MULESHOE & GRULLA NATIONAL WILDLIFE REFUGES

Bailey County, Texas
Roosevelt County, New Mexico

ANNUAL NARRATIVE REPORT

Calendar Year 1986

U.S. Department of the Interior

Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

Recd 3-31-87 RZ JH

MULESHOE & GRULLA NATIONAL WILDLIFE REFUGES

Bailey County, Texas
Roosevelt County, New Mexico

ANNUAL NARRATIVE REPORT

Calendar Year 1986

Johnny N. Beall — Refuge Manager — 3-26-87 — Date

James I. Hubert — Refuge Supervisor Review — 4-2-87 — Date

W. Ellis Kent — Regional Office Approval — 4/7/87 — Date

MLS1 Refuge Files

INTRODUCTION

Muleshoe NWR is located on the High Plains of West Texas along State Highway 214. It is 20 miles south of Muleshoe in Bailey County. The refuge, established by Executive Order No. 7214 on October 24, 1935, is the oldest National Wildlife Refuge in Texas.

The refuge consists of 5,809.1 acres broken by two caliche outcroppings in the form of rimrock. Approximately 4,800 acres are covered with short grasses and scattered mesquite. Three saline lakes on the refuge provide over 1,000 surface acres of water and marsh when they are full. There usually is much less surface water present. The refuge was originally acquired due to the waterfowl use on the lakes. Since then, changes in land use practices in the surrounding area and an extended period of reduced runoff has resulted in a decrease in waterfowl habitat.

Beginning in the early 1930's, sandhill cranes began using the High Plains in ever increasing numbers. The cranes roost on saline or large playa lakes at night and fly out to surrounding agricultural fields at dawn to feed on waste grain. Muleshoe NWR normally hosts the largest concentration of sandhill cranes in North America, and by definition the world, during the winter months. The roosting population on Muleshoe NWR peaked at over 250,000 birds on February 14, 1981.

HISTORY

The acquisition of land progressed quickly after President Roosevelt signed the Executive Order establishing the refuge. The first tract purchased was 738 acres from George and Mattie Robinson and Annie Robinson on August 17, 1936. This land includes the area where the refuge headquarters is located. The second tract of 2,214.00 acres was purchased from Henry and Vivian Wilson on February 6, 1937 and included Goose Lake. The Bureau of Biological Survey purchased 1416.80 acres, including Paul's Lake and all of the land lying east of the old (abandoned) right-of-way for the Muleshoe-Morton road, from J.H. Paul and F.A. and Mattie H. Paul on December 23, 1936. The last tract of land of 1,440.30 acres was acquired from Isaac and Crawford Enochs as of October 14, 1938.

The refuge lands were placed under the protection of a caretaker in May, 1937 and the first manager, J.K. Walton, arrived on August 24, 1937. A Works Progress Administration (WPA) Project was established February 1, 1938 and work started on the headquarters buildings and the residence diversion canal. By May 1, there were 77 WPA workers on payroll, increasing to 112 workers by June 1. At this time, all transportation was over the old, unpaved Muleshoe-Morton road. Work was frequently hampered by problems of getting WPA workers to the refuge from Muleshoe and Morton due to wet, slippery road conditions. The present state highway 214 (paved) was built in 1941. All of the buildings and major improvements on dikes and roads were completed between May 1, 1938 and May 24, 1942, when the WPA Project was terminated due to a lack of manpower. The number of WPA workers dropped rapidly after 1939 and only about 10-15 worked in 1942.

During the early years, water was present in nearly all lakes every year and the number of ducks using the refuge during the winter frequently exceeded 300,000. Geese were never present in large numbers like ducks, but several thousand usually used the lakes. The number of waterfowl in recent years has been drastically reduced to less than 30,000 ducks and a few thousand geese. This can be attributed to the nationwide decline in waterfowl numbers, less water available, and the abundant available food supply near other Panhandle lakes due to increased farming and irrigation.

One interesting item found while reviewing the records is the small number of sandhill cranes that used the refuge in the early days. Today, Muleshoe refuge is well known for the huge concentrations of 100,000 to 250,000 sandhill cranes that visit the refuge most years. During the early refuge history, the number of cranes present was commonly reported at 3,000-15,000. The sharp increase in sandhill

crane use is probably the result of the reduced water in the lakes, leaving large open expanses for the cranes to roost on and the abundant food supply due to irrigation.

In January, 1945, Muleshoe Refuge recorded the first documented case of avian cholera among wild, free-flying waterfowl. It is believed this first outbreak was the result of infected domestic chickens being disposed of in roadside ditches near the refuge. Outbreaks still occur on the refuge and cholera outbreaks occur nearly every year somewhere in the Panhandle, killing thousands of birds.

The refuge has changed very little since the "early" days. Wildlife is still abundant during winter months, only now it is sandhill cranes instead of ducks that attract visitors to this winter haven. Only three new buildings, an office and shop in 1982 and a storage building in 1979, have been added in the 50 years since the WPA days. The future of Muleshoe is secure and hopefully, in the **next** 50 years, our children and grandchildren will be able to visit and observe or listen to the calls of the sandhill cranes.

I N T R O D U C T I O N

Page

T A B L E O F C O N T E N T S

F. HABITAT MANAGEMENT

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

K. FEEDBACK

L. INFORMATION PACKET

HIGHLIGHTS

- Employees receive Special Achievement Awards (section E.1).
- Complex Manager transfers (section E.1).
- Prescribed burn accomplished (section F.9).
- Duck use up 76%; goose use down 72% (section G.3).
- Crane use decreases (section G.4).
- Displays and VCR for Visitor Contact Station received (section H.6).
- Interpretive signs for wayside exhibits received (section H.6).
- Refuge open house well-received (section H.7).
- Main entrance road and Paul's Lake road converted to all-weather surface (section I.2).

B. CLIMATIC CONDITIONS

During 1986, Muleshoe NWR received 26.92 inches of precipitation at refuge headquarters. The official U.S. Weather Service station at Muleshoe NWR was established November 1, 1966, with 1967 the first full year of record. An unofficial station was maintained at refuge heaadquarters beginning January 1, 1953. The 26.92 inches of precipitation recorded in 1986 is the third highest amount since then and the highest since 1969. Precipitation in 1986 was up 62% from the 1967-1985 average of 16.62 inches. This year was also the third consecutive year of over 20 inches of precipitation. Enochs Pond, approximately two miles south of refuge headquarters, received 21.06 inches of moisture in 1986. The gauge on the East Unit was moved from the old food plot in the middle of the unit to the gate at highway 214. This gauge, approximately three miles northeast of headquarters, received 27.00 inches of precipitation in 1986. Evaporation from April 1 through September 30 totaled 55.43 inches. This is 2.06 times the rainfall.

The following chart summarizes the weather conditions for 1986 and provides the 19 year rainfall average (1967-1985) for comparison.

Weather Conditions

January 1 - December 31, 1986

Precipitation

Month	Snowfall	Average	CY	Max.Temp.	Min.Temp
JAN		0.40	0.00	78	10
FEB	5.7	0.45	0.75	86	2
MAR		0.57	0.70	86	26
APR		0.89	0.67	91	29
MAY		1.69	2.62	99	36
JUN		2.32	5.49	96	52
JUL		2.51	1.74	102	56
AUG		2.73	3.12	106	55
SEP		2.16	4.41	92	42
OCT		1.90	3.90	84	25
NOV	T	0.55	1.84	75	16
DEC	10.5	0.44	1.68	65	18
TOTAL	16.2	16.61	26.92	EXT.106	2

The high temperature for the year was 106° F on August 2 and the low was 2° F on February 10. The temperature reached 100° F on thirteen days. High temperature records were set on 25 days and tied on two more. Low temperature records were set on nine days and tied on one more.

MLS2-7/86 RFK

White Lake-All Refuge Lakes Held Water Most of the Year

All lakes held some water at the beginning of 1986. All except Upper and Lower Paul's Lakes dried up by mid-May. Repeating from last year, major rainfall occurred in May, June, September, and October, with the largest amount being 2.62 inches on June 7 and 8. This heavy rain fell over much of the area around the refuge and some distance to the north and west. This rain filled Upper Paul's lake past the spillway level and filled Upper Goose Lake to within two feet of the spillway. Water running over the spillway in Paul's Lake filled the lower lake. Water occurred in Upper Goose Lake for only the third time in nine years and at the highest level since 1969. July and August were below normal in both precipitation and evaporation. Heavy rains fell again during September and October. By the end of the year Lower Paul's Lake was almost three feet deep while the upper lake still trickled over the spillway. Upper Goose Lake was still almost five feet deep and all other lakes still held plenty of water.

D. PLANNING

2. Management Plans

During 1986, Muleshoe NWR submitted the Animal Control Plan to the Regional Office. Approval had not yet been received by the end of the year.

5. Research and Investigation

Soil Erosion Rates on Muleshoe NWR, Texas
Bureau of Economic Geology, University of Texas, Austin, Texas.

The field portion of the project was completed during 1985. The following draft report was produced from the data collected on the refuge and at other sites in the panhandle.

> EROSION RATES AND PROCESSES IN SUBHUMID AND SEMIARID CLIMATES, TEXAS PANHANDLE: STATISTICAL EVALUATION OF FIELD DATA by William W. Simpkins & Thomas C. Gustavson. Prepared for U.S. Department of Energy, Office of Nuclear Waste Isolation under contract # DE-AC97-83WM46651. Bureau of Ecomonic Geology, The University of Texas, Austin, TX.
>
> "Since 1978, the Bureau of Economic Geology has been monitoring the rainfall amount and intensity, soil and air temperature, soil electrical resistance (soil moisture), slope erosion and deposition, and slope retreat at six stations in the Texas Panhandle. Erosion rate and climatic data recorded at these stations on slopes near

draws in the interior of the Southern High Plains, large playa lake basins, and along the Caprock Escarpment in the Texas Panhandle indicate that slope erosion, slope retreat, and stream headcut retreat are occurring at relatively rapid rates. Precipitation intensity, slope, vegetation, and soil texture significantly influence erosion and deposition in the study area; however, the indications of these variables to produce erosion are not well understood. Minor soil movements disaggregate soil and sediment for later transport by surface runoff.

Muleshoe NWR is one of these sites. A climate monitoring station located on the High Plains surface north of Goose Lake and four sets of erosion pins around the lower lake provided data for the portion of the study on Muleshoe NWR. Two sets of pins in mudstone and playa bottom sediments on the north side of the lake demonstrate rapid soil creep and volume changes with changes in soil moisture. Erosion on the playa bottom is evidenced by erosion pins being completely excavated in less than six months. The other two sets of pins are located in lee dunes east of Goose Lake, both east and west of Highway 214. Soils on these lee dunes are highly susceptible to rill, gully, and probably wind erosion."

Microearthquake Survey of the Texas Panhandle
Stone and Webster Engineering Corp., Boston, MA. under contract for the U.S. Department of Energy

During 1983, sixteen monitoring stations were set up in the Texas Panhandle, including one on Muleshoe NWR. The station is free standing with a solar powered radio transmitter. Data from all stations is transmitted to a collection point in Amarillo, Texas for analysis.

About 24 minor tremors occurred in the northern Panhandle of Texas and in Eastern New Mexico in the last two and one-half to three years but none occurred in the Muleshoe area. The study on Muleshoe NWR was terminated by October 30, 1986.

Jump-Yipping Behavior in Black-Tailed Prairie Dogs (Cynomys ludovicianus)
W.J. Loughry, University of California, Davis, CA.

During 1986, Mr. Loughry submitted two papers concerning prairie dog/ snake interactions for publication based on the results of this study:

THE DYNAMICS OF SNAKE HARASSMENT BY BLACK-TAILED PRAIRIE

DOGS, BEHAVIOR (in press)

DIFFERENCES IN EXPERIMENTAL AND NATURAL ENCOUNTERS OF BLACK-TAILED PRAIRIE DOGS WITH SNAKES, ANIMAL BEHAVIOR (submitted 1/7/87)

These papers discuss the differences in harassment of snakes by black-tailed prairie dogs. During the study, two western diamondback rattlesnakes and two bullsnakes (large and small of each species) were tethered in the prairie dog colony NNE of the refuge office. Observations were made on these and wild, unrestricted snakes in the town as they interacted with the black-tailed prairie dogs. These observations in both natural and experimentally-induced encounters indicated substantial differences in how various age/sex classes deal with snakes.

