Technical Report No. 45

COMPREHENSIVE NETWORK SITE DESCRIPTION

PANTEX

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GRASSLANDS BIOME

U. S. International Biological Program

I. *Site name:* Pantex - Texas Tech University Research Farm.

a. The Research Farm is administered through the Board of Regents of Texas Tech University, the President, Vice-Presidents, the Dean of Agricultural Sciences, who is also Director of Farms, and the Farm Superintendent located at Pantex.

b. At present, Texas Tech holds a deed to 5,821.9 acres at an inventoried value of $1,523,660.00. In addition, the university has an agricultural use permit on another 8,000 acres of land now operated by the Atomic Energy Commission.

II. *Location and elevation.*

a. Texas Tech University Research Farm is located in the northern panhandle of Texas, near Amarillo, Texas, in the western edge of Carson County. Ground elevation is approximately 3,590 ft.

b. The Pantex site is located 15 miles east of Amarillo, Texas, on U. S. 60. The main offices, located in the Kilgore Beef Cattle Center, are 0.5 miles north of U. S. 60 on FM 683.

c. Arrangements for work or travel on the site should be made through the Farm Superintendent, Dr. Hollis Klett. The grazed treatment and the exclosure (grazed 1969/ungrazed 1970) are located on deeded land. The ungrazed treatment is located on Atomic Energy Commission land and permission must be obtained through the Farm Superintendent to visit this site.

III. *Size, shape, etc.*

a. The total land area is 16,076 acres, of which Texas Tech has 5,821.9 acres deeded and an agricultural use permit for an additional 8,000 acres. Appendix I is a scale drawing of the facility. Parts of this

tract are in small blocks of odd shapes and sizes thus making management difficult. Non-fenced shortgrass prairie areas can be found adjacent to old building sites and along the railroad right-of-way. These areas, because of man's activities and/or excessive edge effects, limit their use for the ungrazed studies of the grassland biome study.

b. The ungrazed study area is located in a 35-acre pasture bordered on all sides by pasture. Bomb storage structures are located in the pastures on the east and west sides of the plot. This pasture was used for occasional grazing by a few bulls from 1940 to 1966. Since, 1966, no animals have been pastured on it; however, cattle have been held in the pasture for one to three days once or twice a year.

c. The 158-acre pasture which will be used for the grazed treatment and the grazed 1969/ungrazed 1970 treatment, has been grazed moderately to lightly each year in a systematic grazing management procedure. Plant species composition of this pasture is similar to the ungrazed tract; however, a noticeable litter differential is present. This study area is located approximately one mile from the ungrazed site.

IV. *Type of prairie or grassland.*

a. The Pantex site is located in the northeast corner of the Llano Estacado, the physiographic unit of the Great Plains located south of the Canadian River, east of the Pecos Valley of New Mexico, west of the Rolling Plains of Texas and north of the Edwards Plateau. The Llano Estacado, a plateau without prominent topographic features, slopes from 5,000 ft in the northwest to 2,500 ft on the southwest. The area is approximately 20,000 sq miles.

b. The Pantex grassland sites are characterized as shortgrass prairie with blue grama predominating. Throughout the study areas plains prickly pear is very evident. Additionally small colonies of kochia are noticeable near rodent and ant disturbed areas.

c. Vegetative composition and productivity appear to be uniform throughout the study sites. Preliminary sampling indicates that the total aboveground herbage biomass if from 800 to 1,000 lb. per acre.

d. A vegetational inventory has been conducted on the entire grassland area at Pantex. Up to this date, over 115 plant species have been found. Table 1 shows a list of major species which can be found on the study sites.

V. *Climate.*

A general description of the climate was given by Russel (1945) as a steppe, mesothermal with occasional microthermal years, with dry winters. A summary of climatic data is given in Table 1.

a. Rainfall varies widely from year to year with 70% to 80% of the total occurring between May and October as short, intensive thunderstorms covering small areas. An average of ten local hailstorms occur. The average annual rainfall is approximately 21 inches with a range of ten inches in 1956 to 40 inches in 1923. Average annual snowfall varies from less than one inch to over 30 inches with an average of 12 inches; high winds frequently cause considerable drifting, especially on bare cropland.

b. Temperature. Mean annual maximum temperature is 72°F; mean annual minimum temperature is 42°F. The extreme maximum was 108°F recorded in July which is the hottest month; the extreme minimum was -16°F

recorded in February, although January is the coldest month. On the average, two days per year have minima below 0°F. The average frost free season is 197 days, from April 17 to October 31; extremes are from 170 to 240 days. Mean monthly maxima and minima are given in Table 2.

c. There are rapid and wide changes in temperature, with drops of 50° to 60°F in a 12-hour period during the passage of cold fronts which may move at speeds as high as 40 mph. The prevailing strong winds, with an average annual average of 63,245 miles, are apparently caused by the absence of sheltering mountain ranges and the fact that the area is in the path of major areas of high and low pressure.

d. The nearest U. S. Weather Bureau is located at the Amarillo Air Terminal, six miles west of the site.

