QUIVIRA NATIONAL WILDLIFE REFUGE

Stafford, Kansas

ANNUAL NARRATIVE REPORT

Calendar Year 1989

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVAL

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Calendar Year 1989

Refuge Manager _____ Date _____

Refuge Supervisor _____ Date 11/21/90

Regional Office Approval _____ Date 12/26/90

INTRODUCTION

Quivira National Wildlife Refuge is located in Stafford, Reno and Rice counties in south-central Kansas. The establishment of the refuge was approved by the Migratory Bird Conservation Commission on May 3, 1955 and acquisition of the 21,820 acres was completed in 1969. The natural and developed marshes on the refuge provide resting and feeding areas for spring and fall migrating waterfowl and wintering habitat for mallards and Canada geese. Endangered species, other migratory birds, resident wildlife and the public benefit from Quivira's varied habitat.

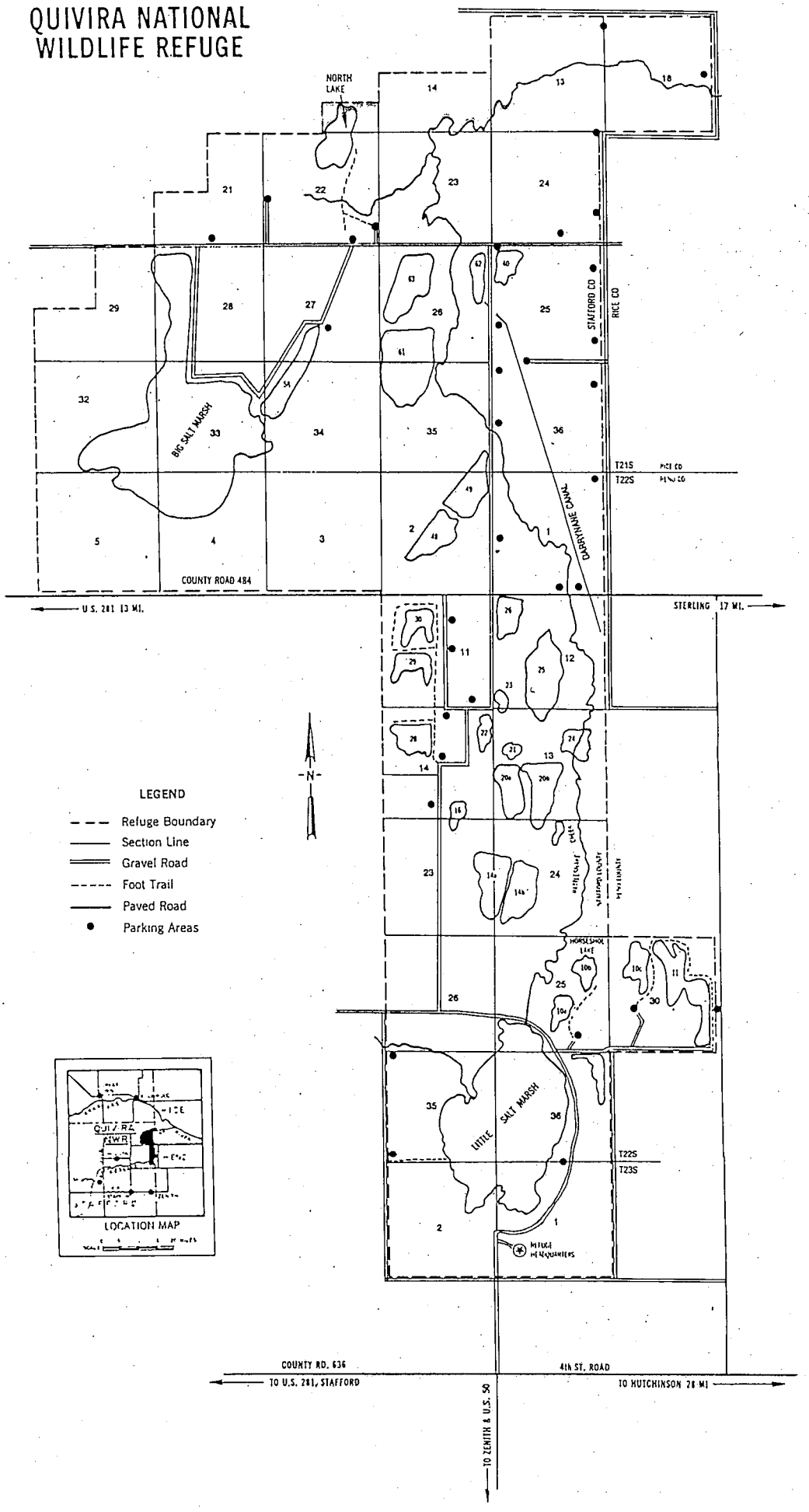
The area is relatively flat with soils ranging from light sands to clay loam and from neutral to alkaline. Thirty refuge water units are filled naturally or by water diverted from Rattlesnake Creek through a system of canals and water control structures. Refuge waters are slightly to moderately saline and are highly productive of small invertebrates, small fish and submergent plants. When all the units are at capacity, the refuge contains about 5,000 surface acres of water.

A winter wheat-milo-fallow rotation is practiced on 1,200 acres by neighboring farmers in a cooperative farming program. The 13,000 acres of rangeland include wet meadows of saltgrass and cordgrass, subirrigated sites with big bluestem, switchgrass, indiangrass and eastern gamagrass, and dry sandy uplands covered with little bluestem, sandlove grass, and sand reedgrass. The trees in numerous shelter belts and old farmstead sites provide additional diversity of habitat. The Santana Research Natural Area has been set aside to maintain a small example of the original prairie that greeted the first pioneers. This 363 acre area contains stabilized sand dunes and 15 acres of century-old cottonwoods originally planted as a timber claim.

Spring and fall are the best seasons to visit Quivira Refuge. Wildlife, especially waterfowl and shorebirds, are at their peak numbers at these times. Hunting and fishing are permitted on the refuge in accordance with state seasons.

The combination of habitats at Quivira National Wildlife Refuge make an important contribution toward ecosystem diversity and the well being of our wildlife heritage in Kansas and the Central Flyway.

QUIVIRA NATIONAL WILDLIFE REFUGE



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2. Jim McCollum, Refuge Manager since 1984 transferred to Medicine Lake NWR, Montana in February. Dave Hilley was selected to fill the vacancy. (Section E.1)

3. As the rains returned, wetland conditions improved dramatically. By years end all marsh units were at their desired level. (Section F.2)

4. Grasslands conditions improved significantly with the implementation of the new rangelend management plan. (Section F.7)

5. With the early drought conditions, wildfires were a major concern. In April, a wildfire burned 3,800 acres on Quivira. (Section F.9)

6. A meeting was conducted in July with personnel from the Regional Office, Fish and Wildlife Enhancement, Kansas Department of Wildlife and Parks, and Kansas Geological Survey to discuss refuge water problems. (Section F.11)

7. Whooping cranes used Quivira during their spring and fall migrations. (Section G.2)

8. In December, subzero temperatures caused a water pipe to break, resulting in a flood in the refuge office. (Section I.3)

B. CLIMATIC CONDITIONS

The year started with near normal temperatures but a severe shortage of moisture, as the 1988 drought continued. In February, an arctic cold wave brought sub-zero temperatures and dangerous wind chills throughout much of the lower Great Plains. By the end of April however, over 100 degree temperatures had been recorded with the prospects high for another hot, dry summer. The story changed in May as the rains started to fall. From May through August, 17.8 inches of rain were officially recorded by the Weather Bureau at Hudson, eight miles west of the refuge. The storms varied over the region with some area stations recording over 11 inches of rain in August alone. Good moisture continued through early September but by October things were again drying up and the winter wheat crop looked stressed. The low moisture situation continued through the end of the year. Good subsoil moisture was available for the wheat but not enough moisture was in the top soil to allow the wheat roots to penetrate to the water. Sub-zero cold in December may have winterkilled a lot of the stressed wheat, we can only wait and see.

Table 1. Weather Data, Quivira NWR, 1989

Month	Precip.	Avg. Precip.	Max. Temp.	Min. Temp.
January	.46"	.57"	74°	7°
February	.19"	.84"	73°	-10°
March	1.03"	1.40"	86°	5°
April	.30"	2.19"	102°	31°
May	6.02"	3.77"	97°	36°
June	6.32"	3.67"	96°	49°
July	2.82"	2.93"	96°	36°
August	2.68"	2.59"	103°	52°
September	2.03"	2.42"	97°	37°
October	.61"	1.80"	92°	25°
November	Trace	.93"	79°	16°
December	.04"	.77"	68°	-18°
Totals	22.50"	23.88"		

Official precipitation was recorded at Hudson, Kansas; unofficial refuge totals were 3 to 4 inches higher for total annual precipitation.

C. LAND ACQUISITION

2. Easements

The status of the title transfer for the Hornbaker FmHA tract remained in limbo throughout the year. Wetland restoration work done under the conservation easement produced dividends

as the heavy summer rains filled the basins.

D. PLANNING

3. Management Plan

The final draft of the Interior Least Tern Management Plan was completed, incorporating suggestions and comments from state and regional authorities. The long term research conducted by Dr. Roger Boyd on the least terns nesting at Quivira provided valuable data for this plan. The plan is being distributed nationwide and published in the Federal Register to allow public comment. Hopefully, the implementation of this plan will improve the production of the least tern on Quivira.

4. Compliance with Environmental and Cultural Resource Mandates

During 1989, three Section 7 consultations were developed for activities on Quivira. In February, an Intra-Service Consultation was completed for the activities proposed in the Least Tern Management Plan. The other consultations were related to oil and gas activities, one for a low pressure gas line for Ainsworth Operating Co. and another for a new oil well proposed by Davis Petroleum. Consultations were processed through the State and the Fish and Wildlife Enhancement office in Manhattan, Kansas. Results are pending public review on the management plan consultation and "no effect" opinions were issued for the oil and gas activities.

5. Research and Investigations

Quivira NR 89 - "Habitat Management and Population Ecology Studies of the Least Tern in Kansas and Oklahoma" - Dr. Roger L. Boyd, Baker University, Baldwin City, Kansas

This is the 10th year of a long term study on the endangered least tern by Dr. Boyd. The study is being conducted to quantify population density and stability, reproductive success, movements of birds between colonies, the reasons for continued loss of nesting habitat, and the potential for managing habitat for the benefit of the nesting birds.