Acid Rain Deposition Study
National Atmospheric Deposition Program under the auspices of the U.S. Geological Survey.

This study, begun in June 1985 with the setting up of a precipitation collection station at the refuge headquarters, continued through 1986 with the collection and analysis of precipitation at refuge headquarters. The field portion of this study is conducted by refuge personnel. After field analysis, the samples (including those with no precipitation) are sent to The Illinois Water Survey Central Analytical Lab in Champaign, IL.

E. ADMINISTRATION

1. PERSONNEL

	PFT	PPT	TFT
FY-86	3	1	1
FY-85	4	0	1
FY-84	4	0	1
FY-83	4	1	1
FY-82	2	2	0

Fy-82 PPT refuge clerk converted to PFT at end of year.
FY-83 PPT maintenance worker to PFT, PFT clerk retired, TFT clerk hired.
FY-84 TFT clerk converted to PFT.
FY-85 PFT clerk resigned, TFT clerk hired.
FY-86 TFT clerk converted to PPT.

Refuge Clerk Margaret Gregory received a Special Achievement Award for developing computer programs for

refuge use.

MLS3-2/86 1 - 2 - 3 - 4 RFK
Refuge Staff - FY 86

1. Rod Krey-Complex Manager-GS11-Transferred to Salt Plains Refuge 8/86.
2. Margaret Gregory-Refuge Clerk-GS4-Transferred to Salt Plains Refuge 1/87.
3. Dean Gilliam-Maintenance Worker-WG8-PFT.
4. Allen Jones-Resident Refuge Manager-GS9-Transferred to Brazoria Complex 2/87.

Maintenance Worker Dean Gilliam received a Special Achievement Award for development work he and others completed at Buffalo Lake NWR.

Refuge Clerk Gregory received a promotion from a TFT GS-1 to a TFT GS-4 in the spring. Effective September 14, 1986, she was converted to PPT.

Complex Manager Rod Krey transferred to Salt Plains NWR effective August 17, 1986. Assistant Manager Johnny Beall of Buffalo Lake received a temporary promotion to become Acting Complex Manager through the end of the year.

MLS4-2/86 REF
Maintenance Worker Gilliam Receiving Award

2. Youth Programs

Muleshoe NWR hosted a YCC camp from June 9 through August 1, 1986. The camp included 6 enrollees and one leader - Larry Brotherton of Sudan. Larry is the industrial arts teacher at Sudan High School.

The projects completed by the YCC enrollees were selected to accomplish needed work on the refuge as well as to provide a variety of experience. YCC enrollees tore out the obsolete restroom in the YCC stall in the old office, installed interpretive signs, built new and tore out old fence, reposted boundary signs, repaired and painted buildings and other structures, built an observation platform, cleaned up obsolete posts, wire, and cable from around the refuge, mowed lawns, and generally assisted the refuge staff.

As a public service, the Muleshoe NWR YCC camp cleaned and repaired the restrooms at the baseball park in Sudan, TX.

The Muleshoe NWR YCC crew visited the Texas Tech Museum, Planetarium, and Ranching Heritage Center along with the YCC crew from Buffalo Lake NWR. They had also intended to tour the Lubbock Lake Archeological Site on the trip,

but it was closed due to high water. Instead, an archeologist at the Tech museum discussed the significance of the site with them at the museum. On July 25, the YCC enrollees hosted a cookout at the refuge for their families.

MLS5-7/86 RFK
YCC Installing Signs at Highway Rest Area

4. Volunteer Programs

No formal volunteer programs exist at this station. However, assistance from groups and individuals occurs regularly. The Llano Estacado Audubon Society of Lubbock, Texas assisted with census work at various times during the year. Volunteers also assisted with the refuge banding program. Volunteers donated 600 hours of work during FY 1986, as documented in the semi-annual volunteer service reports.

5. Funding

Funding for FY 1982 through FY 1986 is as follows:

FY 1986	Total O&M	ARMM	RPRP	Fire
1260	167,000			
1520	12,500			
1971	510			
8610	1,200			
TOTAL	180,010			

FY 1985	Total O&M	ARMM	RPRP	Fire
1260	180,100	47,000	29,000	3,000
1520	12,000			
1994	2,000			
TOTAL	194,100	47,000	29,000	3,000

FY 1984	Total O&M	ARMM	RPRP	Fire
1260	123,400	20,000		2,000
1520	14,600			
1994	2,000			
TOTAL	140,000	20,000		2,000

FY 1983	Total O&M	CM
1210	104,000	19,000
1220	9,000	
1240	8,000	2,000
1520	16,370	
1994	1,500	
6810	5,500	
TOTAL	144,370	21,000

FY 1982	Total O&M	CM	BLHP CAF
1210	79,000	16,000	
1220	4,600		
1230	500		
1240	5,000	2,000	
1994	1,500		
2821			1,123
TOTAL	90,600	18,000	1,123

6. Safety

Safety meetings were held regularly by the staff of Muleshoe NWR. All available staff participated in these meetings including YCC staff and enrollees, when the camp was in session. Items discussed included office safety, adverse weather preparedness, use of protective clothing, hearing conservation, heat exhaustion, safety problems peculiar to YCC, fire extinguishers and their use, and proper use of ladders and tools. Safe driving practices including defensive driving and use of seat belts were stressed all year. Safety films viewed during the meetings covered defensive driving, tornado

safety, fire extinguishers, and traffic violations. At the April safety meeting, the warnings and preparedness meteorologist from the Lubbock office of the National Weather Service presented a program on tornados. It included a film and a slide series of recent disastrous tornados in West Texas.

During 1986, the old well house at refuge headquarters was converted into a storm shelter. The WPA crew on Muleshoe NWR in the late 1930's constructed this building mostly underground with only the frame roof sticking up. A local contractor replaced this roof and filled two well windows with six inches of concrete. The refuge staff poured a new floor, finished the walls, rerouted the water lines through this building (formerly used as a pumphouse), and built a cellar door. During 1987, we plan to cover the building with blowsand for insulation and paint the inside wall white to enhance lighting. A box fan was acquired to provide ventilation while working in small, dusty areas such as in this shelter. See also section I.1.

The 1967 Case 531 farm tractor, which must be and is used a great deal, was discussed at various times during the year as being potentially dangerous. The front axle has been broken and rewelded many times in several places and the PTO could not be shut off at times. The former is a nuisance and a constant source of frustration. The PTO, on the other hand, was quite dangerous and caused the tractor to be red-lined until it was repaired. The generator was also repaired.

MLS6-7/86 RFK

Broken Front Axle - Case Tractor

No lost time accidents occurred in 1985. The present record of 12,743 calendar days without a lost time accident stretches back to February 11, 1952.

A fire equipment technician from Clovis, NM performed the annual inspection on all fire extinguishers and made needed repairs.

7. Technical Assistance

Muleshoe maintains eleven LP gas powered "Scar-away" guns for use in the local area to keep sandhill cranes, waterfowl, and other migrating birds away from agricultural crops. ADC depends on Muleshoe NWR for depredation control work in this area. During 1986, 12 guns and two boxes of craker shells were loaned out. Most requests for assistance are received from August through December. (see also section F.10)

8. Other Items

Official Visitors - FWS

February 28	Mike Spear RD-R2 - visit Les Beatty DARD-RW - visit John Winship Reg. Pilot - visit
April 1	Lee Marlatt RM - Bitter Lake NWR - visit Kathy Wood ARM - Bitter Lake NWR - visit
July 28	Bill Long ARM - Salt Plains NWR - Borrow Equipment Leroy Ackley MW - Salt Plains - Borrow Equipment
December 29	C.D. Littlefield Crane Researcher - Malheur NWR - visit

Training and Meetings

Complex Manager Krey	- Zone 2 Project Leaders meeting, Hagerman NWR - 2/24-27 - Region 6 Waterfowl Disease Coordinating Committee, Kearney, NB - 4/1-5 - Talk on waterfowl capture techniques at animal control conference, Midland, TX. 4/23-24 - 40 hr. LE Refresher, Albuquerque, NM. 5/19-23 - Interagency Playa Lakes Disease Council (IPLDC),

	Lubbock, TX. 5/14-15
	- Wildlife Resources Programmatic, Albuquerque, NM. 8/4-8
Refuge Manager Jones	- 40 hr. LE Refresher, Albuquerque, NM. 5/14-15
	- LE update and pistol requalification, Washita NWR, 10/15
YCC Crew Leader Brotherton	- YCC Safety Orientation, Albuquerque, NM. 6/3-4

F. HABITAT MANAGEMENT

2. WETLANDS

All lakes, including Upper Goose Lake, held some water at the beginning of the year. The extremely limited precipitation through mid-May resulted in both parts of Goose and White Lakes going dry. By the end of May, all lakes except Upper Goose had caught some water. Upper Goose Lake filled to within two feet of the spillway as a result of the storm on June 8. The 5.20 reading on the gauge in this lake accounted for the first time the reading had been over one foot since prior to 1978 and the highest reading since June 1970, when it still held water from a peak of 12.00 feet following a severe hail storm in June 1969. Lower White Lake went dry in mid-July for a short period. Other than that, all lakes held plenty of water through the end of the year (see also section B).

MLS7-8/86 RFK

Paul's Lake

4. Croplands

No crops are raised on Muleshoe NWR. However, crops grown on farmland surrounding the refuge strongly influence sandhill crane and waterfowl use of Muleshoe NWR. Various studies of sandhill cranes on the High Plains have suggested that the amount of milo (grain sorghum) grown in the surrounding area is one of the factors in the selection of roost lakes. The cranes also utilize winter wheat fields for feeding and resting. Although cotton fields are occasionally used for daytime roosts, their primary influence on sandhill crane concentrations is to reduce the number of preferred milo and winter wheat fields. The table below compares the total acreage of the three most important farm crops grown in Bailey County that influence waterfowl and sandhill crane populations.

Bailey County Crops (Acres)

Crop	1984	1985	1986
Cotton	102,500	89,600	80,300
Winter Wheat	65,000	75,000	54,000
Milo	30,000	70,000	75,000

Muleshoe refuge is located in the southern half of Bailey County, which is primarily dryland farming with cotton, wheat, and milo the primary crops. The northern half of Bailey County is mostly irrigated farming with fields of corn, soybeans, and vegetables frequently grown.

5. Grasslands

Blue grama and buffalograss dominate the upland grass communities while alkali sacaton dominates the high lime soils near the lakes. The rank, almost monotypic stands of the alkali sacaton are both unpalatable to cattle and of limited usefulness to wildlife. Approximately 300 acres were burned in unit #A3 on March 13 to open up the dense stand of alkali sacaton and promote new growth (see section F.9.). The new grazing system implemented last year was added to this year by additional electric fencing and installation of water line and stock tanks (see section f.7.).

7. Grazing

Grazing on Muleshoe NWR during 1986 was permitted under special use permit #MLS-86-1 to Lewis Brothers of

Muleshoe, Texas, which allowed 80 AUM's of cattle to be grazed for six months on the refuge at $5.00/AUM. Four pastures were grazed this year and three were rested. The table below indicates the number of days the cows and calves were in each pasture.