VI. *Soils, topography, exposure.*

a. Topographically the Pantex site is nearly a level plain. Excluding the 10% to 15% slopes at the margin of playa lakes, all land seldom has over a 4% slope. Thus surface water runoff from the upland sites is slow.

b. Due to the persistent high winds on the North Texas Panhandle, wind erosion is of more significance in soil loss than is water erosion. According to Weather Bureau records the average wind velocity on a yearlong basis is 7.1 mph.

c. The Pullman silty clay loam which predominates in all of the North Texas Panhandle is the soil present on the study sites. The Pullman soil has been classified as a reddish chestnut soil and has a brown compact clayey subsoil which restricts water percolation. The substrata are permanently dry and the soil is seldom wet for extensive periods of time.

d. Laboratory analyses indicate that clay percentages average about 30% in the surface soil and may exceed 50% in the subsoil. Montmorillinite is the dominant clay in this soil.

e. The Pullman silty clay loam has a buried soil at about 33 inches. Apparently a soil was first developed from medium-textured sediments then was buried by wind deposited finer-textured sediments. A typical profile description is as follows:

Pullman silty clay loam located
in the northwest corner of Section 198,
Survey Block 9, Randall County, Texas

A1 0-8 inches, dark brown (10YR4/3) clay loam; dark brown (10YR3/3) when moist; dark grayish-brown (10YR4/2) in lower part when dry; weak, fine, granular structure; hard when dry, friable when moist, non-calcareous; clear boundary.

B21t 8-12 inches, dark grayish-brown (10YR4/2) clay; very dark grayish-brown (10YR3/2) when moist, moderate, fine and very fine, subangular and irregular blocky structure; very hard when dry, very firm when moist; continuous thick clay films, few fine pores; few wormcasts; non-calcareous; clear boundary.

B22t 12-23 inches, dark grayish-brown (10YR4/2) clay; very dark grayish-brown (10YR3/2) when moist; moderate to strong, medium blocky structure; extremely hard when dry, very sticky and plastic when moist; continuous thin clay films; few very fine pores; non-calcareous; gradual boundary.

B23tca 23-33 inches, brown (7.5YR5/2) clay; dark brown (7.5YR3/2) when moist; similar structure to that of B22t except that some of the blocks tend to be platy; consistence, clay films, and porosity as in B22t; strongly

calcareous with few small, soft masses of $CaCO_3$ mostly between peds; gradual boundary.

B2tb1 33-46 inches, reddish-brown (5YR5/4) clay loam; dark reddish-brown (5YR3/4) when moist, weak, fine and medium, subangular blocky and weak blocky structure; very hard when dry, sticky and plastic when wet; continuous clay films and threads of $CaCO_3$; strongly becoming weakly calcareous in lower part; gradual boundary.

B2tb2 46-62 inches, reddish-brown (5YR5/4) clay loam; reddish-brown (5YR4/4) when moist; weak, medium blocky and fine subangular blocky structure; very hard when dry, sticky and plastic when wet; few films and threads of $CaCO_3$; few black films or coatings, apparently of manganese oxide on ped surfaces; soil mass non-calcareous; abrupt boundary.

VII. *Physical facilities.*

a. The $530,000.00 Kilgore Beef Cattle Center has facilities for storing and mixing feed rations, fifty experimental cattle pens, a scale house, an air-conditioned arena, a library, laboratory and office space, a conference room, a catering kitchen and an apartment. In addition, a 28 x 40 ft brick building with water, heat, and lights will be availabl for IBP work. Minor renovations are planned to provide office and laboratory space for graduate students and investigators. Phone number and address of the main office is 806-335-1606; P. O. drawer 7, Pantex, Texas 79069.

b. A drying oven and ashing oven, berlese funnels, binocular microscopes, desk calculator, typewriter, and a Metler balance will be available. Shop facilities for repairing field equipment will be available through the Farm Superintendent.

c. The apartment in the Kilgore Beef Cattle Center has bath and cooking facilities, beds for three people and space for three or four cots or bedrolls. This facility is usually used by two or three graduate students during the summer but is available at other times. Arrangements can be made to use the shower facilities at any time.

