

QUIVIRA NATIONAL WILDLIFE REFUGE

Stafford, Kansas

ANNUAL NARRATIVE REPORT

Calendar Year 1991

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

REVIEW AND APPROVAL

QUIVIRA NATIONAL WILDLIFE REFUGE

Stafford, Kansas

ANNUAL NARRATIVE REPORT

Calendar Year 1991

Dave Tilley 6/17/92
Refuge Manager Date

D. Henry _____
Refuge Supervisor Date

Regional Office Approval

Date

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-two 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 over 5,000 surface acres of water.

A winter wheat-milo-fallow rotation is practiced on 1,300 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 8,000 acres of 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.

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K. FEEDBACK

A. HIGHLIGHTS

1. Kansas Geological Survey continued research on Rattlesnake Creek to gather data on refuge water problems. (Section D.5)
2. The Primary Assistant Manager position is vacated in July and remains vacant at years end. (Section E.1)
3. Assistant Secretary of Interior Mike Hayden visits Quivira three times during the year. (Section E.8)
4. Severe drought conditions cause all refuge wetlands, except a small pool in the Big Salt Marsh, to go completely dry. (Section F.2)
5. Wildfires burn over 4100 acres of refuge rangelands during 1991. (Section F.9)
6. The endangered least terns have a record production year on Quivira, with 38 young fledged. (Section G.2)
7. A thriving population of Kansas threatened Arkansas Darters are discovered in several small refuge pools. (Section G.2)
8. An educational video for kids, on wetland values, is filmed on Quivira using local school students. (Section H.2)
9. A new 45' x 152' steel-sided equipment storage building is constructed. (Section I.1)
10. Much needed equipment, including a self-propelled excavator, new farm tractor and levee plow were received during 1991. (Section I.4)
11. An oil spill from a Texico pipeline requires removal of over 5000 cu.yds. of contaminated soil and costs the company over \$25,000. (Section J.2)

B. CLIMATIC CONDITIONS

The weather was a major factor in Kansas in 1991. The year started with above normal temperatures, but very little moisture. The lowest temperature recorded for the year was five degrees in January and the hottest temperature was 106 in July. There were no below zero temperatures for 1991, which is unusual for Kansas.

Drought conditions started early and continued throughout the year. Total precipitation amounted to only 15.08 inches of moisture for the year. This is 8.80 inches below normal and the second lowest precipitation recorded since 1966.

On March 26, tornados moved through the area and caused several million dollars worth of damage to the nearby communities of Willowbrook and Abbyville. Fortunately there were few injuries and no fatalities. At sundown on April 26th, exactly one month later, another wave of storms hit and this time people were not as lucky. A total of 17 tornados were on the ground at one time near the town of Andover, KS. When the night was over, several towns were virtually destroyed and 22 people were dead. The refuge received high winds but not a drop of rain from either storm front.

Fall weather continued warm and the moisture condition improved slightly but it was too little too late. The only significant snow fall occurred on Halloween night but the moisture was soon absorbed by the dry earth.

Table 1. Weather Data, Quivira NWR, 1990

| Month | Precip. | Avg. Precip. | Max. Temp. | Min.Temp. |
|-----------|---------|--------------|------------|-----------|
| January | .29" | .57" | 54 | 5 |
| February | .00" | .84" | 72 | 14 |
| March | 1.45" | 1.40" | 81 | 19 |
| April | 2.42" | 2.19" | 84 | 39 |
| May | 2.15" | 3.77" | 99 | 39 |
| June | 2.43" | 3.67" | 102 | 61 |
| July | .63" | 2.93" | 106 | 59 |
| August | 1.12" | 2.59" | 103 | 56 |
| September | .57" | 2.42" | 95 | 40 |
| October | 1.06" | 1.80" | 92 | 19 |
| November | 1.43 | .93" | 68 | 5 |
| December | 1.53 | .77" | 64 | 19 |
| Totals | 15.08 | 23.88" | | |

All figures were recorded at the U.S. Weather Bureau Station, Hudson, Kansas, eight miles west of the refuge.