Pasture #	# AUMS	Dates Grazed	Days
P5	80	May 1 - May 25	25
P4	80	May 26 - June 15	25
P7	80	June 16 - July 1	16
P5	80	July 2 - July 21	20
P4	80	July 22 - August 15	25
P7	80	August 16 - Sept. 15	31
P2	80	Sept. 16 - October 31	46
TOTAL	480	May 1 - October 31	184

MLS8-7/86 RFK
Grazing Permitted Under New Grasslands Management System
View Looking North From Headquarters

The Snell solar powered electric fence continued to work extremely well. The solar cell kept the 12 volt battery charged and the fence was very "hot". All grazing units now have water available with the installation of a tank and line in pasture P2 in January. This line, approximately one mile long, was dug with the refuge backhoe except where the local telephone cooperative bored under State highway 214. This completes the

system as originally planned, with water readily available in all pastures to help distribute grazing pressure and provide water for wildlife. After using this system the last two years, we need to consider splitting unit P2 at the narrow point at the refuge corner and P3 along the north side of Goose Lake.

Grazing fees were set at $5.00/AUM for this year. The grazing rate will increase to $6.00/AUM in 1986. It will continue to increase by $1.00/year until it reaches $8.50/AUM in 1989, as indicated by a grazing rate appraisal completed in 1985 by a contract appraiser.

9. Fire Management

MLS9-3/86 RFK

Resident Manager Jones Igniting Prescribed Burn

The fire crews from Muleshoe and Buffalo Lake NWRs ignited planned burn unit #A3 on March 3. There was a northeast wind at five to nine mph. The relative huimidity of 51% at the start dropped to 25% at the end of the burn. The fire cleaned about 80% of the dead alkali sacaton and broom snakeweed from approximately 300 acres. New growth provided a green cover on the area by the end of March. The northeast wind was ideal for burning this unit and would be for many units on this refuge except that it is uncommon enough that it can't be planned on. We also started burning after lunch to allow the Buffalo Lake crew time to get here.

It is normally better to start as early in the morning as possible so as to be finished by the time the wind picks up. Again, the northeast wind allowed this procedure but we can't count on it in the future.

MLS10-3/86 MLV
Aerial Photo of Prescribed Burn - Goose Lake in Foreground, White Lake in Rear

G. WILDLIFE

2. Endangered and Threatened Species

Bald eagles occasionally wandered onto Muleshoe NWR between January 1 and early April and again between mid-October and early December.

3. Waterfowl

Waterfowl use days increased 49% in CY 86 from 835,000 to 1,248,000. Goose use decreased 72% from 129,000 use days in CY 85 to 36,000 U/D in CY 86. Duck use increased 76% from 688,000 to 1,212,000 U/D. Most waterfowl use again occurred in January and during the fall migration and early winter. Waterfowl use was limited during late winter and the spring migration when little water was present on the refuge.

MLS11-2/86 RFK

Mallard x Pintail Cross Trapped While Banding

Major duck species during 1986 included green-winged teal - 507,000 use days, American wigeon - 311,000 U/D, northern shoveler - 131,000 U/D, northern pintail - 67,000 U/D, and mallard - 48,000 U/D. Goose use included Canada geese - 32,000 U/D, snow geese - 3,300 U/D, and white-fronted geese - 30 U/D. The white-fronts are listed as rare by the Muleshoe NWR birdlist.

Several species of ducks listed as rare or accidental occurred on the refuge this year. A female oldsquaw in winter plumage, first observed on Paul's Lake in Mid-December 1985, remained on the lake until mid-May. Female oldsquaws were again seen on the refuge in November and December 1986. Both fall sightings (1 on 11/17, 2 on 12/27) occurred on Upper Goose Lake. A female black scoter, first observed on Upper Paul's Lake on May 12, remained on the Lake until June 23. A female surf scoter appeared on Upper Paul's Lake June 23 and remained until July 4. Two female surf scoters stopped on Upper Goose Lake on October 20. A male Eurasian wigeon was observed on Upper Paul's Lake on February 19. Two common goldeneyes visited the refuge on March 31. Three hooded mergansers were observed on November 10 and one on December 27. The black and surf scoters and the Eurasian wigeon are new species for the refuge. The oldsquaw is accidental and the common goldeneye and hooded merganser are rare visitors. Ten blue-winged teal and five ruddy ducklings fledged on Upper Paul's

Lake during the summer of 1986.

During 1986, peak goose populations (1,900) occurred January 6 and the peak duck concentration occurred November, 10 (29,000). Peaks for individual species are as follows:

Canada geese	1,800	1/06
Snow geese	200	2/15
Green-winged Teal	18,000	11/10
American Wigeon	7,000	11/17
Gadwall	3,600	11/10
Northern Shoveler	3,500	11/10
Pintail	2,100	2/10
Mallard	1,700	11/10
BW/Cinnamon Teal	1,700	9/22

4. Marsh and Water Birds

Sandhill cranes continued on the roller-coaster begun last fall. Only 44,000 cranes were present on January 1, 1986. The number roosting on the refuge varied between 73,000 and 10,000 during January and February. The population dropped to 19,000 on the first of March, beginning the decline as the cranes moved out to the north. About 175 cranes remained into the second week of April. Sandhill cranes returned to Muleshoe NWR on October 3 when eleven were observed on White Lake. The number built quickly to 78,000 by the beginning of November. Crane use then dropped off. A front moving through the area on November 10 dropped the number to 30,000. It built back to 58,000 just before Thanksgiving but dropped to only 15,000 immediately afterward. Crane use increased to 31,000 just before Christmas but was below 20,000 the rest of the month. Reasons for the drastic drop in crane use are unclear but may be related to the high water level in Paul's Lake, the amount of water available in the surrounding area and the location of food sources. Several hunting guides in the area have also commented on the absence of cranes both on the refuge and in the surrounding area.

American coots were quite common for this station all year. With a spring peak of 550 on April 21 and a fall peak of 1500 on November 17, they accounted for 55,000 use days on the refuge. They also nested on the refuge and fledged ten young. Eared grebes were common on Paul's Lake again during the spring, peaking at 20 on April 14. Pied-billed grebes nested on Goose Lake and fledged 10 young. The peak was 20. Black-crowned night herons, which peaked at 15 on September 8, also nested and produced five young. White-faced ibis stopped at the refuge on both north and south migrations, with a spring peak of 27 on April 21 and a fall peak of 21 on August 19.

MLS12 REF

Roosting Sandhill Cranes

Unusual species (for this station) observed during 1985 included a double-crested cormorant (rare-10/6), a little blue heron (acc.-5/27), an American bittern (rare-4/28, 5/27, 7/1, & 8/5), a least bittern (new species-6/9), and five yellow-crowned night herons (rare-10/6).

5. Shorebirds, Gulls, Terns and Allied Species

Gulls were the only members of this group present on the refuge at the beginning of the year except for some resident killdeer. A few peeps showed up in late February, and long-billed curlews returned in early March. Otherwise, the shorebird migration began in late March and lasted through May.

Shorebird use during June, July, and August was limited due to high water in Paul's Lake. The exception to this were Wilson's phalaropes, which peaked at 5,400 birds on July 28. These swimming sandpipers covered much of the 100 acre Lower Paul's Lake during July, August, and September.

Nesting species such as killdeers, snowy plovers, American avocets, and black-necked stilts spread out into new edge areas created by the high lake levels. The fall migration ran from mid-July through the end of October.

MLS13-8/86 RFK

Shorebirds Using Paul's Lake

Unusual sightings during 1986 included a ruddy turnstone (acc.-5/27), a pectoral sandpiper (rare-9/20), a marbled godwit (acc.-7/21 & 9/22), sanderlings (acc. 4-9/1, 1-9/8, 5-10/6, 1-10/13, & 3-10/20), and a common tern (rare-10/20).

6. Raptors

Solitary Mississippi kites (rare-9/1 & 9/7) and an osprey (acc-9/17) were observed on the refuge during the year.

7. Other Migratory Birds

Rare and accidental birds seen on the refuge in 1985 and not discussed in other sections include the following:

Species	Date	Status
lesser nighthawk	4/28 (1)	rare
Cassin's kingbird	4/28 (1)	rare
common bushtit	12/27 (15)	accidental
catbird	4/28 (2)	rare
blackburnian warbler	9/20 (1)	accidental
yellow-headed blackbird	7/20 first nesting record	
western tanager	9/7 (1)	rare

black-headed grosbeak	9/7 (1)	rare
house finch	spring first nesting record	
Lincoln's sparrow	12/27 (1)	rare

The Llano Estacado Audubon Society of Lubbock, Texas conducted the Christmas bird count on Muleshoe NWR on December 27. Eleven people counted 21,952 birds of 60 species, including 17,200 sandhill cranes.

10. Other Resident Wildlife

Although Muleshoe NWR has always carried the bobcat on reports and lists as occurring on the refuge, no records of recent sightings existed. Two sightings in 1986 remedied this situation. The first sighting occurred when a cat flushed from the Bois d'Arc orchard at headquarters during the late evening on November 23. The Llano Estacado Audubon Society of Lubbock made the second sighting during the Christmas bird count on December 27. They surprised this cat in a draw leading up the bluffs north of the Goose Lake dike.

Ring-necked pheasants seem to be slightly increasing on the refuge as well as in most of the area south of the sandhills (south of Muleshoe).

14. Scientific Collections

Refuge personnel collected one drake redhead, one drake lesser scaup, and two scaled quail for mounting and display at the office visitor center. Personnel from the Clovis, NM zoo captured 15 injured cranes on the refuge for display at the zoo. Two were later transferred to the Alamagordo, NM zoo and one to the Roswell, NM zoo.

15. Animal Control

Muleshoe NWR assisted area farmers with control of crop damages from migratory birds (See section E.7).

Approximately 1500 prairie dog holes around the refuge headquarters area, east of the well house, and on adjacent private land were treated with two phostoxin pellets each. The project was completed by personnel from Muleshoe and Buffalo Lake NWRs, along with the neighbor's hired hand. We estimated about 65% success overall.

16. Marking and Banding

The staff of the Muleshoe NWR Complex was again requested to band "as many as possible" of the Texas state quota of 4,000 mallards (2,000 of each sex). Swim-in traps were set on Muleshoe and on playas, as well as on an impounded stream near Bovina and Hub, in

Parmer Co., Texas. The off-refuge sites are about 40 miles north, northwest of Muleshoe NWR. The banding program during January and February of 1986 yielded a total of 1,326 birds. This included 783 mallards (518 male, 265 female), 243 American wigeon, 164 northern pintails, 131 green-winged teal, and five gadwall.

MLS14-1/86 RFK

Swim-in Banding Trap on White Lake

17. Disease Prevention and Control

We received a report of sandhill cranes dying at Cedar Lake again this year. Approximately 200 cranes died in the outbreak. Two diagnosticians from NWHL and two scientists from the Peanut Institute in Atlanta, GA. analyzed sick and dead sandhill cranes and hundreds of pounds of waste peanuts from the fields around the lake. No cause of the mortality was determined but it is believed to be the result of some type of mycotoxin. Muleshoe NWR provided a 4x4 pickup, a three-wheel Honda and trailer, and six Scar-away guns to the project.

The Interagency Playa Lakes Disease Council (IPLDC) has been very active this year. One graduate study thru Texas Tech was completed on a Historical Disease Survey. This report compiled all the data that could be found from FWS, TPW, NWHL, Texas Tech, and other agencies and individuals. Two other studies are in progress: one involves using particle markers to monitor the movement

of birds and a companion study uses patagial tags to monitor movement between lakes and during migration.

MLS15-2/86 RFK
NWHL Personnel Retrieving Sick Sandhill Cranes Near Loop, Texas

Muleshoe NWR is the central receiving point for all waterfowl disease outbreak reports in the Playa Lakes Region, including the Texas Panhandle and South Plains, Eastern New Mexico, and the Oklahoma Panhandle. Each disease report is checked out by FWS, TPW or Texas Tech personnel and appropriate action is taken. If a cleanup operation is needed, it is arranged between these agencies. On November 20, the IPLDC had a tour of Muleshoe NWR and disease prone playas in the Texas Panhandle. This was in conjunction with the fall IPLDC meeting. Mr. Nelson Kerno, ARD-WR and Jim Matthews, Refuge Zone Supervisor from Region 6, participated in the field trips and meeting. Mr. Chuck Sowards, Ecological Services, Pierre S.D. also participated in the meeting. The IPLDC and the Nebraska Rainwater Basin Disease group will be working closely together, since there is thought to be a close correlation between fowl cholera problems in the Playa Lakes and the Rainwater Basin.