Populations are monitored at Quivira NWR and at Salt Plains NWR, Oklahoma and along the Cimarron River in both states. During 1989, Greg Kramos, Dr. Boyd's research assistant, spent the entire summer on Quivira to be able to more closely monitor the terns.

Figure 1. Pat Gonzales and researcher Greg Kramos banding a least tern chick. 89-DH

Figure 2. Weights were taken on the least tern chicks at the time of banding. 89-DH

Figure 3. Of the 23 pairs that attempted to nest, only two juveniles were known to have fledged. Flooding and predation being the main problems. 89-DH

Quivira NR 89 - "Shorebird population surveys and movements" (Official Project Title Undetermined) - Dr. Susan Skagen, USFWS, National Ecology Research Center, Fort Collins, Colorado

This is the first year for this study, with plans to continue if funding is available. Researchers surveyed shorebirds at Quivira NWR, Cheyenne Bottoms and Salt Plains NWR to develop migration and movement patterns. Foraging and aggressive behavior among the various species was also monitored. Body condition of the migrants was determined as the birds were mist netted and banded for the movement portion of the study.

Figure 4. Sally Flatland, Research Assistant, for the National Ecology Research Center, along the Big Salt Marsh on Quivira. 89-PG

Figure 5. Dr. Susan Skagen and Sally Flatland, banding and processing the shore birds mist netted on Quivira. 89-PG

Quivira NR 89 - "Comparative Study of Water Use Efficiency of Two Growth Forms of Suaeda calceoliformis" - Dr. Art L. Youngman, Wichita State University, Wichita, Kansas

This research was conducted on the annual succulent halophyte, Suaeda calceoliformes on the salt flats north of the Big Salt Marsh. "This project has attempted to explore the significance of difference in physiological responses of erect and prostrate growth forms of Suaeda calceoliformes to increasing salinities. These growth forms were shown previously to differ in pressure potentials due to inherent differences in cell-wall elasticity, the prostrate form having higher pressure potentials and lower cell-wall elasticity at salinities above 1.0% NaCl than does the erect form. Our hypothesis has been that the leaf cells remain more turgid (have higher pressure potentials) in prostrate forms because the stoma close sooner in response to decreases in water potential during the morning or early afternoon than do the erect forms."

Figure 6. Dr. Art Youngman, Wichita State University, conducting plant research on the Big Salt Marsh. 89-DH

E. ADMINISTRATION

1. Personnel

Table 2. Personnel, Quivira NWR, 1989

Name	Title	Appt.	Grade	EOD-Term.
1. James E. McCollum	RefMgr	PFT	GS-11	8/84-2/89
2. David Hilley	RefMgr	PFT	GS-11	5/89
3. Patrick Gonzales	AsstMgr	PFT	GS-09	3/88
4. Daniel R. Schaad	RefAsst	PFT	GS-05	5/88
5. Scott S. Glup	MgrTrn	PFT	GS-05	3/88
6. Carl D. Marks	MntLdr	PFT	WL-08	7/74
7. Stanley A. King	MntWrkr	PFT	WG-07	9/82
8. Gary F. Meggers	RngTch	PFT	GS-05	5/85
9. Henry H. Hall	MntWkr	TFT	WG-07	1/89
10. Todd J. Lovin	RngTch	TFT	GS-04	4/89-11/89
11. Byron L. McNickle	RngTch	TFT	GS-04	4/89-11/89
12. Lonnie D. Hook	BioAid	TInt	GW-01	2/89-10/89

There were several personnel changes at Quivira during 1989. After almost five years as Manager of Quivira , Jim McCollum transferred in February to Medicine Lake NWR, Montana. Dave Hilley was selected to fill the vacancy and transferred in from Sand Lake NWR, South Dakota in May.

In December, Scott Glup, Refuge Manager (Trainee) accepted an Assistant Manager position at the Devils Lake WMD, North Dakota.

Table 3. Quivira NWR, Staffing, 1985 - 1989

Year	Permanent Full Time	Permanent Part Time	Temp.	YCC	Total FTE
1989	7	0	4	1	9.81
1988	7	0	5	2	10.46
1987	6	0	7	2	9.91
1986	6	0	5	5	9.67
1985	7	0	3	4	7.66

Figure 7. Quivira NWR, Staff, 1989. Left to right: Gonzales, Glup, Marks, King, Schaad, Meggers, Hall, Lovin, McNickle, Hilley. 89-DH

Figure 8. Chad Churchill, 1989 YCC enrollee proved a valuable asset to the refuge. 89-SG

2. Youth Programs

Quivira's lone Youth Conservation Corps (YCC) enrollee for 1989 was Chad Churchill. Attempts were made to hire a second enrollee but met with little success.

Chad was integrated into the refuge work crew and did an outstanding job. Projects he worked on included facilities maintenance, fence construction, yardwork and general painting and clean up.

4. Volunteer Programs

The Flint Hills Audubon Society, Manhattan, Kansas, has adopted Quivira under the Audubon Society's Adopt-A-Refuge Program.

In April, seven members of the Society provided volunteer services to restain two of the three refuge interpretive kiosks.

In September, thirteen volunteers from the Society, assisted the refuge in a project to benefit the endangered least tern. The volunteers along with Dr. Roger Boyd, tern researcher, and refuge staff constructed 185+ elevated nesting pads on the salt flats north of the Big Salt Marsh. Each pad consisted of five gallons of egg rock topped with five gallons of gravel to provide an elevated nesting site for the terns. The work was labor intensive but the new pads should prevent flood damage to developing nests in the future.

Greg Kramos, research assistant to Dr. Boyd for the least tern project donated 72 hours of volunteer service during September. Greg constructed 10 wood duck nest boxes and 20 bluebird boxes. While erecting the bluebird boxes around the refuge, he repaired 15 others and mapped the locations of all 35 boxes for future reference.

Figure 9. Volunteers from the Northern Flint Hills Audubon Society who assisted on tern nest pad project. 89-DH

Figure 10. Large rock and gravel was transported onto the salt flats with ATVs and five gallon buckets. 89-DH

Figure 11. The elevated pads constructed by the volunteers should help prevent flooding of the endangered least tern nests. 89-DH

5. Funding

Funding for the refuge during the past five years is shown in Table 4.

Table 4. Quivira NWR Funding, FY 85 - FY 89

Account	FY 89	FY 88	FY 87	FY 86	FY 85
1260			**319,000	**284,000	**275,000
1261	*184,000	*204,000			
1262	104,000	110,000			
6860	9,000	9,000		10,920	12,000
8610	8,000	9,800	3,000	6,000	7,000
1520			3,000	9,100	7,000
1241/1510	16,400	15,400	15,900	11,500	2,400
Total	321,400	348,200	340,900	321,800	303,400

*Includes YCC funding
**Includes ARMMs funding

6. Safety

One lost time accident occurred during 1989. In July, Range Technician Byron McNickle injured his hand while pounding in a metal fence post. The fleshy portion of the thumb was lacerated and doctors orders resulted in two days lost time.

Monthly safety meeting were conducted with the refuge staff.

Thirteen steel grates were constructed to prevent people or animals from falling into the top of new or rehabed water control structures. A steel catwalk with hand rail was constructed for the RCB structure to allow safe access during high water periods. Safety hand rails were constructed for two deep water canal crosswalks which allow hunter access to water Units 28 and 29. Safety "headache" racks were constructed for the two new pickups.

Two large fireproof storage lockers were received. These lockers are used to provide safe storage of flammable materials such as paints and solvents in the vehicle service area and south storage room of the shop.

In October, all refuge personnel were tested for Lyme disease ($58.00 per sample). Two of the blood samples produced "equivocal" results and those employees were retested. All tests eventually were reported negative.

7. Technical Assistance

The refuge staff met with four private landowners to provide technical assistance with wildlife habitat developments on their property. Wildlife Extension Agreements were proposed with each landowner and were in various stages of progress at years end.

In August, a neighboring landowner notified the refuge that he intended to aerially treat 15 acres of trees along the refuge boundary. Aerially treating nuisance trees with herbicides is common practice in Kansas and often results in environmental damage. A Wildlife Extension Agreement was proposed whereby the refuge agreed to cut the trees with our tree shear at no charge, the landowner would not spray herbicides on the area for three years. With this agreement we not only helped a neighbor but protected the refuge watershed.

8. Other

On May 2, Ray Rauch, newly appointed Associate Manager visited the refuge for an introductory tour.

Nancy Wells, Office of Information Transfer, Fort Collins, Colorado, was given a tour of the refuge on May 18.

Ken Fox, RO Construction Representative, visited the refuge in May to provide recommendations for rehab of the east spillway on the Little Salt Marsh. Ken returned in June to provide hands-on assistance with repairs.

Jim Gergen, Bureau of Land Management, Tulsa, Oklahoma, visited the refuge in June to discuss oil and gas developments.

In August, Maury Wright, Regional I & R Specialist, visited the refuge to discuss public use development plans.

Figure 12. Maury Wright, Regional I & R Specialist and Refuge Manager Hilley look over the site for a future range management interpretive project. 89-PG

Chuck Olson, Regional Engineering Architect, visited on September 18 - 19 to discuss plans for an addition to refuge headquarters to provide much needed public use and storage space.

Also in September, Jim Stevens, SCS Plant Materials Specialist came to Quivira to tour the refuge and discuss a possible cooperative agreement to use areas of the refuge as grass and woody materials demonstration plots.

F. HABITAT MANAGEMENT

1. General

The drought that plagued Kansas throughout last year, hung on until early May, 1989. The year started with all water units dry except for a small portion of the Little Salt Marsh. The tinder dry grassland provided prime conditions for the wildfires that hit the refuge. Following the fires, the parched ground was very susceptible to wind erosion. In mid-May all of this began to change as the welcome rains started to fall. By September, all the marsh units were full again and the grasslands had literally exploded with new growth. Things turned dry at the end of the year and once again farmers are worried about their winter wheat crop. For now however the refuge has good grass and water and things look a lot brighter.

Figure 13. Habitat conditions in early 1989 looked bleak as the prolonged drought dried up the wetlands. This is the Big Salt Marsh in January. 89-PG

Figure 14. By mid-summer, however the precipitation was good and conditions improved dramatically as this June photo of the Big Salt Marsh indicates. 89-PG

2. Wetlands

Approximately 300 to 400 acres of water in the Little Salt Marsh was all that remained on the refuge for the spring waterfowl migration. Drought conditions had dried up all of the other wetland units.