C. LAND ACQUISITION

2. Easements

In August, title to the Hornbaker Tract was transferred to the refuge from FmHA. The tract contains three parcels, the north and south parcels, 60.7 acres and 55.8 acres respectively, were transferred to the FWS, with the center 43.9 acres being sold by FmHA. Unfortunately the refuge was not notified of the final transfer, by either the FmHA or the Region, until after the end of the year, so no cleanup or management was accomplished.

D. PLANNING

4. Compliance with Environmental and Cultural Resource Mandates

Two Section 7 (Intra-Service) consultations were completed during 1991 for activities on the refuge. Both consultations involved proposals for new oil wells. Two wells were proposed by Davis Petroleum Inc. Great Bend, Kansas, and two others from Hallwood Energy Companies, Denver, Colorado.

Consultations were processed through the Kansas Department of Wildlife and Parks and the Service's Fish and Wildlife Enhancement office in Manhattan, Kansas. Both projects were proposed for upland areas within the refuge and subject to stringent special conditions developed to protect habitat and wildlife resources. As a result, "no effect" opinions were issued for the proposed activities. This action allowed for the exploration for oil by both companies as proposed. The results of the projects are described in Section J.2.

In May, Don Ubel, Kansas Department of Health and Environment (KDHE), took samples from the three monitoring wells installed at the site of the leaking underground fuel tank that was removed in 1990. All samples were tested free of hydrocarbons and the monitoring wells were removed. The refuge was then given permission by KDHE to remove the remaining two underground fuel tanks and replace them with aboveground units if no further leaks were discovered. The remaining tanks were successfully removed with no further contamination detected. This project is described in more detail in Section I.3.

5. Research and Investigations

Quivira NR 91 - "Habitat Management and Population Ecology Studies of the Least Tern in Kansas and Oklahoma" - Dr. Roger L. Boyd, Baker University, Baldwin City, Kansas

This was the 12th year of a long term study on the endangered least tern by Dr. Boyd. The study has continued 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.

Under the continuing program, populations are monitored at Quivira NWR and at Salt Plains NWR, Oklahoma and along the Cimarron River in both states. A research student/assistant (Jeff Rupert), completed most of the 1991 field work, both off and on Quivira refuge. Results of this year's program are addressed in Section G.2.

Quivira NR 91 - "Shorebird population surveys and movements" (Official Project Title Undetermined) - Dr. Susan Skagen, USFWS, National Ecology Research Center (NERC), Fort Collins, Colorado

This was the third year for this study, with plans to continue if funding is available. This project is a component of a larger program identifying migration patterns of shorebirds throughout the continental interior. Primary research objectives at Quivira NWR are to monitor patterns of habitat availability and use by all shorebirds (plovers, sandpipers and phalaropes), to describe patterns of body condition of migrants and to determine length of stay.

NERC researchers surveyed shorebirds at Quivira NWR (Section G.5), Cheyenne Bottoms and Salt Plains NWR to monitor migration and movement patterns. Foraging 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.

To evaluate body condition, shorebirds were captured with mist-nets, weighed and measured. The birds were then processed through an animal body composition analyzer which uses electromagnetic conductivity to determine relative amounts of lean body mass and lipids. A total of 476 birds were processed in the spring and 92 birds in the fall. All captured birds were banded with USFWS metal bands and color marked (green flag on the right lower leg and a white band above the joint on the left leg).

To determine duration of stay of selected species, microminitransmitters (0.75g) were attached to the backs of 17 Semipalmated Sandpipers and 11 White-rumped Sandpipers. The average duration of stay of Semipalmated was significantly shorter (4 days) than the stay of White-rumped (8.5 days). Birds were tracked at 1-2 day intervals at Quivira, and when signals disappeared, the birds were tracked at Cheyenne Bottoms. Only one bird (a Semipalmated Sandpiper) travelled to Cheyenne Bottoms.