H. PUBLIC USE

1. **General**

Community and Professional Services

Complex Manager Krey - Board of Directors - Muleshoe Kiwanis Club, Member National Wildlife Refuge Association, Texas Chapter of the Wildlife Society, The Nature Conservancy, Llano Estacado Audubon Society, Texas Waterfowlers Association, National Wildlife Federation, and attends Muleshoe First United Methodist Church.

Refuge Manager Jones - Muleshoe Rotary Club, National Wildlife Refuge Association, International Crane Foundation, Nature Conservancy, National Wildlife Federation, and Administrative Board, Muleshoe First United Methodist Church.

Refuge Clerk Gregory - DHR foster parent program.

Maintenance Worker Gilliam - Civil Defense (Weather watch).

Visitor Non-FWS

February 14,19	Karla Leslie & Photographer	KCBD-TV	Lubbock
February 18	Scott Camp & Photographer	KAMC-TV	Lubbock
February 21	Kenn Wigner	USWS	Lubbock
	Ron McQueen	USWS	Lubbock
March 24	Bob Murdock	Triangle Research Institute	Durham, NC
July 9	Ron George	TP&WD	Austin
	Dale Witt	TP&WD	Austin
September 18	Alan May	TX. Rodent & Predator Cntrl Service	Amarillo

Personnel from the SCS District Office in Muleshoe and the local state game warden from Littlefield were frequent visitors throughout the year.

Off Refuge Public Relations

January	Talk to Muleshoe Rotary Club concerning waterfowl disease problems in area.
February	Public interest news spot KCBD-TV (ch. 11) Public interest news spot KAMC-TV (ch.28)

6. Interpretive Exhibits/Demonstrations

MLS16-2/86 RFK

Newly Installed Signs at Paul's Lake

About half of the displays for the interior of the visitor contact portion of the office building were received and installed. These include a sandhill crane diorama, most of a duck identification exhibit, a sign describing various types of work performed by refuge personnel, and the service purpose message. Still on backorder are plaques describing the sandhill crane diorama and the duck ID exhibit and entire exhibits on the playa lakes region, "Beaks and Feet", and waterfowl diseases in the playa lakes region. Also installed in the VCS during 1986 is a VCR with screen and external controls which will provide several choices of video shows to the public. All of the interpretive signs ordered for wayside exhibits on the refuge roads and overlooks were received and installed. This accounted for eleven sign-type exhibits in six wayside areas, including a new, updated historical marker sign. The

latter was developed with assistance from the Bailey County Historical Society. YCC built an observation deck at the Paul's Lake overlook in conjunction with the interpretive signs there. The main entrance road and the road to the Paul's Lake observation area were both surfaced with caliche for all weather use.

7. Other Interpretive Programs

Muleshoe NWR held an open house on February 15 and 16 to celebrate the 50th anniversary of the establishment of the refuge on October 24, 1935. The open house was delayed until a larger concentration of sandhill cranes was present and until some of the new interpretive exhibits could be in place. The open house drew 240 people to view the new exhibits, see a movie about the refuge system and a slide-tape program about lead poisoning, and to just look around.

Two Lubbock Television stations (KCBD-TV, ch.11 and KAMC-TV, ch. 28) aired short stories about Muleshoe NWR. They featured sandhill cranes, waterfowl, and short interviews with Complex Manager Krey on their local news shows on February 27 at 6:00PM (ch.28) and 10:00PM (ch. 11). The channel 11 story was rebroadcast on February 28 at 12:00 noon.

MLS17-2/86 REF
Local News Filming Short Story About Refuge

News releases on the Muleshoe NWR open house were distributed to area newspapers for release just prior to the event. News releases were sent to the Muleshoe Journal and the Morton Tribune about the special achievement awards for Margaret Gregory and Dean Gilliam, respectively. Information on YCC recruitment was sent to area newspapers and radio stations. "Take Pride In America" radio spots were sent to stations in Muleshoe, Morton, Littlefield, and Levelland during the year. The Hunting and Fishing News called regularly during the sandhill crane hunting season for information on population trends and hunter success.

8. **Hunting**

Muleshoe NWR assists the Texas Parks and Wildlife Department by issuing sandhill crane hunting permits. During the 1985-86 hunting season, the refuge issued 207 permits.

11. **Wildlife Observation**

Muleshoe NWR recorded 30,675 visits in 1986. Wildlife observation on foot or by land vehicle and photography accounted for about 60% of the visits and 80% of activity hours.

MLS18-7/86 RFK
Paul's Lake Wildlife Observation Platform

The heaviest use occurred during the summer when school was out. The YCC program attracted additional attention. The second major period of use occurred during the fall and early winter when the cranes returned to the lakes. The Llano Estacado Audubon Society of Lubbock, Texas held field trips to the refuge April 19, July 4, and September 19-20 and sponsored group outings throughout the year. They were responsible for many of the unusual bird sightings on the refuge and conducted the Christmas Bird Count on December 27.

The first grade class from Morton, TX (91 people) held an end of school outing on the refuge on May 9. The Morton 5th grade held an outing on May 28.

12. Other Wildlife Oriented Recreation

The refuge maintains a small picnic and camping area between the headquarters and the back gate. This area is used by visitors in support of wildlife-oriented activities such as wildlife observation and photography. It is also used for group camping by scout, church, and 4-H groups. During 1986, the camping area was used by a bird group from Dallas, March 22; The LLano Estacado Audubon Society of Lubbock (LEAS), April 19; a Boy Scout Troop, June 28; LEAS, July 3-4; YCC end-of-camp picnic, July 25; LEAS, September 19-20; and LEAS, December 27.

13. Camping

See section H.12.

14. Picnicking

See section H.12.

17. Law Enforcement

Complex Manager Krey and Refuge Manager Jones completed 40 hours of LE refresher training at Albuquerque, NM May 19-23, 1986. They requalified with their service revolvers at this session and again on October 15 at Elk City, OK.

I. EQUIPMENT AND FACILITIES

The following "ARMM's" projects were completed during 1986:

Ordered interpretive signs and exhibits; installed those that arrived in the office/ visitor contact station and in waysides.

(sections H.5. and I.1.).

Purchased and spread caliche on the main entrance road and the Paul's Lake road.(section I.2.)

1. New Construction

Maintenance Worker Gilliam used Buffalo Lake NWR's backhoe to dig approximately one mile of water line ditch. Five area telephone cooperative workers drilled under the state highway to connect the line to a stock tank in grazing unit P2. A water line from the domestic well now serves one stock tank each in grazing units P2, P3, P5, P6, and P7, and two in unit P4. . Approximately 1.6 miles of electric fence, erected to divide grazing units P4 and P5, completed the development required to reorganize the pastures in accordance with the Grazing Plan approved in 1985.

MLS19-7/86 RFK

Constructing Refuge Storm Shelter

While building Muleshoe NWR refuge headquarters in the late 1930's, the WPA also built a partially underground well house. The well has been replaced at other locations several times since, and in 1984, most of the remaining pumps, tanks, and lines were removed from this building. Even though Muleshoe NWR is situated in tornado alley, there has never been a storm shelter on the area. The best we could do was the basement of the

residence, the old well house along with the electrical wires, pumps, tanks, and waterlines, or a strong spot in the new office or shop. In August of 1986, the refuge staff removed the frame roof along with all electric lines from the old wellhouse. A local contractor poured a six inch slab roof on the old foundation. The refuge staff then replaced the remaining PVC water pipe with galvanized pipe and rerouted it out of the way. A new drain into the old well replaced the old floor drain which appeared to just be stubbed off into the ground. We then poured a new concrete cover for the old well and a new concrete floor. The walls were plastered with portland cement to fill holes and dips and make them flat and level. They will be painted in the near future. A flourescent light fixture completed the inside work on the storm shelter this year. A storm-proof door cover was fashioned out of aluminum and steel to provide protection from flying debris and help insulate the shelter.

During FY 86, ARMMs money was available for interpretive exhibits in the visitor contact station and in waysides around the refuge. Some of the VCS exhibits and all of the wayside exhibits were received and installed, as described in section H.6.

2. Rehabilitation

The second ARMMs project on Muleshoe NWR for FY 86 called for improving the main entrance road and the Paul's Lake road. Both of these roads became quite muddy, slippery, and all but impassable when wet. During 1986, a local contractor hauled 2,028 tons of caliche to the Paul's Lake road and 2,132 tons to the entrance road. The caliche , spread with refuge equipment to a depth of six inches, completed the all-weather surface on Paul's Lake road from state highway 214 to the overlook (one mile) and the entrance road from state highway 214 to the White Lake road (1.45 miles). Of these distances, approximately one-half mile of each road had been caliched previously. The remaining 1.2 miles of the entrance road past the office and picnic area to the back gate also needs the same treatment. In conjunction with caliching the entrance road, the cattleguard and associated posts and fence were removed from around the point where this road intersects with state highway 214. All refuge roads and trails were bladed and shaped as needed during the year.

The continued high water in Upper Paul's Lake ate away at the dike between this lake and Lower Paul's Lake. A vertical drop of up to three feet developed outside the roadway on the upper side of the dike. To handle this problem, approximately 230 tons of caliche rock (riprap) from one to three feet in diameter or larger

was dumped into the washout along the edge of the dike.

MLS20-4/86 RFK

Placing RipRap on Paul's Lake Dike

In 1978, YACC acquired a 20' x 48' metal building for use on Muleshoe NWR as a storage and office building. They started construction but didn't finish before the end of the program. Since then, YCC and the refuge have worked on the building as time and money were available. During the summer of 1986, YCC finished the inside with masonite paneling on the walls and batten strips on the walls and ceiling. They then painted the inside and outside. The inside took two coats, prime and finish. The outside was painted two years ago with "Impervakoat" but the mix turned out too yellow. The new paint is browner to blend with the other buildings and the landscape. Finally, the refuge staff installed the light fixtures and a local contractor installed lockable metal doors.

A local contractor replaced the pump, motor and starting capacitor of the domestic well. The pump and motor were under warranty. In March, following a short in the electric line leading to the well, the starting capacitor had to be replaced again.

The YCC fencing job for the year entailed removing approximately 1,200 feet of fence on the crest of the hill between White Lake and the overlook. They rebuilt

about the same length of fence at the bottom of the hill out of sight of the overlook. YCC tore out the obsolete restroom in the YCC storeroom, repaired the pen for injured animals and built a firehose storage box. While they were involved in repainting the outside of the metal storage building, they also painted all seven new stock tanks, the grain bin, and the explosives bunker, all of which are now a tan color to better match the other buildings and blend into the landscape.

3. Major Maintenance

YCC reposted the refuge boundary along state highway 214, cleaned up obsolete fence wire and posts from around the refuge, and removed the old metal pipes and cable used to delineate the parking overlooks at Goose and White Lakes.

Maintenance Worker Gilliam used the TD-20 to bury scrap runway matting removed from the Paul's Lake spillway and scrap concrete and pipe from old wells at the refuge headquarters. He also rewired the office restroom lights so the switches would be inside the restrooms instead of in the hall outside. In addition, he poured a new concrete base for the shower in the residence basement.

The solar hot water heater in the new shop quit working in early summer and had to be run on the electric backup. A local contractor replaced one defective part and it should have worked, except that we found we needed propylene glycol. After much searching, a supplier was found. He hurried the needed material to us in only three months. We finally did get the hot water heater working; eventually, the company even sent us the manual for it. The hot water heater is a construction legacy of the new buildings on this station several years ago.

4. Equipment Utilization and Replacement

The Champion road grader at this station again failed to live up to its name. While spreading caliche, the operator noticed the grader making an odd noise and also noticed a trail of oil behind the machine. He quickly shut off the grader and upon investigation, found a broken rod had knocked holes in both sides of the engine block. Since the engine was shot anyway, we started it long enough to straighten the grader and lift the blade. It maintained enough oil pressure to manage these minor tasks. The grader company (ASCO) wanted $11,000+ to repair the damage. A Detroit Diesel dealer (the engine make) bid considerably less and replaced the engine for $6360.71. At the time of the engine failure, this machine had only 560 hours on it, but the warranty ran out after one year regardless of the number of hours.