Camping and trailer space, with water and electricity will be available near the IBP headquarters. A KOA campground is located between the site and Amarillo. Motels in all price ranges are available in Amarillo, 15 miles away, where the nearest restaurants are located. There is a restaurant at the air terminal, approximately six miles from the site.

VIII. *Previous studies and continuing long-term projects.*

Previous studies at the Texas Tech University Research Farm have been summarized in the publication, "Twenty Years of Progress in Agricultural Research, Education and Public Service." ICASALS Special Report No. 27. Texas Tech University, Lubbock, Texas. Limited copies are available from the Dean of Agricultural Sciences.

a. Major studies have been in the following areas:

1. Animal nutrition, including rations, digestibility, and intake and composition of diets of grazing animals.
2. Animal breeding, including performance bull testing, crossbreeding, selection in sheep and cattle, and carcus quality evaluation.
3. Crop sciences, including grain and forage sorghum variety and fertilization trials, irrigation and weed control.
4. Soil sciences, including detailed morphological and mineralogical studies of soil profiles.

5. Range management, including interseeding, reseeding, range pitting, fertilization and prickly pear control.

6. Entomology, including biology and control of the greenbug, brown wheat mite and false wireworm on wheat.

b. Aerial photographs in two-, four-, and eight-inch scale are available from USDA-SCS Cartographic Unit, P. O. Box 11222, Fort Worth, Texas. Maps are also in the most recent soil survey for Carson County, Texas, published in 1962 by Jacquot, *et al.* and is numbered USDA-SCS 1959 No. 10.

IX. *Publications about the area.*

Blood, R. D. and R. J. Hildreth. 1958. Late spring and early fall low temperatures in Texas. Texas Agr. Exp. Sta. Miscellaneous Pub. 298.

Bloodgood, D. W., R. E. Patterson, and R. L. Smith. 1954. Water evaporation studies in Texas. Texas Agr. Exp. Sta. Bull. 787..

Jacquot, L. L. [ed.]. 1962. Soil survey of Carson County, Texas. USDA-SCS Series 1959, No. 10.

Lotspeich, F. B., and M. E. Everhart. 1962. Climate and vegetation as soil forming factors on the Llano Estacado. J. Range Manage. 15:134-141.

Russel, R. J. 1945. Climates of Texas. Ann. Ass. Amer. Geogr. 35: 37-52.

Table 1. Major plant species found on the Pantex grassland biome research areas.

Common Name	Scientific Name	Longevity	Origin
Red three-awn	*Aristida longiseta* (Steud.)	P	N
Purple three-awn	*Aristida purpurea* (Nutt.)	P	N
Sand dropseed	*Sporobolus cryptandrus* (Torr.) Gray	P	N
Blue grama	*Bouteloua gracilis* (Wild ex H.B.K.)	P	N
Buffalograss	*Buchloe dactyloides* (Nutt.) Engelm	P	N
Tumble windmillgrass	*Chloris verticillata* (Nutt.)	P	N
Western wheatgrass	*Agropyron smithii* (Rydb.)	P	N
Little barley	*Hordeum pusillum* (Nutt.)	A	N
Prairie sunflower	*Helianthus petiolaris* (Nutt.)	A	N
Prairie coneflower	*Ratibida columnaris* (Sims)	P	N
Snow-on-the-mountain	*Euphorbia marginata* (Pursh)	A	N
Golden dalea	*Dalea aurea* (Pursh)	P	N
Wild alfalfa	*Psoralea tenuiflora* (Pursh)	P	N
Scarlet globemallow	*Spharalcea coccinea* (Pursh) Rydb.	P	N
Halfshrub sundrops	*Oenothera serrulata* (Nutt.)	P	N
Wooly plantain	*Plantago purshii* (R & S)	A	N
Plains prickly pear	*Opuntia polyacantha*	P	N
Kochia	*Kochia scoparia* (L.) Schrad	A	N