The survey efforts, banding and body condition studies will continue in 1992. Additional shorebirds will be fitted with radio transmitters to follow their movements.



Figure 1. The radio tracking vehicle used for the shorebird research project got a lot of attention from the local folks. We told them the TV reception was great. 91-DRS

Quivira NR 91 - Stream-Aquifer and Mineral Intrusion Modeling of the Lower Rattlesnake Creek Basin---The Future of the Quivira National Wildlife Refuge - Marios Sophocleous, Kansas Geological Survey, The University of Kansas, Lawrence, Kansas

This research, began during 1990 and continued during 1991, was initiated because many areas of western and central Kansas have experienced significant groundwater and stream flow declines, most severely within the last two decades.

According to the Kansas Water Office (KWO), extensive groundwater appropriations in the Big Bend Prairie aquifer have contributed to extreme low flows in the Arkansas River and Rattlesnake Creek (KWO, 1984), the latter of which is the life blood of Quivira NWR.

There is also major concern that the quality of ground and surface waters is deteriorating due primarily to "increased natural non-point mineral intrusion from underlying geologic formations; this increased mineral intrusion is a consequence of freshwater declines in the Quaternary alluvial aquifers of central Kansas."

The specific objectives of the research project are listed below, as they appear in the project proposal and include:

- 1) The present and future outlook for available surface and ground-water supplies to the Quivira National Wildlife Refuge, and strategies to maintain and/or enhance these supplies.
- 2) An analysis of the effects of overall regional appropriations and various patterns on stream base flows and mineral intrusion from underlying geologic formations. This will involve application of a coupled stream aquifer salt-water intrusion numerical model and field monitoring of the saltwater interface.
- 3) The impacts of minimal stream flows (and low flows) on the Quivira wetland.
- 4) Development of an overall mass balance for the Quivira wetland in order to properly interpret its function.
- 5) Determination of protective corridors around the Rattlesnake Creek for consideration for possible water right restrictions in cases of streamflows below established minima, or in cases of drought conditions.

During 1990, two 5-inch, fully screened to bedrock monitoring wells were established within the Rattlesnake Creek watershed. The wells were fitted with monitors to record mineral intrusions resulting from fluctuating aquifer elevations. During 1991, refuge personnel monitored the salt water/fresh water interface location on these two wells, which showed fluctuating trends due to seasonal groundwater use. The computer model for the hydrologic budget was developed and tested using data collected and covering different pumping scenarios.

This is a very important research project as it's results could have far reaching implications within this area of Kansas. We are expecting to be involved with this project and associated subjects for a long time into the future. More on this subject is addressed in the water rights (F.11) section.



Figure 2. Dan Schaad and personnel from Kansas Geological Survey collecting data from one of the groundwater monitoring wells in the Rattlesnake Creek Study. 91-GM

E. ADMINISTRATION1. Personnel

Table 2. Personnel, Quivira NWR, 1991

| Name | Title | Apt. | Grade | EOD-Term. |
|-----------------------|---------|------|-------|------------|
| 1. David Hilley | RefMgr | PFT | GS-11 | 5/89 |
| 2. Patrick Gonzales | AsstMgr | PFT | GS-09 | 3/88- 7/91 |
| 3. Daniel R. Schaad | AsstMgr | PFT | GS-07 | 5/88 |
| 4. Gary F. Meggers | RngTch | PFT | GS-05 | 5/85 |
| 5. Jan L. Turner | RefClk | PFT | GS-05 | 6/90 |
| 6. Carl D. Marks | MntLdr | PFT | WL-08 | 7/74 |
| 7. Stanley A. King | MntWkr | PFT | WG-07 | 9/82 |
| 8. Henry H. Hall | MntWkr | PPT | WG-07 | 1/89 |
| 9. Jody W. Brister | RngTch | TFT | GS-04 | 5/91- 1/92 |
| 10. Byron L. McNickle | RngTch | TFT | GS-05 | 4/91-12/91 |
| 11. Paul G. Kramos | RngTch | TFT | GS-05 | 4/91-12/91 |
| 12. Brian K. Marks | BioTch | TFT | GS-04 | 4/91- 4/92 |
| 13. Kelli L. Stone | BioTch | TFT | GS-05 | 7/91- 8/91 |