Normally, following migration, some of the wetland units would be staged down to stimulate growth of the desirable moist soil plants. In early 1989, there wasn't enough water to get the moist soil plants started. Things looked very bleak. All flows from Rattlesnake Creek were being held in the Little Salt Marsh with no water available for diversion to the other units.

Rains started in May and continued throughout the summer. Flows in the Rattlesnake increased with the precipitation. In mid-June the creek was out of it's banks near the headwaters at Greensburg, Kansas and running over a mile wide. The refuge prepared for a flood but the thirsty ground soaked up most of the high water before it reached the refuge. As the rains continued, it was often difficult to keep the water moving through the refuge canals and structures without causing damage but no one was complaining.

The rains created the perfect moist soil conditions and smartweed, wild millet and nutsedge responded with tremendous growth in most units. The frequency of the rains provided the necessary irrigation for the plants throughout most of their growing season.

Because of the early drought conditions, significant portions of Units 30, 48, and 49 developed major cattail and cocklebur infestations. When discovered it was too late in the growing season to expect much response from moist soil plants so approximately 50 acres of the units were disced and seeded, force account, to Japanese millet.

When the waterfowl returned on their fall migration, they found ideal wetlands conditions. Enough water was available to allow the moist soil units to be slowly flooded to make the plant seeds and tubers available for the birds and they responded to the banquet.

Water diversions from Rattlesnake Creek totalled 5,603 acre feet for 1989, down from the 8,038 diverted in 1988. The increased rainfall allowed us to achieve refuge objectives with less diverted water.

Figure 15. Yellow nutsedge (chufa), a very important waterfowl food plant, in moist soil Unit 61. 89-SG

Figure 16. Tubers from the yellow nutsedge (chufa) are eaten by ducks and relished by Canada geese. 89-SG

A final report was received in October on the selenium testing done on Quivira by FWE, Manhattan, Kansas. Samples were taken (12 sediment, 6 filamentous algae and 12 common carp) in 1987 after a Kansas Department of Health and Environment (KDHE) investigation indicated elevated selenium levels in Rattlesnake Creek. Selenium levels in the samples were below the levels that are of concern to fish or wildlife resources. Test results indicate that the source of the selenium measured by KDHE is downstream from the refuge.

Water quality samples were taken by the refuge staff, twice a month at five points on Quivira. This is part of a Service-wide effort to establish water quality standards for wildlife, as mandated by Congress and to provide baseline data. The testing is also to monitor the actual water makeup to determine possible contamination problems.

Figure 17. Range Tech. Todd Lovin and Volunteer Greg Kramos performing water quality measurements on samples from the Big and Little Salt Marshes and Rattlesnake Creek. 89-PG

Figure 18. Millet was seeded, force account, into portions of Units 30, 48, and 49 to provide waterfowl feed in a previous cattail, cocklebur infestation. 89-PG

4. Croplands

The four refuge cooperators farmed 1,177.8 acres on Quivira during 1989. Of this total, 546 acres were in winter wheat, 249 acres were in milo and 382.8 acres were summer fallowed.

The diverse weather conditions had a big impact on the refuge farming program in 1989. The fall of 1988 was so dry that some of the farmers did not want to put in as much winter wheat. This was lucky because those that did got very little or no return for their effort. The refuge wheat crop, as with most of Kansas, was a complete bust. The Kansas wheat crop was the worst ever recorded. No wheat was harvested on the refuge in 1989. One farming cooperator made an attempt and got between .6 - .8 bushels/acre before giving up on the crop.

When the rains started in May everyone figured the milo crop would make up for the wheat loss. But as the rains continued, the milo planting was delayed by the wet fields. One refuge farmer was still planting "short season" milo in mid-July. With the adequate soil moisture things looked good for a big milo harvest if the frost would just hold off. If farming wasn't such a big gamble, everyone could do it but this year the refuge farmers came away big losers. On September 23 and 24 the temperature dipped below freezing, putting an end to hopes of a good milo crop.

We had decided to leave the refuge share of the milo crop unharvested instead of taking a dollar share of the grain as in the past. This was almost a mute point however, as a result of the early frost. One cooperator did harvest and sell some crops and the refuge share for both wheat and milo totalled $355.88, not a big return for the year.

Winter wheat planted in the fall of 1989 was stressed by a lack of late fall rains but barring any unforseen disasters should make a crop. Surrounding private landowners were hard hit by the 1989 crop failures and if another failure occurred the only thing left growing in this country would be farm auction signs.

Figure 19. No rain to grow, too much rain to plant and an early frost all combined to reduce crop production on Quivira to near zero. 89-SG

5. Grasslands

Native grasslands make up the largest habitat type on Quivira, consisting of over 13,000 acres. Cattle grazing, rest and prescribed burns are the major management tools used on the refuge grasslands.

At the start of the year, the refuge grasslands looked pretty bad as a result of the 1988 drought. Several wildfires (see fire management section) had blackened large areas of the refuge and the lack of rainfall had prevented any green up. When the rains stated in May, the recuperative power of the native grasslands soon became evident as the prairie literally exploded with new growth.

A Special Use Permit was issued to B & W Seeds, Stafford, Kansas, to harvest native grass seed on approximately 1,900 acres of the refuge. Indiangrass, switchgrass and big bluestem were the primary species to be harvested. The refuge share was 30% of the harvest after cleaning, bagging and germination testing.

Figure 20. B & W Seeds, Stafford, Kansas, harvesting native grass seed on portions of Quivira. 89-SG

Figure 21. Only the grass seed heads are removed, leaving the major portion of the plant intact for wildlife cover. 89-SG

7. Grazing

Quivira's grassland management has seen drastic changes in the last four years. Prior to this time most areas on the refuge were "understocked and overgrazed". Relatively small numbers of livestock were placed in one large area for a period of five to six months during the growing season. This resulted in severe over grazing of some plants and under utilization of others. Heavy tree and brush invasions were also a result of this type of grazing. The last three years have been devoted to intensive facility developement to provide a means to better manage the grasslands. Most development has been directed toward building fences and watering facilities to break the larger units into smaller more manageable areas. Eight of nine grassland management areas have been developed to some degree with five being virtually completed. Some areas have been divided into as many as 32 paddocks. Grazing fees have been used to offset the majority of the costs of this development.

When development is completed approximately half of the area in each grassland management unit will be grazed in a given year; the remaining areas being rested to provide high quality cover for ground nesting birds and other resident wildlife. These same areas will be used as a safeguard should extreme conditions such as fire or drought occur which would require changing of a grazing program in process. Eventually, in a given year one will be able to find paddocks varying in amounts of rest and grazing all within a grassland management unit, which will provide a high degree of diversity.

Because of winter wildfires and incomplete development of some grassland management units, the graze half/rest half goal was not achieved in 1989. Approximately 88% of the uplands on Quivira were grazed to some degree in 1989. Grazing ranged from as little as 0.1 AUM/acre to as high as 1.11 AUM/acre. Areas with the highest utilization rates were areas which were grazed during the dormant season as well as the growing season. In all of these cases the majority of the AUMs were removed during the dormant season grazing period. Grazing during the growing season rarely exceeded 0.5 AUMS/acre. Although these rates were high, habitat conditions during the fall were excellent. It is becoming increasingly more apparent that time of year and length of grazing have more effects on grass response than intensity of grazing.

Dormant season grazing programs were carried out by three permittees, involving 439 cows grazing 757.6 AUMs on 1,920 acres. The period for dormant grazing was December 1 - March 8. These programs were designed to remove accumulated litter from areas with a history of little or no vegetation management. The cows did a good cleanup job and the grass

responded well with good seed production and vigorous upright growth. The results were similar to a spring burn without the danger. The only draw back to dormant season grazing is the loss of winter cover during the treatment. Due to the deteriorated condition of the grass on the grazed units prior to treatment, there was little winter cover of any value to lose.

Nine growing season grazing treatments were accomplished in 1989, beginning as early as April 17 and lasting three to six months. By November 1, all livestock were removed from the refuge. Table 5 summarizes the 1989 grazing program.

Table 5. Quivira NWR Grazing Program, 1989

Permittee	Grazing Period	Livestock # & Class	AUMs	Acre	Avg. AUMs/acre
Figger	2/1-3/1	65 C	65	160	0.41
Hamilton	4/30-10/15	100 C/c	686	2,306	0.30
Hildebrand	1/1-2/11	75 C	96	320	0.30
	5/5-11/1	52 C/c	374	1,050	0.36
Hornbaker	5/1-11/1	35 C/c	263	564	0.47
McMurphy	4/30-10/1	62 C/c	393	1,200	0.33
Miller	5/1-10/16	110 C/c	755	1,830	0.41
Schweizer	4/17-7/15	115 Y	452	1,519	0.30
Sleeper	6/22-8/20	329 Y	490	2,351	0.21
Turner	1/1-3/8	299 C	597	1,440	0.41
	4/18-8/16	112 C/c	449	1,291	0.35
	4/17-8/16	95 C/c	460	1,392	0.33
Totals		1,449	5,080	15,423	0.32

* C - Cow, C/c - cow with calf, Y - yearling

Figure 22. Cattle grazing has proven to be one of the most effective management tools on Quivira's native grasslands.
89-PG

Reactions to the new grazing program by the permittees have been mixed. Since the refuge began these major changes, three permittees have given up their grazing privileges. This has not caused any problems because it seems that there is a large source of willing livestock operators looking for an opportunity to become permittees. When a grassland management unit loses a permittee, the area is advertized on a bid per AUM basis. Potential bidders are made aware of all of the requirements of the grazing program.

We still experience reluctance to the new program from some current permittees. The permittees agree with the theory behind the program and even admit that the habitat looks better. Most permittees run cow/calf herds on the refuge and have experienced good animal performance with the new program. Their gripe is the time involved in moving the livestock so often. Most of our permittees are farmers with a livestock operation secondary to the farming operation. It is difficult for them to justify the time involved in moving livestock especially during planting and harvesting times for wheat and milo.

During 1989, several outside influences affected the refuge grazing program. The early drought conditions made some permittees and the refuge staff nervous that the grass and water supplies might not hold up to the planned grazing. When the rains finally started, everyone breathed a sigh of relief.