Also, during the year we remodeled the muffler to make it steadier and repaired the starter.

MLS21-7/86 RFK

Replacing Motor in Champion Grader

The front suspension on the Case 531 tractor broke twice this year. First the left spindle broke while turning. Later, the axle broke on two different occasions while using the front end loader for pulling. In all instances, the breaks were rewelded with additional iron in and around the joint for added strength. All breaks had broken at least once before. Someday we hope to acquire a new tractor stout enough to withstand the strain of everyday use. Also during 1986, the PTO and the generator on the tractor were rebuilt. YCC replaced the knives on the flail mower used with this tractor.

On October 31 we received word from the Ford dealer in Muleshoe that he had received a new Ford Ranger pickup for the refuge. The Ford dealer undercoated the pickup and installed a cruise control at our request and performed unrequested dealer prep service on it. We paid him for the requested service and told him he would have to talk to Ford about the other, since they were supposed to deliver the truck to the refuge in the first place. It seems like a nice LITTLE truck, although the 2.9L, six cylinder engine may be a bit much for it. The larger engine was not ordered but was used to replace another option we requested that was not available.

The Dodge power wagon still doesn't work right. It seems to gag as it goes down the road. We and the local Dodge dealer are about out of ideas. We reworked the carburetor again and tried all possible combinations of electric and hydraulic fuel pumps. Sometimes it works better. Also, during the year we rebuilt the starter, replaced all four shocks and two tires, and installed a Versa-ramp. We also replaced the rear shocks and tires on the Chevy pickup.

Maintenance Worker Gilliam built a dumping tailgate suitable for use with rock and caliche for the IHC stake dump truck. We also replaced all four rear tires and the hoist main bushing prior to using this truck to haul caliche and rock this past spring. Since this truck only hauls about five cubic yards per load, it would have taken far too many trips to accomplish the needed work. Wichita Mountains NWR loaned us one of their nine yard dump trucks for the spring and early summer.

In December, 1985, Muleshoe-Buffalo Lake NWRs picked up a tractor-trailer rig from Ft. Bliss, El Paso, TX. This year we had a local contractor remodel the trailer to cut the bed height down to 42" and cut the length to 30'. The trailer is still really about six inches higher than we would have liked it, but it would have been OK if the beavertail had been at a slightly shallower angle. As it is, either the grader blade or the transmission hits the angle between the beavertail and the bed. A different set of axles would lower the bed and the beavertail needs to be rebuilt at a shallower angle.

During 1986, the Plymouth Reliant Sedan was transferred and the TD-20B was loaned to Salt Plains NWR. The old LeTourneau scraper was transferred to the Texas Surplus Property Agency.

J. OTHER ITEMS

4. Credits

Refuge manager Jones wrote the rough draft of this narrative prior to transferring to the Brazoria NWR Complex in mid-February. Buffalo Lake NWR staff were involved in the production of the final draft of this narrative as follows:

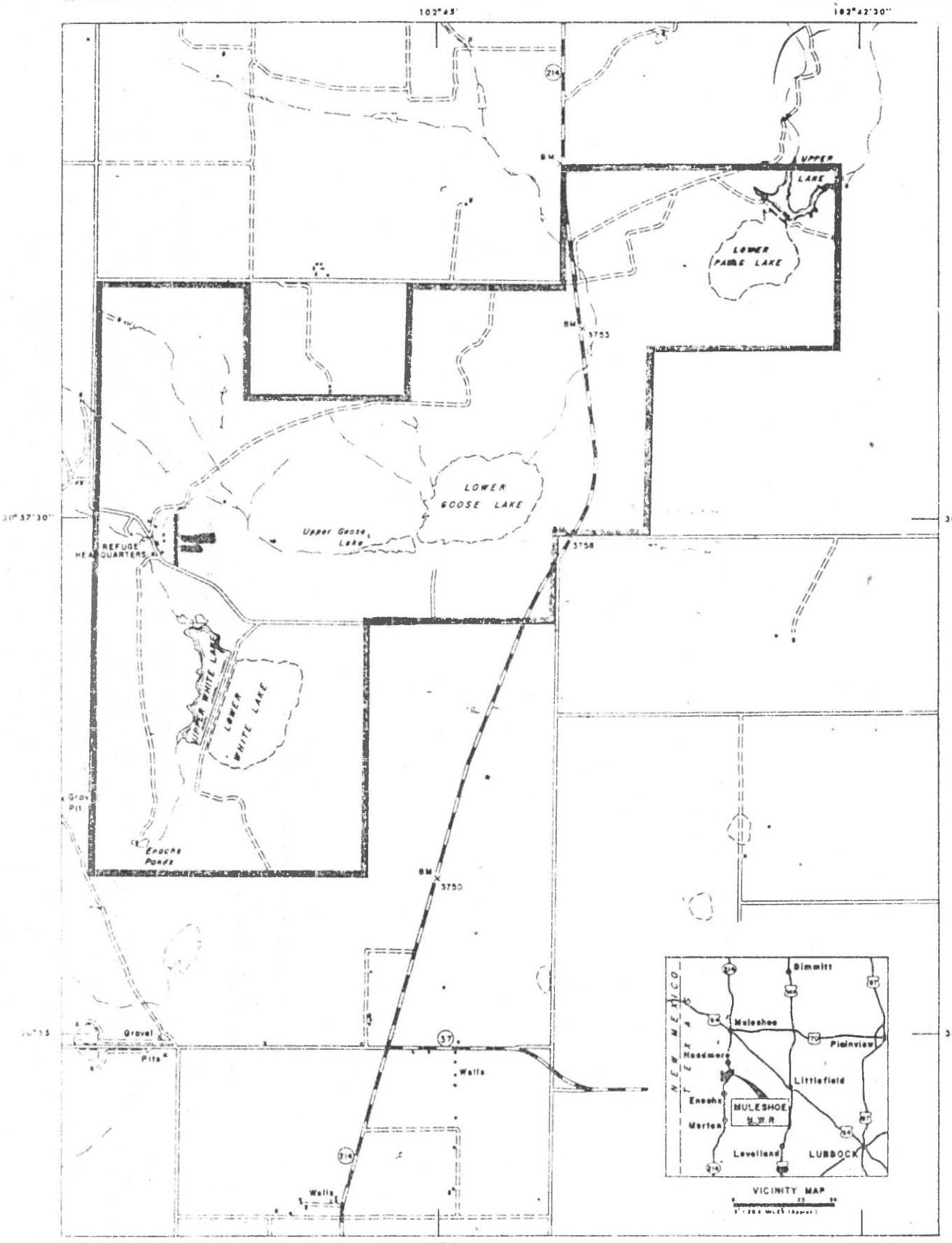
Bio-Tech. Vaniman - Photos, editing, and binding
Office Clerk Barrows - Typing and editing
Complex Manager Beall - Editing and insight
Photo Credits - RFK, Krey; MLV, Vaniman; REF, Refuge files.

MULESHOE NATIONAL WILDLIFE REFUGE

UNITED STATES
DEPARTMENT OF THE INTERIOR

BAILEY COUNTY, TEXAS

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE DIVISION OF REALTY
FROM U.S.G.S. QUADRANGLES AND OTHER
OFFICAL INFORMATION

ALBUQUERQUE, NEW MEXICO APRIL 1976

0 2000 4000 6000 8000 FEET
0 .5 1 1.5 2 KILOMETERS

12°30' E
TRUE N
MAGNETIC
MEAN
DECLINATION
1968

2R TEXAS 191 404

INTRODUCTION

Grulla National Wildlife Refuge is located in Roosevelt County, New Mexico near the small village of Arch, approximately 25 miles west northwest of Muleshoe National Wildlife Refuge. The refuge contains 3,236 acres of which 906 are grassland and 2,330 are saline lakebed. Grulla was officially established as a National Wildlife Refuge on November 6, 1969 by Public Land Order No. 4742, transferring the land from BLM.

The refuge provides a unique, specialized and strategically located habitat type necessary to accomplish distributive management of the lesser sandhill cranes on their wintering grounds. The normally dry lakebed within the area is used as a roosting ground for large concentrations of cranes, especially during periods of severe weather when freshwater playas are frozen.

Page

T A B L E O F C O N T E N T S

F. HABITAT MANAGEMENT

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

K. FEEDBACK

L. INFORMATION PACKET

A. HIGHLIGHTS

- Volunteer recruited to monitor rainfall at refuge.
- Sandhill Cranes die on refuge.
- YCC constructs visitor use trail.
- New entrance road and parking lot covered with caliche.
- Local rancher builds 1/4 mile of refuge boundary fence.

B. CLIMATIC CONDITIONS

No weather data is kept at Grulla NWR. For part of the year, rainfall records were kept at Arch, New Mexico, located three miles north of the refuge. However, the official weather station there was removed early in August. Rainfall data for the period of August through December was received from local farmers with private rain gauges. In December, a volunteer agreed to keep rainfall records on the refuge proper, using a gauge provided by the U.S. Weather Service.

Rainfall - Grulla NWR - 1986

JAN - 0.00	MAY - 2.92	SEP - 2.50
FEB - 1.00	JUN - 4.54	OCT - 2.00
MAR - 0.00	JUL - 1.10	NOV - UNK
APR - Tr	AUG - UNK	DEC - UNK

Weather conditions on Grulla are similar to those at Muleshoe NWR.

D. PLANNING

1. Master Plan

The Planning Needs Assessment was updated and submitted in June.

E. ADMINISTRATION

1. Personnel

Grulla NWR is an unpersoned station administered from the Buffalo Lake NWR complex, which includes Muleshoe NWR. The staff of the complex consists of a Complex Manager (BFL), Resident Manager (MLS), Biological Technician (BFL), Office Clerks (BFL,MLS) and

Maintenance Workers (BFL,MLS). Most of the work at Grulla is accomplished by the Muleshoe office staff.

2. Youth Programs

YCC enrollees from Muleshoe NWR posted approximately two miles of boundary along the new access road at the refuge. They also removed one mile of obsolete interior barbed wire fence, built 500 feet of boundary fence and spread caliche on an overlook trail leading to an observation area.

GRL1-8/86 RFK

Muleshoe YCC Removing Obsolete Fence

4. Volunteers

Mr. Raymond Stokes of Arch, New Mexico agreed to keep rainfall records on the refuge beginning in January of 1987. The U.S. Weather Service has provided him with a reliable gauge.

5. Funding

Refuge Funding FY 82 - 86

FY	1260	1210
82		5,000
83		3,000
84	4,000	
85	15,000	
86	4,000	

6. Safety

Safety programs are administered by the complex staff.

8. Other Items

Zone 2 Refuge Supervisor James Hubert performed a refuge inspection on April 14.

F. HABITAT MANAGEMENT

1. General

Grulla NWR contains 3,236 acres and consists of 906 acres of grasslands and 2,330 acres of saline lakebed.

2. Wetlands

GRL2-7/86 RFK

Salt Lake and Visitor Overlook

Salt Lake was dry until the last week of May, when the area received almost three inches of rain. The amount of water then steadily decreased until October, when rainfall filled the basin again. The water remained through the end of the year.

There is no management of the lake basin, since parts of the bed are in private ownership. There is potential for management for migratory birds but land would need to be purchased and a dependable water source located.

5. Grasslands

At present, the refuge cannot be fenced due to the nature of the present boundary, which extends into the lakebed in some areas and on the shoreline in other areas. In either case, fencing would limit access to and around the refuge and would disrupt a delicate situation in which we depend on the adjacent owners for access to the refuge. Acquisition of the abandoned road right-of-way in 1983 eased the problem but did not eliminate it. The solution is to acquire adequate upland on the refuge to provide the necessary access to all parts of the refuge.