In July, Pat Gonzales, Assistant Refuge Manager since 1988, accepted the project leader position for Lee Metcalf NWR, Montana. Pat worked on a wide variety of projects while at Quivira and his able help will be missed. The position remained vacant through the end of the year.

Brian Marks joined the staff in April as a Biological Tech to work on private lands activities. Brian is a Kansas native and works well with landowners.

Kelli Stone, Research Assistant for the National Ecology Research Center shorebird project, was converted to a Biological Technician and came on board in July. In August, Kelli was signed up for the coop education program and started graduate studies at Oklahoma State University. Her Masters research will center on shorebirds at Quivira.

Jan Turner, Refuge Assistant, was promoted to GS-5 on 6/4 and Dan Schaad, Assistant Refuge Manager, was promoted to GS-7 on 3/24/91.

Table 3. Quivira NWR, Staffing, 1987 - 1991

| FTE Year | Permanent | | Temp. | YCC | Total |
|-------------|-----------|-----------|-------|-----|-------|
| | Full Time | Part Time | | | |
| 1991 | 7 | 1 | 5 | 1 | 10.25 |
| 1990 | 7 | 1 | 3 | 1 | 9.97 |
| 1989 | 7 | 0 | 4 | 1 | 9.81 |
| 1988 | 7 | 0 | 5 | 2 | 10.46 |
| 1987 | 6 | 0 | 7 | 2 | 9.91 |

Figure 3. Taking the annual staff photo is always fun. First you all stand around..



Figure 4. Then you try to beat the self-timer...



Figure 5. Finally, no one has their eyes closed. Back Row: (L-R) Meggers, Schaad, Mayer, Kramos, Peterson, Turner, Brister, Marks, Stone, McNickle. Front Row: (L-R) Hilley, Gonzales, Street, Marks, Hall, King. 91-DH

2. Youth Programs

Quivira's lone Youth Conservation Corps (YCC) enrollee for 1991 was Darcy Street from Plevna, Kansas. Darcy was integrated into the refuge work crew and did an outstanding job. Projects she worked on included word processing assignments, facilities construction and maintenance, yardwork, general painting and clean up.

3. Other Manpower

This was the second year Quivira provided employment sites for individuals hired through the Job Training Partnership Act. The program provides employment for economically disadvantaged youths who work a total of 200 hours at minimum wage. Salaries are paid by the Kansas Job Service and the refuge provides the work site and supervision. Local students Travis Mayer and Wes Peterson from Stafford were hired under the program and they worked from June through August. The youths were integrated into the refuge work crew and proved to be a great asset, completing a lot of tasks that would have not been done otherwise.

4. Volunteer Programs

Boy Scout Troop #306, Hutchinson, KS constructed 47 blue bird nesting boxes for the refuge and our private lands program, under a volunteer agreement. Materials were supplied by the refuge and the wood was pre-cut for safety reasons.



Figure 6. The Boy Scout blue bird project was supervised by an Eagle Scout candidate who also assisted the refuge in installing several of the nesting boxes. 91-DRS

In April, members of the Northern Flint Hills Audubon Society had their annual work weekend on the refuge. This Chapter has adopted Quivira in the Adopt-A-Refuge program sponsored by the Audubon Society. The members cleaned and repaired blue bird boxes in preparation for the nesting season.

Two individuals worked a total of 56 hours for the refuge as part of their community service requirements for criminal convictions. A lot of hard work was accomplished during those hours and justice was served.

In October, Judy Brewer, Stafford, signed a volunteer agreement and assisted in a variety of refuge projects from public use to clean-up.

