		1	
162		Boer		1	
163		Boer		1	
164		Boer		1	
165	Boer		1		
166		Arpu		1	
167		Boer		1	
168	Arpu		1		
169		Arpu		1	
170		Boer		1	
171		Boer		1	
172		Gusa		1	
173		Cyun		1	
174		Mele		1	
175		Arpu		1	
176		Boer		1	
177	Arpu		1		
178		Mupo			1
179	Quha		1		
180	Boer		1		
181		Boer		1	
182		Arpu		1	
183		Gusa		1	
184		Chcu		1	
185		Boer		1	
186		Boer		1	
187	Arpu		1		
188		Boer		1	
189	Boer		1		

Data Vegetation WCS - May97

190		Gusa		1	
191		Boer		1	
192		Chcu		1	
193		Mele		1	
194	Boer		1		
195		Prgl			1
196	Prgl		1		
197		Arpu		1	
198		Boer		1	
199		Bohi		1	
200		Boer		1	
201		Mele		1	
202		Arpu		1	
203		Boer		1	
204		Boer		1	
205		Chcu		1	
206		Cyun		1	
207		Spcr		1	
208		Chcu		1	
209		Boer		1	
210		Chcu		1	
211		Mele			1
212		Boer		1	
213		Arpu		1	
214		Mele		1	
215		Arpu		1	
216		Spcr		1	
217		Arpu		1	
218	Arpu		1		
219		Arpu		1	
220		Quha			1
221		Quha		1	
222		Chcu		1	
223		Arpu		1	
224		Quha			1
225		Quha			1
226		Boer			1
227		Spcr		1	
228		Mupo		1	
229		Quha		1	
230		Spco			1
231		Bohi			1
232		Chcu		1	
233		Mupo		1	
234		Chcu		1	
235	Spcr		1		
236		Arpu		1	
237		Boer		1	
238		Boer		1	
239		Mele		1	
240		Gusa		1	
241		Chcu		1	
242		Quha		1	
243		Arpu		1	
244		Chcu		1	
245		Chcu		1	
246		Boer		1	
247		Spcr		1	
248		Lego		1	
249		Gusa		1	
250		Psvi		1	
251		Boer		1	
252		Boer		1	
253		Boer		1	

Data Vegetation WCS - May97

254		Boer		1				
255		Boer		1				
256		Chcu		1				
257		Arlo		1				
258		Arlo		1				
259	Boer		1					
260		Spcr		1				
261		Boer		1				
262		Prgl				1		
263	Spcr		1					
264		Chcu		1				
265		Cyun		1				
266		Lego		1				
267	Chcu		1					
268		Spcr		1				
269		Spcr		1				
270		Boer		1				
271		Spcr		1				
272		Arpu		1				
273		Arpu		1				
274		Boer		1				
275		Boer		1				
276		Boer		1				
277		Boer		1				
278		Boer		1				
279		Arlo				1		
280		Chcu		1				
281		Arlo		1				
282		Chcu		1				
283		Spcr		1				
284		Arpu		1				
285		Arpu		1				
286		Boer		1				
287		Boer		1				
288		Boer		1				
289		Boer		1				
290		Boer		1				
291	Boer		1					
292		Arpu		1				
293		Lego		1				
294		Spcr		1				
295		Boer		1				
296		Boer		1				
297		Lego		1				
298		Boer		1				
299		Hyfl		1				
300		Boer		1				
		Total	34	239	27	0		300
		Percentage	11.33	79.67	9.00	0.00		

Site #4

Date:30 APRIL 97

Data Type:Step Pt.

Step	Hit	Near Pt.	Veg	BG	Ltr	Rock
1		Spcr		1		
2		Spcr			1	
3	Spcr		1			
4		Trmu		1		
5		Spcr		1		
6		Trmu		1		
7	Trmu		1			
8	Boer		1			
9		Spcr		1		
10		Trmu		1		
11	Trmu		1			
12	Bogr		1			
13		Trmu		1		
14		Spcr		1		
15		Spcr				1
16		Bogr		1		
17		Bogr		1		
18		Trmu		1		
19		Bogr		1		
20		Spcr				1
21		Spcr		1		
22		Trmu				1
23		Spcr		1		
24	Bogr		1			
25		Bogr		1		
26		Bogr				1
27		Spcr		1		
28	Bogr		1			
29		Boer		1		
30		Boer		1		
31	Spcr		1			
32		Spcr		1		
33	Arpu		1			
34		Boer		1		
35		Spcr		1		
36		Prgl		1		
37		Spco		1		
38		Opsp.			1	
39		Trmu		1		
40		Trmu		1		
41		Spco		1		
42	Boer		1			
43		Boer		1		
44		Spcr		1		
45		Spcr		1		
46		Scbr				1
47		Spcr				1
48		Spco		1		
49		Trmu		1		
50		Trmu		1		
51		Scbr		1		
52		Spcr		1		
53		Arpu		1		
54		Boer		1		
55		Boer		1		
56		Spco		1		
57	Spcr		1			
58		Spcr		1		
59		Spcr		1		
60		Trmu		1		
61		Spcr		1		