7. Grazing

Without adequate fencing, cattle graze freely across the refuge boundary from adjacent private land. Overgrazing is a problem in some areas. No permits are issued. This situation existed at the time Grulla NWR was acquired from BLM in 1969. The decision not to disturb the status quo was based on the need for the cooperation of adjacent landowners for official access and controlling public use of this remote area.

9. Fire Management

There were no prescribed burns on Grulla this year. There was a fire that burned about 30 acres of the refuge between February 5 and 20. The origin of the blaze is unknown.

G. WILDLIFE

3. Waterfowl

The first recorded waterfowl use in 1986 was June, when wigeon and northern shovelers arrived. Blue-winged teal, snow geese and Canada geese also used the refuge when conditions were favorable. Peak waterfowl populations were June - 12, July - 3, September - 10, October - 57, November - 310 and December - 29.

4. Marsh and Water Birds

Sandhill cranes arrived at Grulla in October and numbers peaked at 23,000 birds on the 24th, which was also the high for the year. Numbers dropped to about 8,000 in November and increased to about 12,000 birds in late December.

5. Shorebirds, Gulls, Terns and Allied Species

When Salt Lake held water during the year, numerous shorebirds were observed using the area. The most prevalent species on the refuge is the Wilson's phalarope. Up to 900 of these birds were present from June through October. Two marbled godwits, never before recorded on Grulla, were on the refuge June 25. Other recorded species were avocets, stilts, Baird's, least, semi-palmated and upland sandpipers, willets and yellowlegs.

6. Raptors

A pair of great horned owls fledged two young on the refuge this year. Burrowing owls also use the area, as do swainson's hawks, harriers, kestrels and red-tailed hawks. Prairie falcons have also been observed several times.

17. Disease Prevention and Control

On November 28, two cranes on Salt Lake were unable to hold their heads up. Symptoms like this were common two years ago near Loop, Texas when cranes were poisoned by an as yet unidentified aflatoxin associated with waste peanuts left in farmers' fields. Since there are numerous peanut fields in the vicinity of the refuge, the same toxin was suspected this year. On December 12, four sick and eight dead cranes were observed on the lake. By December 26, there were 50-100 sick cranes on the lake and an unknown number of carcasses. The staff of Buffalo Lake and the National Wildlife Health Lab in Madison were kept informed of the situation. Ron Windingstad of the Lab visited the area early in January of 1987. The outbreak had subsided by the second week of January, 1987.

H. PUBLIC USE

1. General

Public use on Grulla is not monitored at this time. The refuge is included in NWR guides so it is certain that some visitation takes place. Estimates place use at less than 200 activity hours.

4. Interpretive Foot Trails

A trail was constructed and covered with caliche by the Muleshoe YCC crew this year. The trail will take the visitor out to the edge of an overlook above Salt Lake. A Service purpose sign is planned for the future.

11. Wildlife Observation

Most of the visits to Grulla are assumed to be for the purpose of wildlife/wildlands observation. There are no facilities on the site.

GRL3-7/86 RFK

Visitor Overlook Trail

I. EQUIPMENT AND FACILITIES

1. New Construction

A private contractor hauled 1534 tons of caliche for the new entrance road and parking lot on the refuge. Muleshoe NWR Maintenance Worker Gilliam spread the caliche as it was unloaded.

J. OTHER ITEMS

1. Cooperative Programs

The refuge supplied a local rancher with supplies and a fence design for about 1/4 mile of boundary fence. The rancher supplied the labor to build the fence.

4. Credits

This report was prepared by Bio-tech. Vaniman, edited by Manager Beall and typed by Office Clerk Barrows.

All photos were taken by Rod Krey.

BIRDS of MULESHOE - National Wildlife Refuge

Muleshoe is an important wintering area for ducks, canadian geese and sandhill cranes. Three playa lakes, often dry, are the main features which provide a food supply and resting area during wetter years. During recent years, mid 1970's, good water conditions have supported as many as 350,000 ducks, 86,000 canadian geese and over 100,000 lesser sandhill cranes. The cranes are most noticeable and generally begin arriving in late September and remain on the refuge until the end of March. Since the winter concentration of Lesser Sandhill Cranes at Muleshoe is the largest in the United States, this refuge is a very important link in the chain of National Wildlife Refuges. This list of 247 species have been observed on the refuge since its establishment in 1935. In addition 36 accidental species have been observed once or twice during that period.

BIRDS WHICH ARE KNOWN TO NEST on Muleshoe National Wildlife Refuge are designated by an asterisk (*).

THREATENED AND ENDANGERED SPECIES are marked by the GREEK LETTER OMEGA (Ω), traditional symbol of "the end."

Other symbols used in this list are defined as follows:

S —Spring	March–May
S —Summer	June–August
F —Fall	Sept.–Nov.
W—Winter	Dec.–Feb.

a–abundant	a common species which is very numerous
c–common	certain to be seen in suitable habitat
u–uncommon	present, but not certain to be seen
o–occasional	seen only a few times during a season
r–rare	seen at intervals of 2 to 5 years

		S	S	F	W
	PODICIPEDIDAE				
____	Horned Grebe			o	o
____	Eared Grebe	c	r	c	r
____	Western Grebe			r	r
____*	Pied-Billed Grebe	u	o	c	o
	PELECANIDAE				
____	White Pelican	r		r	
	PHALACROCORACIDAE				
____	Double-crested Cormorant		r		
	ARDEIDAE				
____	Great Blue Heron	c	o	c	u
____	Green Heron	o	o	o	
____	Cattle Egret			o	
____	Great Egret		r	r	
____	Snowy Egret	r	r	o	r
____*	Black-crowned Night Heron		u	u	
____	Yellow-crowned Night Heron		r	r	
____	American Bittern	r		r	
	THRESKIORNITHIDAE				
____	White-faced Ibis	r		r	
	ANATIDAE				
____	Whistling Swan			r	r
____	Canada Goose	u	r	a	a
____	White-fronted Goose	r		r	r
____	Snow Goose	u		u	c
____	Ross' Goose	u		u	u
____*	Mallard	a	o	a	a
____	Black Duck	r		r	r
____	Gladwall	a	o	a	a
____*	Pintail	a	o	a	a
____	American Green-winged Teal	a	r	a	a
____*	Blue-winged Teal	a	o	a	a
____*	Cinnamon Teal	c	o	c	o
____*	American Wigeon	a	o	a	a
____*	Northern Shoveler	c	o	c	u
____	Wood Duck			r	r
____*	Redhead	c	o	c	c
____	Ring-necked Duck	u	r	u	u
____	Canvasback	c	o	c	c
____*	Lesser Scaup	c	r	c	c
____	Common Goldeneye			r	r
____	Bufflehead	c		c	c
____*	Ruddy Duck	c	o		c
____	Hooded Merganser			o	r
____	Common Merganser			o	o
____	Red-Breasted Merganser			r	r
	CATHARTIDAE				
____*	Turkey Vulture	u	o	u	o
____	Black Vulture	r	r		
	ACCIPITRIDAE				
____	Mississippi Kite			r	
____	Sharp-shinned Hawk	u		u	u
____	Cooper's Hawk	u	r	u	o
____	Red-Tailed Hawk	c	u	c	c
____*	Swainson's Hawk	c	c	c	r
____	Rough-legged Hawk	u	r	c	c
____*	Ferruginous Hawk	c	u	c	c
____	Golden Eagle	u		c	c
Ω	Bald Eagle	o		u	u
____*	Marsh Hawk	c	u	c	c
	FALCONIDAE				
____	Prairie Falcon	u	r	u	u
Ω	Peregrine Falcon	r		r	r
____	Merlin	r		o	o
____	American Kestral	c	o	c	c
	TETRAONIDAE				
____	Lesser Prairie Chicken	r	r	r	r
	PHASIANIDAE				
____*	Bobwhite	c	c	c	c
____*	Scaled Quail	a	a	a	a
____*	Ring-necked Pheasant	o	o	o	o
	GRUIDAE				
____	Sandhill Crane	a	o	a	a
	RALLIDAE				
____	Virginia Rail	r	r	r	
____	Sora			r	
____	Common Gallinule		r		
____*	American Coot	a	o	a	c
	CHARADRIIDAE				
____	Semipalmated Plover	u		u	
____*	Snowy Plover	c	c	c	
____*	Killdeer	c	c	c	u
____	Mountain Plover	r		o	
____	Black-bellied Plover			o	
	SCOLOPACIDAE				
____	Common Snipe	u		u	o
____	Long-billed Curlew	u	o	c	
____	Whimbrel	r		r	
____*	Upland Sandpiper	r	r	r	r
____	Spotted Sandpiper	u	u	u	
____	Solitary Sandpiper	u	u	u	r
____	Willet	o	o	o	
____	Greater Yellowlegs	u	c	c	r
____	Lesser Yellowlegs	u	c	c	r
____	Pectoral Sandpiper	r	r	r	
____	White-rumped Sandpiper			r	
____	Baird's Sandpiper	c	c	c	
____*	Least Sandpiper	c	c	c	
____	Semipalmated Sandpiper	u	u	u	
____*	Western Sandpiper	a	a	a	
____	Long-billed Dowitcher	c	c	c	
____	Stilt Sandpiper	u	u	u	
	RECURVIROSTRIDAE				
____*	American Avocet	c	a	a	
____*	Black-necked Stilt	u	u	u	
	PHALAROPODIDAE				
____	Wilson's Phalarope	a	a	a	a
	LARIDAE				
____	Herring Gull	r		r	u
____	Ring-billed Gull	u		u	u
____	Franklin's Gull	o		o	r
____	Gull-billed Tern				r
____	Forester's Tern	o	r	o	
____	Common Tern		r	r	
____	Least Tern		r		
____	Black Tern	c	c	c	
	COLUMBIDAE				
____	Rock Dove				r
____*	Mourning Dove	a	a	a	c
	CUCULIDAE				
____*	Yellow-billed Cuckoo	c	c	u	
____*	Roadrunner	c	c	c	c
	TYTONIDAE				
____*	Barn Owl	u	u	u	u
	STRIGIDAE				
____*	Great Horned Owl	c	c	c	c
____*	Burrowing Owl	c	c	c	c
____*	Long-eared Owl	u	u	u	u
____	Short-eared Owl	o		o	o
	CAPRIMULGIDAE				
____*	Common Night Hawk	c	c	u	
____	Lesser Nighthawk	r	r		
	TROCHILIDAE				
____	Black-chinned Hummingbird	r	u	u	
	ALCEDINIDAE				
____	Belted Kingfisher	o	o	u	
	PICIDAE				
____	Common Flicker	c		c	c
____	Red-bellied Woodpecker	r		r	r
____	Golden-fronted Woodpecker			r	r
____	Red-headed Woodpecker	r	r		r
____	Yellow-bellied Sapsucker	r		r	r
____	Hairy Woodpecker	r	r	r	r
____	Downy Woodpecker			r	r
____*	Ladder-backed Woodpecker	c	c	c	c
	TYRANNIDAE				
____*	Eastern Kingbird	r	r	r	
____*	Western Kingbird	c	c	c	
____	Cassin's Kingbird	r	r	r	
____*	Scissor-tailed Flycatcher	c	c	c	
____*	Ash-throated Flycatcher	u	u	u	
____	Eastern Phoebe	u		u	r
____	Say's Phoebe	c	o	c	u
____	Least Flycatcher	u		u	
____	Western Flycatcher	c	c	c	
____	Western Wood Pewee	c	c	c	
____	Olive-sided Flycatcher	u	u	u	
____	Vermilion Flycatcher		o		
	ALAUDIDAE				
____*	Horned Lark	a	a	a	a
	HIRUNDINIDAE				
____	Violet-green Swallow	r			
____	Tree Swallow	o	o	o	
____	Bank Swallow	o		o	
____	Rough-winged Swallow	o	o	o	
____	Barn Swallow	u	u	u	
____	Cliff Swallow	u	u	u	
	CORVIDAE				
____	Blue Jay			r	r
____	Scrub Jay	o		o	o
____*	White-necked Raven	u	u	o	o
____	Common Crow	u	u	u	
	PARIDAE				
____	Mountain Chickadee				r
	CERTHIIDAE				
____	Brown Creeper			o	r
	TROGLODYTIDAE				
____	House Wren	o	r	o	u
____	Bewick's Wren		u	u	u
____*	Cactus Wren	c	c	c	c