The large April wildfire also affected the grazing program as large portions of four grassland management units were burned. The person who accidentally started the fire was a grazing permittee and his unit was the most affected area. The start of his grazing period was delayed until June 22 to allow the grass to recover, resulting in a 54% AUM reduction. In addition two other permittees were almost burned out. They were allowed to graze the unburned areas of the firestarter's unit. This mess sounds complicated but worked well, allowing the burned areas adequate recovery time. By the end of the year the wildlife cover looked great in spite of the problems.

These photos show plant response to four different grazing treatments on the same range site and range condition. The photos were all taken within one-quarter mile of each other on September 21, 1989.

Figure 23. Paddock 18, Darrynane Cell, grazed 6/8 - 6/10 at .32 AUM/acre. 89-SG

Figure 24. Paddock 25, Darrynane Cell, grazed 6/19 - 6/24 at .60 AUM/ acre. 89-SG

Figure 25. Paddock 20, Darrynane Cell, grazed 6/14 - 6/19 at .46 AUM/acre. 89-SG

Figure 26. Paddock 24, Darrynane Cell, grazed 6/24 - 6/29 at .43 AUM/ acre. 89-SG

We have no quantitative data to evaluate the effects of the grazing program. Even if we did it is probably too soon for this type of data to show major changes. Weather has been a major influence on habitat conditions in most recent years. One of the greatest benefits of the new grazing program is that it has built in flexibility and safeguards which make it easy to avoid damage to the habitat should adverse conditions occur. Plans to begin an intensive wildlife population survey program designed at evaluating the effects of the grassland management program on wildlife are in the making. Currently we can only give opinions as to the results of the program. The staff was well pleased with grassland conditions in 1989. Wildlife populations which were directly influenced by grazing such as pheasants, quail, turkey and deer were good this year. Prairie chickens were spotted on the north end of the refuge several times this year. This is exciting with sightings becoming more frequent in recent years. There was much interest by private grass seed dealers to harvest grass on the refuge in 1989. This is a good indication that grazing was not detrimental to the grasslands. This is especially evident since much of the grass seed harvested was Big Bluestem. This grass is especially selected for by livestock and overgrazing easily destroys seed production of this species.

The only complaints we are aware of from the general public concerning the grasslands are that they are hard to hunt because the grass is too tall and thick.

We are still in the early stage of implementing the grazing program. Mistakes are still being made, however, good communication between the staff, permittees and the general public is helping to realize and rectify these mistakes.

9. Fire Management

With the extreme drought conditions that started the year, the mention of fire or the sight of smoke sent everyone in the area into a panic. Prescribed burn plans were submitted for areas of the refuge but there was no intention to burn unless the conditions changed.

The first wildfire of the season occurred on March 7, when approximately 600 acres on the northeast boundary of the refuge burned. The fire was probably caused by a cigarette tossed by a passing motorist. Personnel of the Stafford County Fire Department assisted with suppression as per cooperative agreement.

A week later on March 14, the refuge responded to a 1,200 acres wildfire on private land adjacent to the refuge. Wind gusts up to 65 mph had caused the overhead powerlines to arc, creating sparks that started the fire. With the high winds,

the fire was headed toward Quivira but was stopped at the last gravel road entering the refuge.

Because of the severe fire danger, the Stafford County Fire Marshal issued a complete burning ban on March 15. With the large amount of CRP land and native pasture in the county, the stage was set for a major burn.

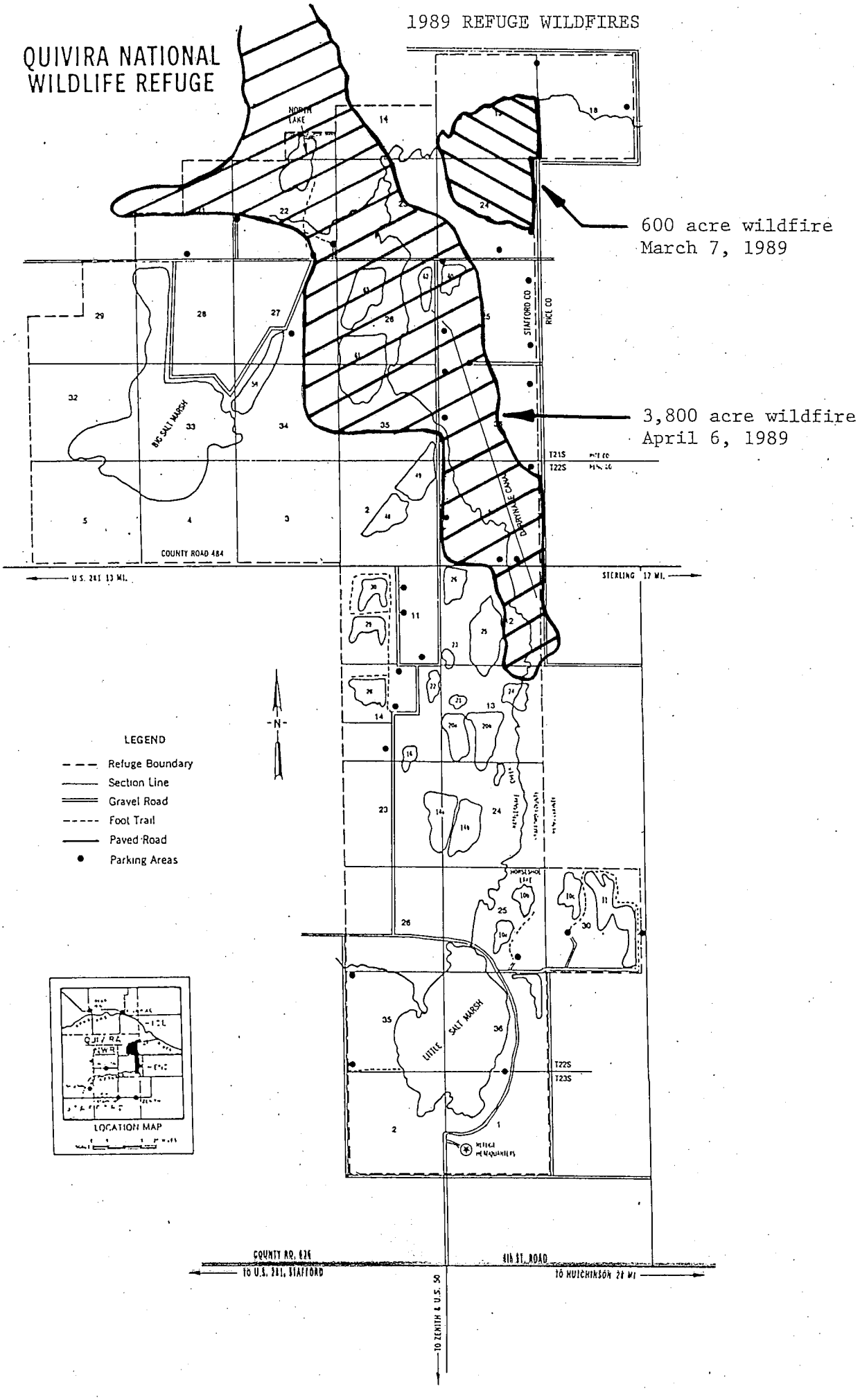
Unfortunately not everyone complied with the ban. On April 6, a neighboring landowner north of the refuge called to say that he was going to "control" burn a pasture. By 1:00 p.m. the fire was out of control and heading south into the refuge, pushed by gusty 40 mph winds. Fire departments from Reno, Rice and Stafford Counties assisted the refuge crew with suppression. Several attempts to stop the flames with backfires were unsuccessful as the winds pushed the blaze across a paved highway and southward. The headfire was finally stopped by backfiring along a water unit but not until it had traveled over six miles into the refuge.

Over 4,800 were burned, 3,800 of which were on the refuge. No injuries occurred during suppression but damages were extensive. Over sixteen miles of refuge barbed wire fence were damaged or destroyed and 2,400 acres of rangeland scheduled for 1989 grazing were burned. The farmer who started the fire was held liable and as restitution agreed to: 1) pay for all activities associated with rebuilding damaged refuge facilities; 2) allow the two affected grazing permittees to graze their cattle on the areas the liable party was originally scheduled to graze; and 3) cover the costs of supplemental feed, if the affected permittees cattle ran short of adequate forage before the burned area recovered to grazing condition.

The liability claim for the fire damage was settled with the landowner's insurance company in June. The company paid the fencing contractor over $11,690 to repair damaged refuge facilities. When word got around the community, it made everyone a little more careful. Unfortunately not everone learned the lesson on fire safety.

On November 20, the refuge responded to yet another fire. This fire, also on private land, was started with trash burning but soon spread through some weeds into a row of 204 large round alfalfa bales. The Hudson Fire Department assisted and the fire did not reach refuge property.

1989 REFUGE WILDFIRES



10. Pest Control

Reduction and eventual elimination of the use of pesticides has been a long standing goal at Quivira. Cooperative farmers are not allowed to use pesticides while farming on the refuge, under normal conditions. Crop rotations and mechanical treatments have proven successful in most situtations to control pest species.

One persistent problem at Quivira has been the invasion of trees into the native grasslands. Without treatment, russian olive seedlings and young red cedars would soon take over large expanses of the refuge. Occasionally cottonwood and elm present a problem but they are not as pioneering as the olives and cedars.

The most effective treatment has been to cut the trees with the refuge tree shear, mounted on the front end loader, and treat the stumps by hand spraying with Banvel CST to prevent resprouting. In January, three days were spent shearing trees in the Santana Research Natural Area. Approximately 450 trees, mostly cottonwood, elm and cedar were treated on 640 acres. In August approximately 3,500 trees, mostly russian olive and red cedar, were removed from scattered areas of the refuge totaling 300 acres.

Except for the Cut Stump Treatment, the only other pesticide application was in May, when refuge personnel treated 1.5 acres of Tall Whitetop along the dike on Unit 26. The immature plants were hand sprayed with 2,4-D amine.

11. Water Rights

In July, Quivira hosted a meeting with personnel from the Regional Office, FWE, Kansas Department of Wildlife and Parks (KDW&P) and the Kansas Geological Survey (KGS)to discuss a developing problem of reduced stream flows in Rattlesnake Creek, the main refuge water source. Irrigation developments within the watershed appears to have reduced the surface flow in the creek over recent years. Tom McClain of the KGS proposed a research project that may provide some data on the relationship between surface and ground water within the aquifer. Plans were developed to assure that the refuge water rights on Rattlesnake Creek are protected.