Data Vegetation WCS - May97

62		Spcr		1
63		Spcr		1
64		Spcr		1
65		Spcr		1
66		Spcr		1
67		Spcr		1
68		Spcr		1
69		Boer		1
70		Spcr		1
71		Spcr		1
72		Spcr		1
73		Spcr		1
74		Spcr		1
75		Bogr		1
76		Arpu		1
77		Boer		1
78		Trmu		1
79		Muro		1
80		Spcr		1
81		Boer		1
82		Boer		1
83		Bogr		1
84		Bogr		1
85		Bogr		1
86		Spcr		1
87		Bogr		1
88		Bogr		1
89		Bogr		1
90		Bogr		1
91	Bogr		1	
92	Bogr		1	
93	Bogr		1	
94		Bogr		1
95		Bogr		1
96		Bogr		1
97		Bogr		1
98		Bogr		1
99		Bogr		1
100		Bogr		1
101		Bogr		1
102	Trmu		1	
103		Bogr		1
104		Bogr		1
105		Trmu		1
106		Bogr		1
107		Bogr		1
108		Trmu		1
109		Bogr		1
110	Boer		1	
111	Spcr		1	
112		Trmu		1
113		Trmu		1
114		Trmu		1
115		Boer		1
116		Trmu		1
117		Trmu		1
118		Trmu		1
119		Boer		1
120	Paha		1	
121		Arpu		1
122		Boer		1
123	Trmu		1	
124		Crdi		1
125		Arpu		1

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126	Boer		1	
127		Trmu		1
128		Bogr		1
129		Trmu		1
130		Boer		1
131		Muto		1
132		Spco		1
133		Trmu		1
134		Spco		1
135		Boer		1
136		Bogr		1
137		Trmu		1
138		Trmu		1
139		Trmu		1
140		Lego		1
141		Trmu		1
142		Sele		1
143		Selc		1
144		Sele		1
145		Bogr		1
146		Spco		1
147		Boer		1
148		Bogr		1
149		Scbr		1
150		Trmu		1
151		Boer		1
152		Trmu		1
153		Boer		1
154		Trmu		1
155	Boer		1	1
156		Boer		1
157		Spcr		1
158	Trmu		1	1
159		Spcr		1
160		Trmu		1
161		Trmu		1
162		Trmu		1
163		Muto		1
164		Trmu		1
165		Trmu		1
166		Scbr		1
167		Scbr		1
168		Scbr		1
169		Scbr		1
170		Scbr		1
171		Trmu		1
172		Scbr		1
173	Trmu		1	
174		Trmu		1
175		Boer		1
176		Boer		1
177	Spcr		1	
178		Spcr		1
179		Spcr		1
180		Arpu		1
181		Spcr		1
182		Trmu		1
183		Scbr		1
184		Trmu		1
185		Trmu		1
186		Spcr		1
187		Trmu		1
188		Trmu		1
189		Spcr		1

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190		Spcr		1	
191		Boer		1	
192		Scbr		1	
193		Bogr		1	
194		Bogr		1	
195		Paha		1	
196	Paha		1		
197		Paha			1
198		Sele		1	
199		Spcr		1	
200	Muto		1		
201		Boer		1	
202		Bogr		1	
203		Boer		1	
204		Boer		1	
205	Bogr		1		
206		Muto		1	
207		Boer		1	
208		Bogr		1	
209	Muto		1		
210		Boer		1	
211		Boer		1	
212		Boer		1	
213		Boer		1	
214		Trmu		1	
215		Trmu		1	
216		Spcr		1	
217		Spcr		1	
218		Boer		1	
219		Spcr		1	
220		Para		1	
221		Para		1	
222		Trmu		1	
223		Boer		1	
224	Spcr		1		
225		Boer		1	
226		Para		1	
227	Para		1		
228		Arpu		1	
229		Boer		1	
230		Arpu		1	
231		Spcr		1	
232		Boer		1	
233		Para		1	
234		Arpu		1	
235		Para		1	
236		Arpu		1	
237		Para		1	
238		Para		1	
239		Spcr		1	
240	Arpu		1		
241		Boer		1	
242		Boer		1	
243	Boer		1		
244		Lego		1	
245	Spcr		1		
246	Arpu		1		
247		Boer		1	
248		Boer		1	
249		Boer		1	
250		Lego		1	
251		Lego		1	
252		Spcr		1	
253		Trmu		1	