		S	S	F	W
_____	Long-billed Marsh Wren	u		u	u
_____*	Rock Wren	u	u	u	u
	MIMIDAE				
_____*	Mockingbird	c	c	c	u
_____	Catbird	r		r	
_____*	Brown Thrasher	c	c	c	u
_____*	Curve-billed Thrasher	c	c	c	c
_____	Sage Thrasher	o		o	
	TURDIDAE				
_____	Robin	c		c	c
_____*	Hermit Thrush	u	u	u	
_____	Swainson's Thrush	r			
_____	Eastern Bluebird	r		r	r
_____	Western Bluebird	r		r	
_____	Mountain Bluebird	c		c	c
_____	Townsend's Solitaire	o		o	o
	SYLVIIDAE				
_____	Blue-gray Gnatcatcher	o		o	
_____	Golden-crowned Kinglet	r			r
_____	Ruby-crowned Kinglet	c		c	u
	MOTACILLIDAE				
_____	Water Pipit	c		c	c
_____	Sprague's Pipit	o		o	o
	BOMBYCILIDAE				
_____	Bohemian Waxwing			r	r
_____	Cedar Waxwing	u		c	c
	PTILOGONATIAE				
_____	Phainopepla		r	r	
	LANIIDAE				
_____	Northern Shrike				r
_____*	Loggerhead Shrike	c	c	c	c
	VIREONIDAE				
_____	Bell's Vireo	r		r	
_____	Solitay Vireo	o		u	
	PARULIDAE				
_____	Black-and-White Warbler	o		o	
_____	Orange-crowned Warbler	o		u	r
_____	Nashville Warbler	o		o	
_____	Yellow Warbler	c	u	c	
_____	Yellow-rumped Warbler	u		c	r
_____	Black-throated Gray Warbler			r	
_____	Townsend's Warbler	r		r	
_____	Black-throated Green Warbler			r	
_____	Northern Waterthrush	r		r	
_____	Kentucky Warbler	r			
_____	MacGillivray's Warbler	c		u	
_____	Common Yellowthroat	o			
_____	Yellow-breasted Chat		r		

		S	S	F	W
_____	Wilson's Warbler	c		c	
_____	American Redstart	r		r	
	PLOCEIDAE				
_____*	House Sparrow	a	a	a	a
	ICTERIDAE				
_____*	Eastern Meadowlark	c	c	c	c
_____*	Western Meadowlark	a	a	a	a
_____	Yellow-headed Blackbird	u	u	u	
_____*	Red-wing Blackbird	a	c	a	c
_____*	Orchard Oriole	u	u		
_____*	Northern Oriole	c	c	c	
_____	Rusty Blackbird				r
_____	Brewer's Blackbird	c		c	c
_____	Common Grackle				r
_____	Brown-headed Cowbird	c	c	c	o
	THRAUPIDAE				
_____	Western Tanager	r		r	
_____	Summer Tanager	r	r		
	FRINGILLIDAE				
_____	Cardinal	o		o	o
_____	Pyrrhuloxia	o		o	o
_____	Black-headed Grosbeak	o		r	
_____	Blue Grosbeak	u	c	u	
_____	Indigo Bunting	r			
_____	Lazuli Bunting	r			
_____	Painted Bunting	o	o	o	
_____	Evening Grosbeak			r	r
_____	House Finch	c	o	c	c
_____	Pine Siskin	o		o	o
_____	American Goldfinch	u		u	u
_____	Lesser Goldfinch			r	r
_____	Green-tailed Towhee	u		u	
_____	Rufous-sided Towhee	c		c	c
_____	Brown Towhee	u	u	u	u
_____*	Lark Bunting	a	a	a	u
_____	Savannah Sparrow	c	o	c	u
_____	Grasshopper Sparrow	u	u	u	
_____	Baird's Sparrow			r	
_____	LeConte's Sparrow			r	
_____	Vesper Sparrow	c		c	u
_____*	Lark Sparrow	c	c	c	o
_____*	Rufous-crowned Sparrow	u	u	u	u
_____*	Cassin's Sparrow	a	a	u	
_____	Black-throated Sparrow	r	r	r	
_____	Sage Sparrow	o			
_____	Dark-eyed Junco	c		c	a
_____	Gray-headed Junco	o		o	o
_____	Tree Sparrow	u		u	c
_____	Chipping Sparrow	c	o	c	o
_____	Clay-colored Sparrow	c		c	
_____	Brewer's Sparrow	o			
_____	Field Sparrow				o
_____	Black-chinned Sparrow			r	

		S	S	F	W
_____	Harris' Sparrow			r	r
_____	White-crowned Sparrow	c		a	a
_____	Fox Sparrow	r		r	r
_____	Lincoln's Sparrow	o		o	
_____	Swamp Sparrow				r
_____	Song Sparrow	c		c	c
_____	McCown's Longspur	u		u	c
_____	Lapland Longspur			r	r
_____	Chestnut-collared's Longspur	u		u	u

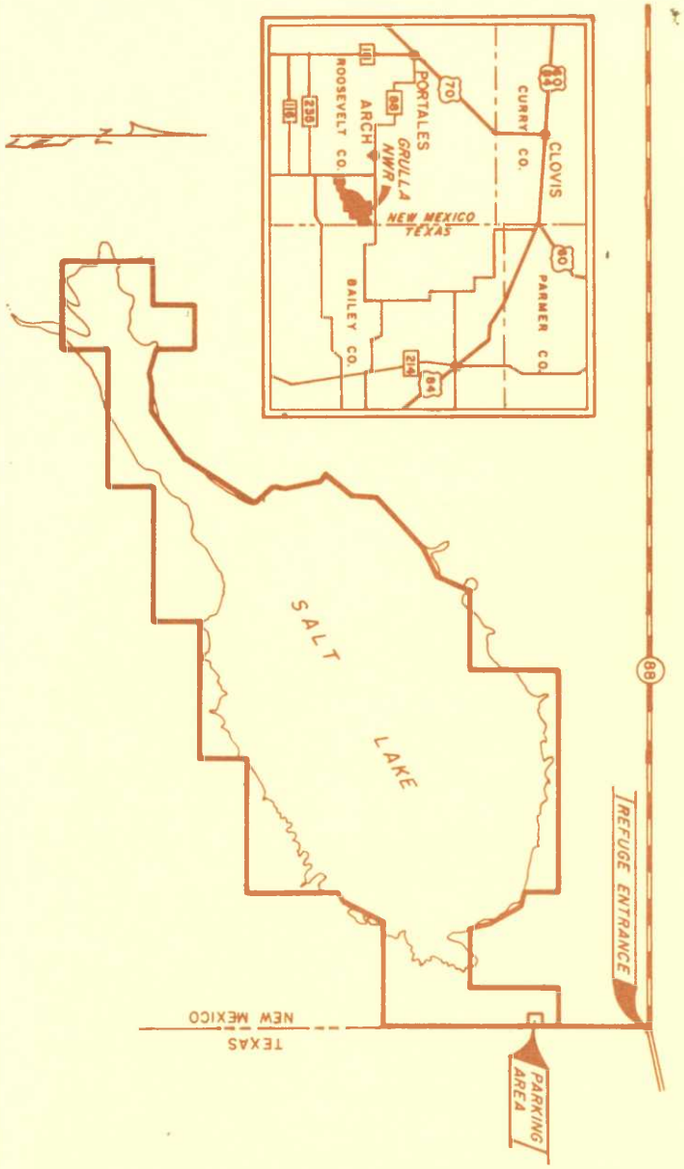
ACCIDENTAL SPECIES

These species have been observed on Muleshoe National Wildlife Refuge only once or twice since the refuge was established in 1935.

Common Loon
Brant
Oldsquaw
White-winged Scoter
Goshawk
Harris' Hawk
Osprey
European Crane
Yellow Rail
Black Rail
Ruddy Turnstone
Dunlin
Sanderling
Pomarine Jaeger
Glaucous Gull
Glaucous-winged Gull
Western Gull
Bonaparte's Gull
Band-tailed Pigeon
White-winged Dove
Black-belled Cuckoo
Black Phoebe
Eastern Wood Peewee
Beardless Flycatcher
Common Raven
Tuffed Titmouse
White-breasted Nuthatch
Red-breasted Nuthatch
Crissal Thrasher
Wood Thrush
Red-eyed Vireo
Warbling Vireo
Blackburnian Warbler
Grace's Warbler
Ovenbird
Hooded Oriole
Golden-crowned Sparrow

REFUGE MANAGER
MULESHOE
NATIONAL WILDLIFE REFUGE
P.O. BOX 549
MULESHOE, TEXAS 79347

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
RF–21590–2 AUG 1979
GPO 852 – 246



FIELD NOTES

Date: _____ Species _____

Time: _____

Observers: _____

_____

Weather: _____

_____

Remarks: _____

_____

_____

_____

_____

_____

_____

_____

For additional information contact:

Refuge Manager
Grulla National Wildlife Refuge
P.O. Box 549
Muleshoe, TX 79347

U.S. FISH & WILDLIFE SERVICE

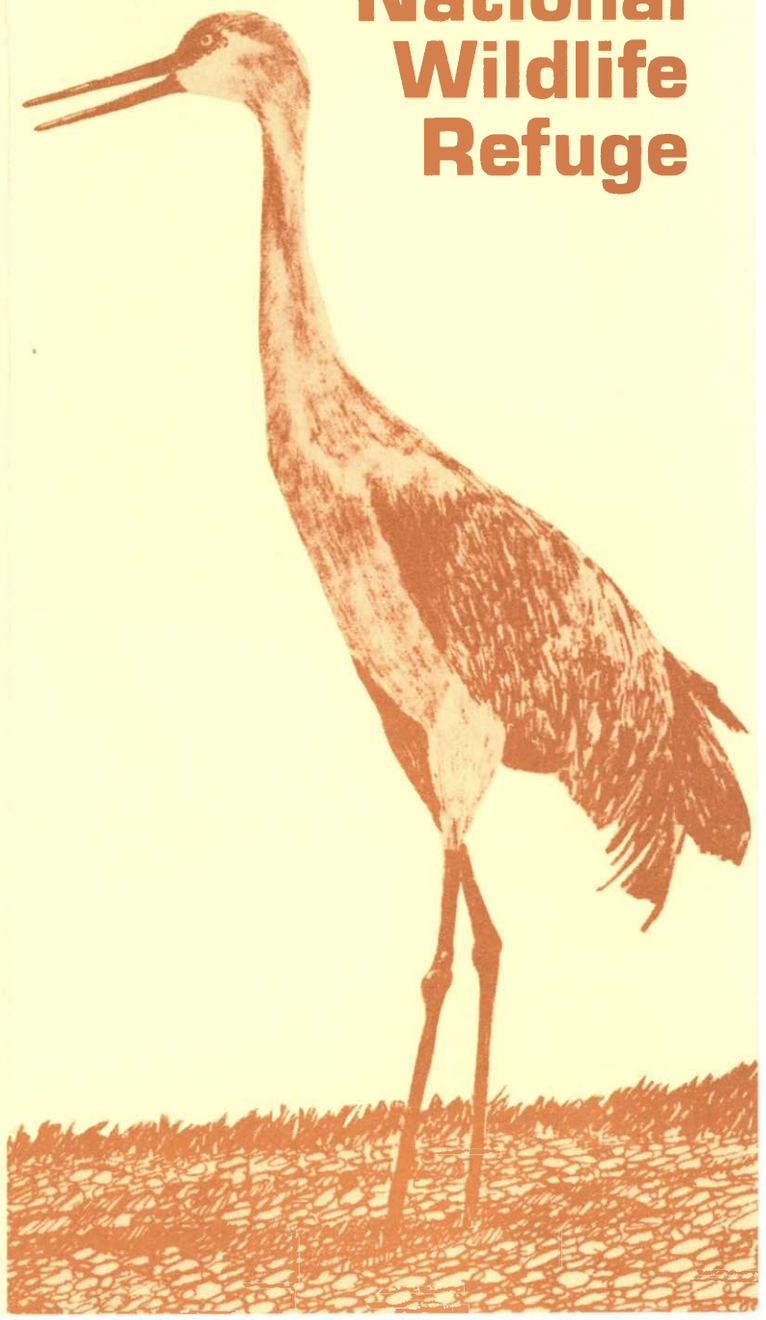
RF-21591-1

U.S. DEPARTMENT OF THE INTERIOR
March 3 1849

March 1986

GRULLA

National Wildlife Refuge



BIRDS of GRULLA National Wildlife Refuge

Grulla National Wildlife Refuge is located near the town of Arch, in Roosevelt County, New Mexico. Established in 1969 as a wintering area for lesser sandhill cranes, Grulla takes its name from the Spanish word for cranes. The refuge contains 3,236 acres, two-thirds of which are saline lake bed. The remainder of the refuge is grassland.