Figure 27. Refuge staff met with personnel from the RO, FWE, KDW&P and KGS to discuss refuge water problems caused by reduced flows in Rattlesnake Creek. 89-PG

Figure 28. Regional Surveyor Pat Carson spent several days on the refuge surveying the water control structures to allow the collection for capacity information to be used to prove up on our water right. 89-DH

12. Wilderness and Special Areas

Portions of the Santana Research Natural Area were grazed in 1989 as part of the refuge grassland management plan. This 362 acre area was set aside to maintain an example of the original prairie that confronted the pioneers as they arrived from the east. The prairie remnant contains stabilized sand dunes and 15 acres of century old cottonwoods originally planted as a timber claim.

Years of non-use has resulted in an invasion of brush species. Through fire and controlled grazing the refuge is now attempting to restore this area to it's original condition. Results are encouraging but the process is slow.

G. Wildlife

1. Wildlife Diversity

Because of it's location in the middle of Kansas, in the middle of America, Quivira is used by a wide diversity of wildlife species. Eastern and western, northern and southern species have all been recorded using the refuge.

2. Endangered and Threatened Species

Four adult whoopers were spotted using the Little Salt Marsh at 7:15 p.m. on April 4th. These were probably the same four birds seen earlier that day southwest of Sawyer, Kansas. These birds left early on the morning of the 5th. No other sightings were confirmed during the spring migration.

At approximately 11:00 a.m. on October 27 while conducting a tour for senior citizens, Asst. Manager Glup spotted five whoopers on the salt flats north of the Big Salt Marsh. He was left at the site and proceeded to inform the waterfowl hunters in the area that they were to cease all hunting activities. The first pair of hunters informed him that the whoopers had landed next to their decoys at approximately 8:30 that morning. These birds remained on Quivira until 9:15 a.m. of October 29. Service personnel observed the birds during all daylight hours of their stay at Quivira. Word quickly spreads when whoopers are on the refuge. An estimated 300 people showed up on the 28th to observe the birds. In the past, some photographers have become a real nuisance to the birds; therefore we have found that service personel are required to maintain watch over the observers more so than the whoopers.

On November 2, a local farmer reported two whoopers on a wetland 3 1/2 miles west and 1 1/2 miles south of Stafford, Kansas. These were confirmed at 9:15 a.m. by Quivira

personnel. At 10:00 a.m. they took off heading southeast at a slow pace. They were last seen near Preston, Kansas.

During 1989, Dr. Boyd of Baker University, Baldwin, Kansas, was again studying the interior least tern and snowy plover production on Quivira. After two unsuccessful nesting attempts by most of the terns in the colony, it looked as though fledgling success on the third attempt would produce a banner year. As usual this was not the case. A severe thunderstorm in early August killed 17 of 18 chicks present at the time. Only two chicks fledged in 1989. A total of 23 pairs produced 58 nests with 107 eggs. Thirty-two eggs hatched, 31 eggs were flooded, 32 eggs were depredated by coyotes and coons, and 12 eggs met an unknown fate but did not hatch. Twenty-three pairs are down from the usual 25 to 28 pairs using Quivira. Twenty-nine juveniles were banded and 9 adults were banded during the year. There were 15 recaptures, evenly distributed from 1980 - 1987.

An oil well pad that the terns preferred for nesting was fenced off using electric polywire fence to keep out predators. Only one nest was destroyed and that was by a raccoon. One bird did fledge from this area, accounting for 50% of Quivira's production. The other nests present were flooded during severe thunderstorms.

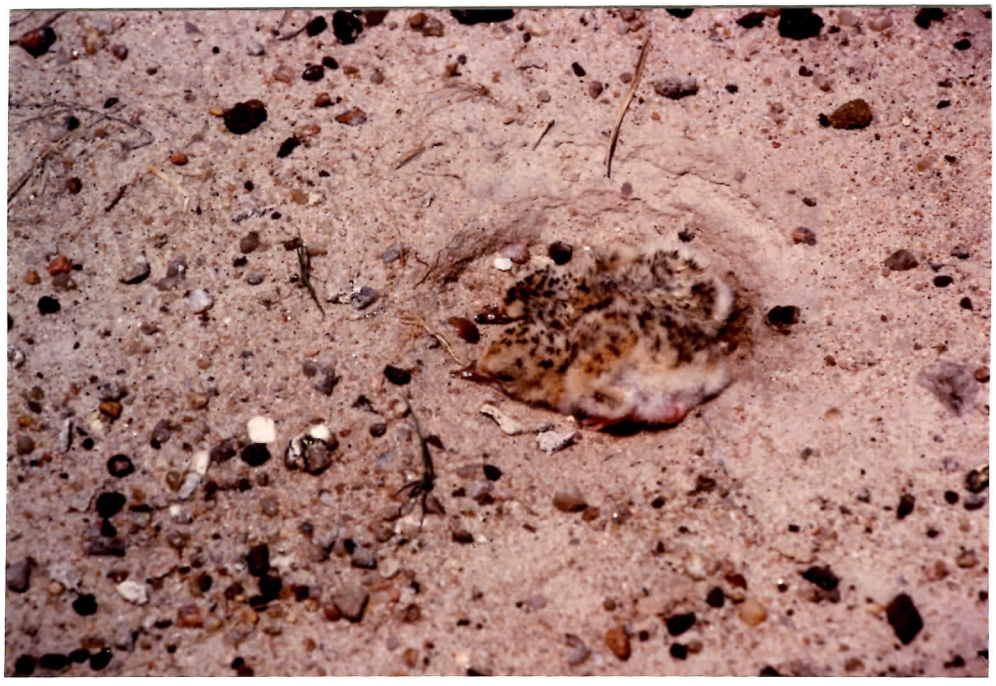


Figure 29. Production of the endangered Interior least tern was poor on Quivira due to flooding and depradation by coyotes. 89-DH

Figure 30. An electric poly-wire fence around an old oil pad provided some protection from coyotes for the nesting terns. 89-DH

In September approximately 185+ nesting pads were added to the 25 pads already in place. These pads were constructed of egg rock and gravel using volunteer help from the Audubon Society (See Section E.4). The pads are designed to provide a good nesting substrate which is elevated several inches above the salt flat to protect the nest from shallow flooding that often occurs during thunderstorms.

Last year we reported that the drought may have severly limited the plains killifish population in the Big Salt Marsh. As suspected this was the case. When the terns arrived this spring they were feeding at sites further from the nesting areas than usual. Most of the feeding was taking place below the Salt Creek water control structure. This structure was preventing the fish from going upstream to the flats of the Big Salt Marsh. Refuge personnel seined fish below the structure and released them on the upstream side. Many of the fish were released in the ditch adjacent to the county road. Later, least and forster terns were observed using this ditch extensively as a feeding site. By mid summer, killifish were again abundant in the shallow wetlands of the Big Salt Marsh.

Bald eagles are winter residents and are closely associated with waterfowl use on the refuge. The peak number observed was in December, when eight eagles were recorded.

Peregrine falcons were spotted on the refuge several times throughout the year.

On August 2, a piping plover was observed and two more were observed on the 3rd.

3. Waterfowl

On January 4, there were approximately 23,000 ducks, mostly mallards, and 11,000 geese, primarily Canadas, present on the refuge. By February 7, there were only two mallards present in a spring area. All other water units were frozen over. Numbers began to rebuild at the end of the month. Early March was the peak of the spring migration with 25,000 ducks and 15,000 geese using the refuge.

No brood counts were conducted in 1989 as low water conditions resulted in very poor production. Several wood duck, mallard and blue-winged teal broods and one gadwall brood were observed.

Canada goose production in 1988 was a record year on the refuge with 58 young being fledged. Due to very poor water conditions, goose production crashed in 1989. Only three broods were observed and it is not known if two broods of those fledged. Declining water conditions resulted in the

broods having to move some distance from were they hatched. Fall migration was later than normal due to mild temperatures. On December 5, 23,887 ducks and 1,600 geese were using the refuge as well as 1,160 sandhill cranes and 60 pelicans. Two weeks later, all the water units were frozen over and only seven mallards and 1,500 Canada geese were counted. By the end of the month, Canada geese and a few more mallards had returned, and totals were up to almost 13,000 geese and 2,668 ducks.

4. Marsh and Water Birds

King, sora, Virginia and black rails are summer residents at Quivira. All are believed to nest here. The first king rail was observed on January 22, during a warm spell. The search for the black rail brings several birders to Quivira each year. We are not aware af any sightings this year. Several birders reported that they did have males respond to their tape recordings of black rail calls.

The first sandhill cranes were observed on January 18, much earlier than normal. The refuge population peaked at 7,500 on March 7. The first fall migrants were observed on October 3 for the third consecutive year. Numbers peaked at 5,500 in mid-November.

White-faced ibis were commonly seen during the summer, feeding in the Big Salt Marsh and adjacent areas which had burned in the April wildfire. Nesting was documented in Water Unit 58 when eight nests were located. There was no effort to census the nests to prevent disturbance of the colony. Approximately 170 ibis were using these cattails, so many more nests are expected.

Great blue herons, little blue herons, great egrets, snowy egrets, and cattle egrets were commonly observed, however no nesting was documented.

5. Shorebirds, Gulls, Terns and Allied Species

Low water during the spring migration did have one benefit, as it produced good quantities of habitat for shorebirds. Over 5,000 were counted in late March. Dr. Susan Skagen and her assistant, Sally Flatland from the National Ecology Research Center, Fort Collins, Colorado, conducted 17 shorebird surveys from August 3 to September 9. Three additional surveys were conducted on September 20 and 30 and October 4 by personnel from FWE in Manhattan, Kansas. Thirty species of shorebirds were observed. Shorebird populations averaged 2,100 during this time and varied from 254 to 3,044. Banding efforts here and at Cheyenne Bottoms indicated that there is alot of movement between these areas. Data indicates that 80% of the

peeps using Cheyenne Bottoms, which is famous for it's shorebird use, also used Quivira. It appears that Quivira's importance to shorebirds is over-shadowed by Cheyenne Bottoms' publicity. In reality, because of Quivira's more stable water conditions, during dry periods Quivira's importance to shorebirds may exceed that of Cheyenne Bottoms.

6. Raptors

Red-tailed hawks, northern harriers and great horned owls are present year around and are commonly seen. Screech owls are commonly heard but rarely seen. A sharp-shinned hawk was seen taking advantage of the bird feeders at the refuge headquarters and residences throughout the winter. Another sharp-shinned hawk was present in the same area again this fall. Also for the second consecutive winter, a dark-phased red-tailed hawk was present near the refuge headquarters. No ospreys were observed in 1989. Golden eagles were observed on several occassions this year.