A - Annual

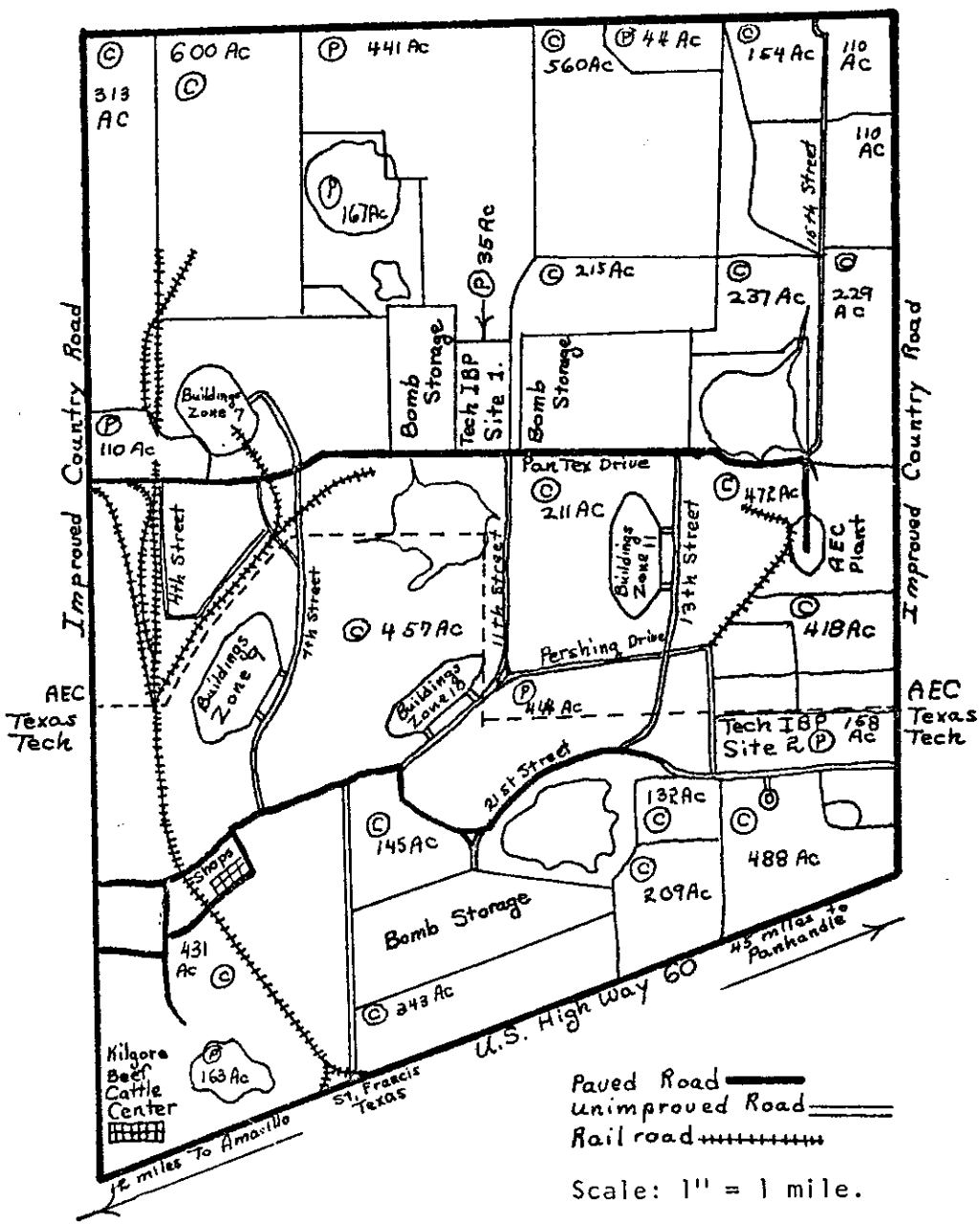
P - Perennial

N - Native

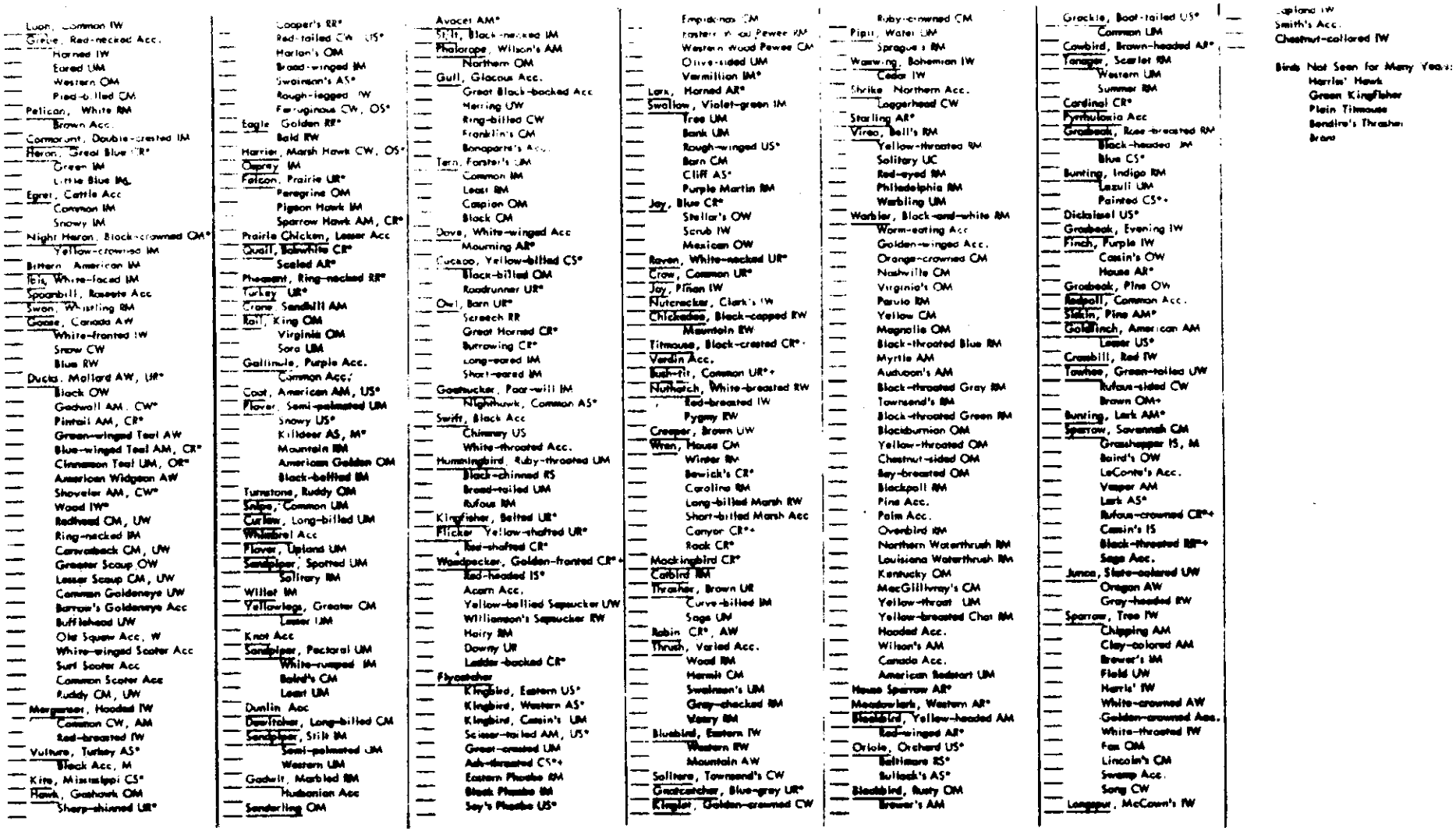
Table 2. Mean monthly and annual meteorological data for stations from which evaporation records are available.

Amarillo	Length of Record Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Evaporation - B.P.I. Pan (Inches)	2	2.50	3.74	5.72	7.67	8.56	11.19	11.32	9.36	6.88	6.26	3.62	2.53	79.35
Evaporation - Y Pan (Inches)	3	3.16	4.03	6.83	8.62	9.77	10.98	12.08	9.97	8.66	6.96	4.13	2.41	87.60
Evaporation - W.B. Pan (Inches)														
Experiment Station	26	--	--	--	7.64	9.28	10.87	11.12	10.17	7.85	--	--	--	--
Standardized Station	3	3.42	4.16	7.37	9.47	11.26	13.12	13.10	11.22	8.95	7.14	3.79	2.45	95.45
Rainfall (Inches)														
Amarillo W.B. Station	62	.54	.72	.80	1.56	3.06	2.81	2.61	2.98	2.21	1.76	.95	.77	20.77
Exp. Sta. Bushland	15	.55	.38	.41	1.30	2.91	2.53	2.51	2.57	1.68	2.14	.75	.71	18.44
Mean Maximum Temperature (°F)	15	51	56	65	72	80	89	91	90	85	74	61	53	72
Mean Minimum Temperature (°F)	15	23	26	30	40	50	60	63	62	54	44	31	25	42
Mean Relative Humidity (%)	14	60	58	48	49	54	50	50	50	51	52	53	59	53
Wind Movement (Miles)	15	5,203	5,296	6,517	6,150	5,720	5,459	4,688	4,461	4,774	4,571	4,541	4,865	62,245

Appendix I. Pantex Site Map



Field Check-list, Texas Panhandle Audubon Society



Code: A - abundant
C - common
U - uncommon
O - occasional
Acc - accidental
M - migrant
S - summer
W - winter
* - breeding
+ - only in canyons