Wildlife use at Grulla depends heavily on the amount of water in Salt Lake. Sandhill crane, waterfowl, and shore-bird use of the lake is often heavy when water is available, or when surrounding playa lakes are frozen. The recorded peak number of cranes on the refuge is 85,000 in December, 1975. Numbers of these species are very small during the summer, or when the lake is dry. The number of raptors and other birds which are not directly dependent on water in the lake is more stable.

The bird list in this leaflet is the first attempt to compile the recorded observations of the refuge staff and knowledgeable observers in this area. This list of 87 species is in accordance with the Sixth A.O.U. Check-list.

The east end of Grulla NWR is open to the public. Access to the remainder of the refuge is limited due to the lack of roads.

Symbols used in this list are defined as follows:

S-Spring	March-May
S-Summer	June-August
F-Fall	September-November
W-Winter	December-February

A-Abundant	A common species which is very numerous
C-Common	Certain to be seen in suitable habitat
U-Uncommon	Present, but not certain to be seen
O-Occasional	Seen only a few times during a season
R-Rare	Seen at intervals of 2 to 5 years

*Nests on the refuge

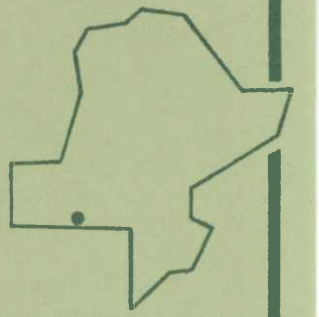
	S	S	F	W
GREBES				
____ Eared Grebe	C	R	C	R
BITTERNS & HERONS				
____ Great Blue Heron	C	O	C	U
____ Snowy Egret	R	R	O	R
____ Cattle Egret			O	
SWANS, GEESE & DUCKS				
____ Snow Goose	U		U	C
____ Canada Goose	U	R	C	C
____ Green-winged Teal	C	R	C	C
____ Mallard	C	O	C	C
____ Northern Pintail	C	O	C	C
____ Cinnamon Teal	C	O	C	O
____ Northern Shoveler	C	O	C	U
____ Gadwall	C	O	C	C
____ American Wigeon	C	O	C	C
____ Redhead	C	O	C	C
____ Ring-necked Duck	U	R	U	U
____ Ruddy Duck	C	O		C
AMERICAN VULTURES				
____ Turkey Vulture	U	O	U	O
KITES, HAWKS & EAGLES				
____ Mississippi Kite			R	
____ Bald Eagle	O		U	U
____ *Northern Harrier	C	U	C	C
____ Sharp-shinned Hawk	U		U	U
____ Cooper's Hawk	U	R	U	O
____ *Swainson's Hawk	C	C	C	R
____ Red-tailed Hawk	C	U	C	C
____ *Ferruginous Hawk	C	U	C	C
____ Rough-legged Hawk	U	R	C	C
____ Golden Eagle	U		C	C
FALCONS				
____ American Kestrel	C	O	C	C
____ Merlin	R		O	O
____ Prairie Falcon	U	R	U	U
PHEASANTS & QUAIL				
____ *Ring-necked Pheasant	O	O	O	O
____ *Northern Bobwhite	C	C	C	C
____ *Scaled Quail	A	A	A	A
RAILS, GALLINULES & COOTS				
____ American Coot	U	O	U	U
CRANES				
____ Sandhill Crane	C		C	C
PLOVERS				
____ Black-bellied Plover			O	
____ *Snowy Plover	C	C	C	
____ *Killdeer	C	C	C	U
STILTS & AVOCETS				
____ Black-necked Stilt	U	U	U	
____ American Avocet	C	C	C	
SANDPIPERS & PHALAROPES				
____ Greater Yellowlegs	U	C	C	R
____ Lesser Yellowlegs	U	C	C	R
____ Solitary Sandpiper	U	U	U	R
____ Willet	O	O	O	
____ Spotted Sandpiper	U	U	U	
____ Long-billed Curlew	U	O	C	
____ Semipalmated Sandpiper	U	U	U	
____ Western Sandpiper	C	C	C	
____ Least Sandpiper	C	C	C	
____ Baird's Sandpiper	C	C	C	
____ Pectoral Sandpiper	R	R	R	
____ Long-billed Dowitcher	C	C	C	
____ Wilson's Phalarope	C	C	C	C
GULLS & TERNS				
____ Ring-billed Gull	U		U	U
____ Black Tern	C	C	C	
PIGEONS & DOVES				
____ Rock Dove				R
____ *Mourning Dove	A	A	A	C
CUCKOOS & ROADRUNNERS				
____ *Greater Roadrunner	C	C	C	C
TYPICAL OWLS				
____ *Burrowing Owl	C	C	C	C
____ Great Horned Owl	O	O	O	O
____ *Long-eared Owl	U	U	U	U
____ Short-eared Owl	O		O	O
GOATSUCKERS				
____ *Common Nighthawk	C	C	U	
TYRANT FLYCATCHERS				
____ *Western Kingbird	C	C	C	
____ *Scissor-tailed Flycatcher	C	C	C	
LARKS				
____ *Horned Lark	A	A	A	A
SWALLOWS				
____ Cliff Swallow	U	U	U	
____ Barn Swallow	U	U	U	
JAYS & CROWS				
____ American Crow	U	U	U	
____ Chihuahuan Raven	U	U	O	O
THRUSHES				
____ Mountain Bluebird	C		C	C
PIPITS				
____ Water Pipit	C		C	C
SHRIKES				
____ *Loggerhead Shrike	C	C	C	C
CARDINALS & GROSBEAKS				
____ Blue Grosbeak	U	C	U	
SPARROWS				
____ Brewer's Sparrow	O			
____ *Lark Sparrow	C	C	C	O
____ *Lark Bunting	A	A	A	U
____ Savannah Sparrow	C	O	C	U
____ Baird's Sparrow			R	
____ Grasshopper Sparrow	U	U	U	
____ White-crowned Sparrow	C		C	C
____ Dark-eyed Junco	C		C	A
____ Lapland Longspur			R	R
BLACKBIRDS & ORIOLES				
____ *Western Meadowlark	A	A	A	A
____ Yellow-headed Blackbird	U	U	U	
____ Brewer's Blackbird	C		C	C
FINCHES				
____ Pine Siskin	O		O	O
OLD WORLD SPARROWS				
____ *House Sparrow	C	C	C	C

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service

RF-21590-1
February 1982

MULESHOE



national wildlife refuge

MULESHOE
NATIONAL WILDLIFE REFUGE

Muleshoe National Wildlife Refuge is one of a chain of refuges in the central flyway administered by the U.S. Fish and Wildlife Service. It was established as a wintering area for migratory waterfowl and sandhill cranes. Located on the High Plains of west Texas at an elevation of 3,750 feet above sea level, this refuge hosts tremendous populations of sandhill cranes through the winter as well as a variety of waterfowl, especially in years of sufficient water. Established on October 24, 1935, it is the oldest National Wildlife Refuge in Texas.

The 5,809 acres of the refuge are broken by two caliche outcroppings -- in the form of rimrock -- near the north and west boundaries, with frequent prominent draws leading into the lakes. Over 5,000 acres of short-grass rangelands with scattered mesquite are under a managed grazing program. Livestock are rotated among several pastures to maintain the grasses in optimum condition for wildlife. The three sink-type lakes have no outlets, depend entirely on runoff for water supply, and are periodically dry. When all lakes are full, 600 surface acres of water are available for wildlife.

The outstanding feature of Muleshoe National Wildlife Refuge is the wintering sandhill cranes. They normally begin arriving at the refuge around the end of September or the first of October. During the six month period the cranes are away from their arctic breeding grounds, the refuge hosts the largest concentration of this species in North America. Sandhill cranes reach their peak numbers between late December and mid-February, often with over 100,000 of these interesting birds present at one time. The all-time peak of 250,000+ cranes was reached in February, 1981. The cranes roost on the

refuge lakes at night, as well as on other large saline lakes in the area. At sunrise, they fly out to feed in the surrounding agricultural land, where they search harvested fields for waste grain and invertebrates and graze in the grasslands and wheat fields. Most cranes have departed northward by the end of March.

In addition to the population of wintering sandhill cranes, large numbers of waterfowl are present when sufficient water is available. Migrating waterfowl begin to arrive at the refuge lakes during August and reach their peak population by the end of December. During the mid 1970's, when water was plentiful, duck numbers reached 700,000. Recently, the peak has been below 350,000 ducks. A few Canada geese winter here when water is available. During spring and fall migrations, small flocks of snow geese visit the refuge for a short period of time.

Pintails are the most common species of duck during the winter, followed by American widgeon, mallards, green-winged teal, and ruddy ducks. Blue-winged teal, canvas-backs, redheads, lesser scaup, ring-necked ducks, and buffleheads are present during the migration periods. The northern shoveler is usually late in it's northward migration, often arriving in late March and remaining into June. Occasionally, when adequate water is available, a few duck broods are hatched on the refuge.

There are 247 species on the refuge bird list with the largest species diversity occurring during the spring and fall migrations. This is especially true of the songbirds, but also of shorebirds and herons. Mourning doves, scaled quail, common nighthawks, horned larks, cactus wrens, curved-billed thrashers, and lark sparrows are prominent nesting birds. Many small birds can be seen in the shelterbelt planting which surrounds the refuge headquarters. In addition, 54 accidental species have been recorded on the refuge.

Permission is not required for amateur photography on the refuge, except that the construction of blinds and special travel related to photography must be authorized by the refuge manager. Refuge lakes are closed to boating. No part of the refuge is open to hunting and firearms are prohibited. No rocks, arrowheads, or other antiquities may be hunted or disturbed.

Visitors might watch for some of the species common to this area. Cottontails and jackrabbits are abundant and scaled quail are common over most of the refuge. Prairie dogs and burrowing owls may be seen in appropriate habitat, as well as many species of hawks. During the winter, golden eagles may be residents. Although primarily nocturnal, a coyote, badger, or skunk may sometimes venture out in the daylight.

The refuge is located 20 miles south of Muleshoe, Texas, on state highway 214 and about the same distance north of Morton on the same road. Littlefield is 30 miles east of the refuge on state highways 54 and 37. The populations of these communities are approximately 4,800, 2,500, and 6,500 respectively and all have motel accommodations available. A small

picnic and camping area is available at the refuge headquarters. Visitors are welcome to travel the refuge roads during daylight hours. The refuge office is open Monday through Friday, 8:00 AM to 4:30 PM.

Refuge headquarters may be reached by traveling west for 2¼ miles on a gravel road from highway 214. Visitors may register here and obtain information about the refuge. Additional information may be obtained by contacting the Refuge Manager, P.O. Box 549, Muleshoe, Texas 79347; telephone: Needmore exchange AC-806-946-3341.