7. Other Migratory Birds

No surveys were conducted to determine production or population levels of mourning doves. Numbers appeared to be high throughout the summer. During the fall migration great numbers built in the area, however, use of the refuge was generally low because of the good condition of the grassland. Doves fed in adjacent over grazed pastures and fallow fields on private land. Several large tree groves on the refuge are used as roosting sites. Hunting pressure on the refuge was light, mainly due to the steel shot requirement.

Black-billed magpies are occasionally seen on the refuge. No known nesting occurred this year.

Thousands of blackbirds use the refuge each fall. The birds roost in dense cattail areas in refuge water units. Each morning they fly off to feed in adjacent milo fields. Milo has normally been harvested by the time blackbirds numbers peak. Late maturing grain can be seriously damaged but the refuge staff received no complaints of depredation this year.

8. Game Animals

White-tailed deer are common on Quivira. Spotlight surveys were conducted on November 16 and 22. Sixty-nine deer were observed on the first survey with a 8.9/1 doe to buck ratio. On the 22nd, 79 deer were observed with a 4.6/1 doe to buck ratio. These surveys were conducted prior to the Kansas firearm season. The lower doe to buck ratio on the second survey probably reflects the timing of the rut. The rut was just beginning on the 16th and was in full swing by the 22nd.

In November, a large mule deer buck was seen by Manager Hilley on the south end of the refuge. Although mule deer are not uncommon in the area they are rarely seen on the refuge.

Fox squirrels and cottontail rabbits are common. The abundant grassland, brush and timbered areas provide good habitat for these species. Although they are legal game during the refuge hunting seasons, few are taken each year. Both are usually hunted incidental to upland bird hunting.

10. Other Resident Wildlife

The refuge is home to many species of small mammals, birds, reptiles and amphibians. Coyotes, raccoons, striped skunks and opossums are common. Badgers and bobcats are occasionally seen. A female bobcat was struck by a car on County Road 484 which crosses the middle of the refuge. It was lactating at the time and a search of known denning sites was conducted but no kittens were found. A litter of three badgers was raised in the ditch of the entrance road to refuge headquartes. The young provided several amazing encounters with the staff as they came to work. Another litter of badgers was raised near the bunkhouse.

Figure 31. Two prairie dog towns are located on the refuge and draw a lot of attention from the visiting public. 89-DH

Figure 32. The grasslands, brushy areas and treebelts on Quivira provide ideal habitat for white-tailed deer. 89-SG

Mink, beaver and muskrats are also present on Quivira. The 1988 drought almost totally destroyed the refuge's muskrat population. As 1989 began the only known population consisted of four houses in the spillway on the east side of the Little Salt Marsh. By the end of the year no new houses had been located, however, during the fall muskrats were occasionally seen in the Little Salt Marsh.

Beavers have rebounded slightly from the drought. Beaver were known to occur on three areas on the refuge this fall. These numbers are down considerably from three years ago. This does not disturb the refuge staff as beaver cause considerable problems with our water management activities.

Bobwhite quail and ring-necked pheasant are common in the refuge grasslands and brushy areas. Quail numbers were equal to or higher than 1988 and appeared to have weathered the drought in good condition. Pheasant numbers were down however during 1989. Several factors probably accounted for the drop in pheasants such as the drought and then the heavy thunderstorms during late May and June when the chicks were very small. Why this didn't seem to cause a quail decline is unknown.

Wild turkeys are popular refuge residents. Approximately 150 to 200 turkeys used the refuge and adjacent private lands throughout the year. A flock of 60 roosted in the large cottonwoods west of the office during the fall and provided a good viewing opportunity for the visiting public.

Prairie chickens were sighted three times on the refuge during 1989. All sightings were by grazing permittees or visitors. Quivira is located between a population of greater prairie chickens to the northeast and lesser prairie chickens to the southwest. Chickens were heard "booming" on the north end of the refuge but a lek was not located.

Figure 33. Wild turkey gobblers can often be seen doing their thing to attract a hen during the spring breeding season.
89-DH

Figure 34. Not all refuge residents like to have their photos taken. This eastern hognose snake took exception to the photographer.
89-DH

11. Fisheries Resources

The drought of 1988 resulted in an almost complete fish kill in all units of the refuge except the Little Salt Marsh. Some remnant populations apparently survived in deeper washouts below water control structures.

The heavy rains and resulting high creek flows during the summer of 1989 allowed fish to migrate back into the refuge from deeper spots up and downstream. The return of the smaller fish, the plains killifish, red shiners and flathead minnows was welcomed, as they provided an adequate food supply for the endangered least terns.

14. Scientific Collections

John Link, Galena, Kansas, was issued a Special Use Permit to collect the flowing spikes of cattails on the refuge. Mr. Link uses the spikes for ornamental purposes. Doug Helmers, University of Missouri, Columbia, Missouri, was issued a Special Use Permit for moist soil and wetland research sampling in May. This research was in conjunction with the shorebird research being conducted at Quivira and Cheyenne Bottoms.

15. Animal Control

In the past, beavers have created problems with water management on the refuge by chewing splash boards and plugging up water control structures. The drought forced the beavers to relocate to other areas but with the return of water in 1989, the beavers also returned. Only one problem developed, as a persistent individual took exception with our water manipulations on Unit 22. After we had to unplug the water control structure several times, we were forced to trap and remove the beaver.

16. Marking and Banding

The only banding that occurred on Quivira during 1989 involved shorebirds and least terns banded in conjunction with the ongoing research projects (See Section D.5).

H. Public Use

1. General

Any estimate on the number of visitors that use Quivira would be little more than a wild guess, at best. Few visitors stop at refuge headquarters. The Quivira headquarters is very inadequate for greeting the public, as the building houses office space and a small conference room, capacity 8 - 10

people, with no room for displays or visitors. Because of this most people just don't stop at headquarters.

In 1989, Chuck Olson, Regional Architect, visited Quivira to assist in designing an office addition to provide areas for displays, presentations and much needed storage. Visitation is relatively high on Quivira; this we know from contacts with people in the field, and we are making plans to, hopefully, better accommodate the public.

As the rains came in early summer and the water units filled, refuge visitation also increased. After a year of dry marshes and blowing sand everyone wanted to see the water.

2. Outdoor Classroom - Students

Because of it's diversity of wildlife and habitats, Quivira provides an ideal location for environmental education. For the third year, in cooperation with the Soil Conservation Service, U.S. Geological Survey and Kansas Department of Wildlife and Parks, the refuge hosted an environmental education tour for eighth graders from Stafford, Macksville and St. John schools on September 13. Approximately 75 students participated. In the past, the students rode haywagons between several interpretive stations set up throughout the refuge. This year, cold, rainy weather made it necessary for the students to stay on the buses and somewhat dampened their spirits, but overall everyone still had fun. The six stations during 1989 included interpretive discussions and demonstrations on shelterbelts, soils, grasslands and wetland management, snakes, crop residue and erosion control, and ground water management.

Other environmental education activities included a presentation and refuge tour for Central High School students during the spring and a tour by the Nickerson High School biology class in November.

4. Interpretive Foot Trails

Late in the year, plans were started for two interpretive trails on Quivira. One trail will emphasize the grasslands and woodlots and the other trail will be directed toward interpreting wetlands. A local Boy Scout has expressed interest in helping to develop one trail as part of his eagle badge requirements.

Figure 35. Eighth graders from Macksville, Stafford and St. John schools were given an environmental education tour of the refuge in cooperation with the SCS, USGS and KDW&P. 89-DS

Figure 36. Assistant Manager Scott Glup gave a presentation on wetland management and moist soil plants during the coordinated 8th grade tour. 89-DS

5. Interpretive Tour Routes

The refuge maintains a 5 1/2 mile auto tour route around the Big Salt Marsh on the north end of the refuge. An interpretive kiosk with an educational exhibit marks the start of the tour. Visitors drive along elevated dike tops which allow good wildlife viewing opportunities.

Two other kiosks are located along refuge roads to inform and educate the public. These displays provide a historical background of the refuge, explain why Quivira was established and tell a little about the management of the refuge.

6. Interpretive Exhibits/Demonstrations

On July 19 - 22, the refuge participated in the Stafford, County Fair. A portable display which explained the National Wildlife Refuges in Kansas was exhibited. Refuge staff were on hand to answer visitors' questions. In addition a "What-iz-it?" box, which required the visitors to place their hands in a dark chamber and describe by feel some wildlife object (feathers, turtle shells, snake skins, etc.) was very popular.

Quivira staff, along with personnel from Flint Hills and Kirwin Refuges, participated in the Kansas State Fair at Hutchinson, Kansas, from September 8 - 17. An exhibit describing all three refuges was displayed along with the popular "What-is-it?" box. This was the best year yet at the fair with over 27,200 visits recorded for the refuge booth. A lot of questions were answered and we did a lot to improve the recognition of the FWS in Kansas.

Figure 37. Sometimes refuge managers are called on for odd duties. Manager Hilley, in addition to helping with the refuge booth, assisted the Stafford Pride Committee at the Stafford County Fair (Dave's the one on the left!)
89-Donated Photo

Figure 38. Assistant Manager Glup greeting fair visitors at the refuge booth, Kansas State Fair in Hutchinson, KS. 89-PG

7. Other Interpretive Programs

With the return of water into the Quivira wetlands, public interest in the refuge increased. The following table gives a summary of the 1989 refuge interpretive programs.

Table 6. Quivira NWR, Interpretive Programs, 1989

Date	Program	Attendance
1/17	McCollum - Presented tallk on refuge water problems to Wichita Audubon Society.	25
5/16	Glup - Outdoor presentation to the Kansas Chapter, Daughters of American Revolution	18
5/24	Gonzales - Talk for Cub Scout Pack 304 from Hutchinson, KS	15
5/25	Glup - Slide show to the Stafford County Lions Club	15
6/21	Hilley - Presentation to the Great Bend Pheasants Forever Chapter on possible projects	8
8/24	Staff - Range tour for the Reno and Rice County Extension Services	24
9/28	Glup - Refuge tour for the Sedgewick County Extension Service	50
10/5	Hilley - Slide show for the South Central KS Association of Commissioners and Engineers	50
10/13	Hilley - Slide show to the Stafford Co. Senior Citizens Club	40
10/20	Glup/Schaad - Refuge tour for the Stafford Co. Senior Citizens	19
11/9	Gonzales - Presentation to the annual meeting of the Reno Co. Cattlemens Association	250
11/13	Glup - Presentation to the Sterling Lions Club	29
11/15	Glup - Refuge slide show to the senior citizens at Calavary Baptist Church	14
11/16	Hilley - Slide presentation to the Pratt Rotary Club	60

The refuge grazing program continues to draw interest from the local ranchers and farmers. Two events, the range tour in August and the presentation to the Reno County Cattlemens Association allowed us to provide information and answer some questions. For the range tour, refuge grazing permittee Tom Turner was on hand to give the cattleman's point of view on our program.

The refuge hosted a 10 hour hunter safety course, which was divided into two 5 hour sessions on October 21 and 28. Assistant Manager Gonzales presented discussions and slide shows on conservation, steel shot, refuge law enforcement and waterfowl identification. A total of 21 students were certified.

Figure 38. Interest in the refuge grazing program continues to increase. Grazing permittee Tom Turner was interviewed about the refuge program by a reporter from Grass and Grain magazine.
89-SG

8. Hunting

As word of the improved water conditions on Quivira spread, the refuge was inundated with calls from anxious hunters. Frequent calls from the media kept the public informed about conditions and waterfowl populations. On weekends the refuge answering machine gave callers an updated report and a hunter information board was maintained outside the office to give current hunting conditions.

Quivira is open to hunting for waterfowl, pheasants, quail, dove, snipe, rails, squirrels and rabbits during the regualar Kansas seasons. All other wildife species are protected. Very little hunting occurs for snipe, rail, squirrels and rabbits, with these species being only occasionally taken incidental to other hunting.

Dove hunting starts on September 1, but due to the refuge requirement on steel shot for all hunting there is very little pressure. The difficulty of hitting the target plus the cost of the steel shot is self-limiting.

The duck season for this part of Kansas was divided into three segments; October 21 - 29, November 15 - December 5 and December 23 - 31. All of the hunting units were at full marsh capacity during 1989 compared to only 32 acres of marsh available in 1988. Success was good and most hunters contacted were very happy with the opportunities. As the seasons progressed the success dropped as the birds wised up and moved to the safe areas. By the third segment, almost all of the refuge was frozen over.

Goose season opened on November 11 and continued through January 21, 1990. Early season hunting was fair but late season cold weather pushed more birds onto the refuge and success increased. Hunters on areas around the refuge that used enough decoys and called well, had some excellent hunting.

Pheasant and bobwhite quail season ran from November 11 through January 31, 1990. Success for quail was excellent but the pheasants were a little hard to find. Pheasant production in 1989 was poor and with the good grassland conditions and older, wiser birds, the odds were stacked against the hunters.

9. Fishing

As the water returned to the refuge, fish also moved back into the marshes. Some fishing occurred for catfish and carp in the Little Salt Marsh but the pressure was minimal. Because of the fluctuations caused by recent droughts and unreliable flows during dry periods from Rattlesnake Creek, the

maintenance of a viable fisheries at Quivira is difficult at best.

11. Wildlife Observation

Visits by people, out to see the wildlife, increased in 1989 in direct proportion to the improving wetland conditions. With the larger cities of Great Bend, Hutchinson and Wichita within a short drive of the refuge, a lot of people take the opportunity to visit Quivira.

Figure 40. With the arrival of five whooping cranes in October, the stage was set, as the whoopers watched the people.... 89-SG

Figure 41. ....and the people watched the whoopers. Refuge staff attempted to keep the estimated 300 birders and the cranes separated during the encounter. 89-SG

12. Other Wildlife Oriented Recreation

On April 21 - 23, The Jayhawk Retriever Club held their 24th annual field trial on Quivira. The trial went well with 140 dogs judged during the three days. The trial area was moved from it's traditional location on the refuge, due to the drought and to prevent disturbance of nesting geese.

17. Law Enforcement

Law enforcement patrols were conducted each weekend during the hunting seasons. A lot of hunters were contacted but most were legal. The majority of the hunters realized that if they used the refuge they were very likely to be checked and they cleaned up their act.

Three violation notices were issued, two for not having a state waterfowl stamp in possession and one for taking a goose out of season. All violators paid through the FOC process.

One interesting incident occurred concerning three individuals who asked to use the refuge phone, early in the morning on June 17. Their story made the refuge staff suspicious and just after they left, the County Sheriff was called. The men had several outstanding warrants and were wanted in three counties. The subjects had been involved in a high speed chase and eluded the police near the refuge the previous night.

Refuge officers assisted the sheriff in searching for the individuals who had rapidly left the area on foot, cross country. With the assistance of a refuge neighbor, officers found the subjects' vehicle which had been driven off of the bank of Rattlesnake Creek, then covered with tree branches. One subject was captured later in the week and the two others fled the state. They were eventually apprehended and returned. One individual was on probation for auto theft and with the burglary tools found in his vehicle, the probation was revoked. Many questions still remain unanswered.

Assistant Manager Glup attended Basic Law Enforcement training at FLETC, Glynco, Georgia, from February 25 - May 10. All other law enforcement personnel attended 40 hour in-service training sessions at FLETC, Marana, Arizona.

Assistant Manager Gonzales completed the two week Firearms Instructor Training at Marana, Arizona. Managers Hilley and Glup requalified with their service firearms in September at Flint Hills NWR.

From October 17 - 20, Managers Hilley and Glup participated in a law enforcement road block conducted at Lamar, Colorado.

The road block was a joint effort between the Fish and Wildlife Service and state conservation officers from Colorado, Wyoming and Kansas. Violators were almost more common than non-violators on some shifts. On one nine hour shift alone, approximately $11,000 in fines were issued.

Managers Hilley and Gonzales attended a two day "Street Survival" seminar in Wichita, Kansas on October 29 - 30. The course was sponsered by the Kansas Law Enforcement Association, and is highly recommended.

Two fire extinguishers were stolen from refuge tractors during the year. In addition, a frustrated individual used a knife to cut up an information leaflet booth. Who can figure?

I. Equipment and Facilities

1. New Construction

Drought conditions and mild temperatures during the '89 winter allowed the refuge crew to continue with outdoor projects. The Bantam excavator, on loan from Seedskadee NWR, Wyoming, was used to set four 6 foot sections of 3' x 4' concrete box culverts into the dike between Unit 58 and the Big Salt Marsh. The excavator was also used to clean out 100 yards of the F-line canal, and the canal from the Little Salt Marsh to the C-1 canal, plus construct a livestock water source in Unit A-2.

A large work trailer was constructed by the crew from a 7' x 8' x 15' delivery van box, acquired cheaply from a local individual. A steel I-beam frame was constructed and a set of tandem wheel axles were attached. The trailer has internal lighting and outlets for power tools (connected to a portable generator), a work bench and vise. The trailer allows us to take all the equipment needed to a field project and provides security at the site.

A new concrete, four ft. high, double bay water control structure was constructed on the channel which brings water to Units 48 and 49. This structure provides better water movement capabilities by allowing the units to be managed more independently.

Rangeland developments to facilitate the new grazing program were the main thrust in 1989. Refuge crews constructed over 21.5 miles of permanent electric fence, 15.5 miles of temporary electric fence and converted 11 miles of temporary electric to permanent electric fence. Also 2.7 miles of permanent electric fence had to be rebuilt due to wildfires. The grazing permittees constructed an additional two miles of 3-strand barbed wire and one mile of permanent electric fence.

Because of the 3,800 acre April wildfire, the insurance company for the private landowner responsible for the blaze, contracted to rebuild damaged refuge fences. Before the claim was settled, the contractor had to build 14.5 miles of fence on the refuge, a good reason to be careful with matches.

In addition to the fences to divide the grazing paddocks, 15 cell centers were also constructed. These cell centers are around a watering point and provide a means to easily rotate cattle through the different paddocks. Eleven of the cell centers were developed using only a single strand electric fence and one center was constructed with barbed wire. Twenty-one 16 ft. hinged cattle panels were constructed and these used to develop three more cell centers.

Figure 42. The borrowed Bantam excavator was used to construct a new ditch from the F-line canal into Unit 14B. 89-PG

Figure 43. The new work trailer with lighting, power outlets, work bench, etc. provides security and increases our efficiency for field work projects on the refuge. The crew's camo paint job lets us "blend with nature". 89-PG

Figure 44. The search for livestock water to allow implementation of the grazing plan took a lot of effort in 1989. In addition to the successful wells, the crew also drove over 15 sand points that came up dry or produced water too salty for cattle. First guess the spot, then drive the sand point....
89-DH

Figure 45. ....and if everything goes right you get water. It may look bad but the cattle don't seem to mind. A total of 12 good sand point wells with windmills were constructed during the year.
89-DH

To provide livestock water, in addition to the sand point wells and windmills, the refuge also drilled one cased well and installed an electric pump. Cased wells last longer in the corrosive soil in this region but as with the sand points, finding good water can still be a problem. Three test wells were drilled that either came up dry or too salty for cattle.

2. Rehabilitation

In January, the C-1 water control structure was rehabed to make water diversion easier. The road over the structure was widened and a cattle guard was placed in the road to facilitate the grazing program.

The 500 gallon tank on the 1979 IHC fire truck had severe internal rust problems. The fire truck was refitted with a new 800 gallon stainless, low profile tank to improve capacity and lower the weight to improve handling. Internal tank baffles were added to decrease the problems caused by the shifting load. A roll-over protection device was installed that also serves as hand tool storage. Storage compartments for small equipment such as drip torches, first aid equipment, etc. were installed. The pump controls were also relocated to improve operation.

Portions of the old refuge headquarters building, have been used in the past as a bunkhouse for the seasonal firefighters and for visiting researchers and law enforcement personnel. During 1989 the living quarters were remodeled by the refuge crew to make them more liveable. New plumbing and electrical work was done. Several areas received new drywall and added insulation. Vanities were added to the bedrooms, the quarters were painted and new windows installed.

The east spillway on the Little Salt Marsh received extensive rehab work during 1989. Water had seeped under the concrete structure, causing washouts. Portions of the roadway had collapsed and the washed out soil had left voids under the remaining concrete. Ken Fox, Regional Office Construction Representative visited the refuge on May 30 to survey the damage and help plan the rehab. Portions of the collapsed roadway were jackhammered out and replaced with new concrete. A series of holes were drilled through the upper decking into the voids. Concrete grout was pumped into the holes to fill the voids and strengthen the spillway from underneath. Ken Fox returned on June 27 to assist in applying a skin coat of concrete to prevent water pooling on the spillway apron. Sealants were placed in all joints and cracks to prevent water infiltration to complete the job.

A sheet piling turnout structure on the F-line canal was rehabed by adding a new concrete liner and floor and by

reworking the stoplogs and channel. The rehabed structure improves the ablility to control water in the canal and to flood Unit 14B. Also on the F-line canal, a crossing was improved with the installation of a 4' x 4' fiberglass culvert, 16 ft. long, to replace two 18 inch PVC pipes. The smaller pipes had created water delivery problems by constantly plugging with debris.

Figure 46. Water seeping into the east spillway of the Little Salt Marsh created voids under the concrete. 89-DH

Figure 47. To repair the damage, the refuge crew used a diamond drill to cut holes through the concrete cap. 89-DH

Figure 48. Concrete grout was pumped into the holes to fill the voids and strengthen the spillway. 89-DH

3. Major Maintenance

Concrete rip rap was placed along several eroded sections of refuge dikes and roads. Suitable rocks for rip rap are hard to acquire in this area of Kansas. The refuge has found a ready source of good rip rap material free from the local communmity. Landowners who have old silos, concrete pads or building foundations can contact the refuge. When enough calls come from an area, the refuge crew and dozer breaks up the old structures and hauls it away to be used as rip rap. We benefit by getting good rip rap for only labor costs and the landowners are happy, not to mention the public relations benefits.

Rusted out whistle tubes on Units 28 and 30 were replaced with 6 ft. tall concrete water control structures. In order not to disturb the dikes, the pipe of the old whistle tube is not removed. A new 18 inch PVC pipe is inserted through the old 24 inch tube and the control structure is constructed around the new pipe. Concrete grout is pumped between the old tube and the pipe to complete the job.

Approximately 80 cubic yards of gravel were spread on the roads and dikes on Units 20A and 20B.

Because of new regulations concerning underground storage tanks, that were going to be costly implement, the refuge decided to remove the oldest of our three tanks, the 1,240 gallon tank, vintage 1965, had been acquired surplus from the Air Force. When the tank was dug up, our worst fears were realized. The tank had originally been buried at the old refuge headquarters but in 1981, it was reinstalled in the shop area. During reinstallation the tank had been punctured and a patch was installed. The patch failed and the tank had leaked. Soil around the tank when removed was so saturated with gasoline that it would ignite.

An inspector from the Kansas Department of Health and Environment directed the spill cleanup operations. Several dumptruck loads of contaminated soil were removed from the hole and thinly spread on refuge roads to allow the gasoline to evaporate. Following state procedures, three monitoring wells, down to the water table, were installed at and around the tank location. Samples were taken for analysis from the wells and apparently our cleanup efforts were successful as all samples detected little or no gasoline remaining. While going through all of this it was hard to remember we were trying to save money. You win some, lose some.

A major problem occurred on the night of December 20th. When the staff arrived at the office the next day they were greeted by approximately four inches of water over the floor of the

entire office. Subzero temperatures overnight caused a cap to come off of a water pipe in the wall of the office, flooding everything. Luckily the weather seals around the office doors were poor and a lot of water just ran under the door and out into the parking lot. The parking lot looked like an ice skating rink.

After the initial panic, things were moved to higher ground and Servicemaster of Hutchinson was called. With the help of a strong vacuum, several fans and a dehumidifier they were able to remove most of the water and the carpet dried in two to three days. Other than some damage to boxes, papers, etc. that were on the floor, we were lucky. The carpets just looked like they were cleaned and no damage to the walls or the office computer occurred. The only real damage was to Dave Hilley's Christmas gifts which had been stored on the floor of his office to hide from his children. Santa was a little soggy this year.

Figure 49. The new water control structure under development on Unit 30. Concrete structures with PVC pipes are far more durable in the refuge's corrosive soils than corregated metal tubes. 89-PG

Figure 50. The oldest of the refuge underground fuel tanks was dug up to save the costs of implementing new regulations. But the problems were just starting. 89-PG

Figure 51. Assistant Manager Gonzales showing the patch discovered to be leaking fuel. 89-DH

Figure 52. The buried tank had leaked and the fuel had reached the water table. The line of gasoline contamination can be seen as a dark line on the wall of the hole. 89-DH

Figure 53. Three monitoring wells of four inch PVC pipe were installed, one at the tank site and two down grade, to determine the extent of contamination. 89-PG

4. Equipment Utilization and Replacement

During 1989, the refuge received a 19 inch Magnavox television and a NEC viseo cassette recorder. The equipment will be used for environmental education programs.

A 15,000 BTU, window mount air conditioner was received, to be used in the crew room at the refuge shop.

In March, a 1989 Dodge Dakota 4 x 4 pickup was received. This truck replaced a 1979 Ford Courier.

Shop equipment received during 1989 included a Miller 200LE portable welder/generator and a 14 inch Black and Decker chop saw.

5. Communication Systems

Two radios, one on Service frequency and one high band to communicate with the Sheriff/Fire Departments were installed in the new 4 x 4 pickup.

Eight station radios (5 mobiles, 3 remotes) were repaired by the Motorola service representative from Great Bend, Kansas.

6. Computer Systems

A new Zenith laptop computer plus software was received during the year. A 3.5 inch disk drive and MS Dos 3.3 upgrade was installed in our desktop to allow exchange with the new laptop.

On May 15 - 16, Gonzales and Schaad attended 16 hours of computer training in the Lotus 1-2-3 software at Barton County Community College, Great Bend, Kansas. Hilley, Gonzales, Glup and Schaad returned to the college in July to complete 16 hours of training in Dbase III+.

J. Other Items

1. Cooperative Programs

The refuge continued with the weekly monitoring of the U.S. Geological Survey gauging station on Rattlesnake Creek. Creek levels are recorded and any failures of the measuring equipment reported to USGS.

Quivira once agian participated in the Audobon Society's Christmas Bird Count. A total of 16 participants from as far away as Wichita and Manhattan, Kansas counted 73 species on the refuge, a new record. A total of 162,570 individual birds

were recorded and unusual sightings included a northern shrike and a greater scaup.

Figure 54. The 1989 Christmas bird count crew set a new record at Quivira. 89-DH

2. Other Economic Uses

Interest in oil production continued on Quivira during 1989. In March, Vantage Petroleum, Inc., Great Bend, Kansas began drilling for oil at a site south of the Big Salt Marsh on the "Fair B" lease. The operation was successful and the well was brought into production in April. The required use of steel tanks to contain drilling fluid and cuttings, etc. has greatly reduced the chance of contamination.

Late in the year, Davis Petroleum, Great Bend, Kansas and Quinoco Petroleum, Denver, Colorado, each proposed to drill new wells on their leases on Quivira. The companies were informed of the permit procedures to follow and they were working on the requirements at years end.

Dynoil Inc., Englewood informed the refuge of their intent for oil exploration. Dynoil, Inc. is of the opinion they have territorial acreages within the refuge totalling 1,600 acres

(Sections 3, 27, and W 1/2 Section 26, T22S, R11W). Because of lack of production, the U.S. Solicitor has issued an opinion that Dynoil holds interest only in the NW 1/4 of Section 3. The refuge, based on the Solicitor's opinion, denied any permits on the disputed acreages. Dynoil has indicated they will "take us to court" so the issue is far from resolved.

On January 11, an oil spill occurred on the Wolf lease at the Big Salt Marsh. A lead line delivering oil and brine from two wells to a tank battery developed a leak. The leak was quickly detected and fixed. An area of approximately 70 ft. x 70 ft. of contimanated soil was removed. On January 13, approximately 30 yards from the first leak, a new leak developed. The pumps were shut down and new plastic line was installed to replace the 22 year old metal pipe.

In February, packing failed in the stuffing box of the Whooping Crane Well # 2A, Gneral Oil. The leak was detected early with only a few gallons of oil spilled. Cleanup was satisfactorily completed.

Figure 55. In December, an oil spill occurred on the Texaco Trading Co. pipeline that crosses the refuge. 89-PG

Figure 56. The leak was fixed and 300 ft. of old pipeline was replaced. 89-PG

Figure 57. The area was fenced and a wire canopy installed to keep wildlife from entering the area. The seeping oil was pumped out and the contaminated soil was removed when the seepage had stopped. 89-DH

3. Items of Interest

Assistant Manager Gonzales and Range Tech Meggers traveled to Leon, Kansas with grazing permittee Tom Turner, on February 8 to attend a Holistic Resource Management Workshop.

Firefighters McNickle and Lovin and Maintenance Worker Henry Hall attended Basic Fire trainig (S-130 and S-190) at Fort Niobrara NWR, Nebraska on April 18 - 20.

Refuge Assistant Schaad and Manager Hilley completed the 16 hour small purchasing correspondence course during the year.

On June 12, Hilley, Gonzales and Marks attended the water control structure workshop, presented by Regional Engineering, in Salina, Kansas.

Hilley, Gonzales, Glup and Meggers attended the range management tour of the DeVore Ranch, Cassoday, Kansas; the ranch uses holistic resource management techniques in all aspects of it's operation.

Glup, Gonzales and Hilley toured Cheyenne Bottoms Management Area with Manager Karl Grover on August 4, to discuss mutual concerns.

Managers Hilley and Gonzales attended the District III Project Leaders meeting on August 16 - 17 at Fort Niobrara NWR, Nebraska.

Manager Hilley completed a two day moist soil management workshop held at Mingo NWR, Missouri on September 11 - 13.

Maintenance Worker Leader Carl Marks completed a two week Heavy Equipment Instructor Training program at Wheeler NWR, Alabama, on September 11 - 22.

Figure 58. In December, prior to their departure for Devils Lake, ND, Scott and Kristi Glup were given a going away party. Gifts included a "bullet proof" vest for easement enforcement. 89-PG

Figure 59. Henry Hall and Pat Gonzales received Special Achievement Awards during 1989. Henry's award was for his work on rehabing the IHC firetruck. Pat's award was for serving as Acting Refuge manager during the personnel transfers. Both awards were well deserved. 89-DH

4. Credits

Refuge Manager Trainee Glup wrote Sections F-7 and G. Manager Hilley authored the remainder of the report. All refuge staff provided data and editing. Refuge Assistant Schaad provided word processing and assembled the report. Photos, taken with both refuge and personal equipment, are credited by initials.