In October, members of the Northern Flint Hills Audubon Society returned to Quivira to help with yet another project. Seven society members plus two refuge staff constructed 165 new least tern nesting pads on salt flats on the north end of the refuge. About 135 pads were added to the predator fence area and 30 pads were constructed in a new area where tern breeding activity had been previously observed. A small predator fence will surround these new pads by nesting season. In addition, the 200+ existing pads were refurbished with new gravel and rock. This may seem like a lot of pads for our breeding tern population but we are allowing for expansion and for the large number of snowy plovers that also use the tern pads.

Figure 7. Audubon Society members and staff that worked on the least tern nesting pads. 91-DRS



Figure 8. A lot of gravel and rock was moved and sore muscles developed to help the endangered least terns. 91-DRS

Figure 9. A least tern nesting pad ready for the occupants. 91-DRS



5. Funding

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

Table 4. Quivira NWR Funding, FY 87 - FY 91

| Account | 91 | 90 | 89 | 88 | 87 |
|--------------------------|---------|----------|---------|----------|-----------|
| 1120 | 10,000 | 2,250 | | | **319,000 |
| 1261 | 370,000 | *197,500 | 184,000 | *204,000 | |
| 1262 | 125,000 | 145,000 | 104,000 | 110,000 | |
| 6860 | 10,000 | 10,000 | 9,000 | 9,000 | |
| 8610 | 9,400 | 8,000 | 8,000 | 9,800 | 3,000 |
| 1520 | | | | | 3,000 |
| 1241/1510 | | | 16,000 | 15,400 | 15,900 |
| 9110 | 1,000 | | | | |
| 9120 | 68,500 | 67,000 | | | |
| TOTALS | 593,900 | 429,700 | 321,400 | 348,200 | 340,900 |
| * Includes YCC Funding | | | | | |
| **Includes ARMMS Funding | | | | | |

6. Safety

Safety meetings were held throughout the year on a variety of topics. Carl Marks, Heavy Equipment Safety Instructor, received several new safety films from the Regional office that were used at this and other stations.

Personnel from Precision Testing Lab, Wichita, KS, inspected the refuge office facilities for the presence of asbestos. Negative results were produced from the office complex test samples; which were taken from ceiling tiles, air returns, loose attic insulation, and transite in the outside mechanical room closet. The only apparent potential hazard area was the transite in the outside closet. It was suggested that physical disturbance to the surface of the area (sanding, drilling, breaking, etc.) be avoided, thereby preventing the release of toxic fibers into the air. Painting was also suggested to further reduce the hazard potential.

Two accidents resulted in lost time during 1991, one occurring on and one off the job. In July, Travis Mayer, JTPA enrollee, received a hairline fracture of his right hand while loading fence posts and was put on light duty. Byron McNickle, Range Tech/Firefighter broke his leg while off duty at home and was out of commission for several weeks.

Personnel living on the refuge started noticing problems with the refuge drinking water. The water was analyzed and the salt content was found to be over 850 ppm, while acceptable levels for public drinking water have to be 200 ppm or less. The problem appeared to be related to the drought conditions and mineral intrusion into the freshwater zone of our well. The refuge office, quarters and shop were furnished with bottled drinking water systems until more normal precipitation hopefully relieves the problem.

The refuge hosted a two day all-terrain vehicle safety training course, in conjunction with the SCS, in April. The SCS supplied instructor certified six refuge employees and 12 SCS personnel over the two 6 hr. courses.

In June, most refuge personnel were certified or recertified in CPR by an Emergency Medical Tech from Hudson, KS.



Figure 10. Around and around you go and if you don't hit anything you're certified. SCS/FWS sponsored ATV training on Quivira.
91-BKM

7. Technical Assistance

The refuge talked with well over 100 landowners concerning wildlife extension agreements throughout the year. A lot of the landowners in central and western Kansas did not qualify because of soil types or they wanted something other than what our program provides. If we had been building "fish ponds" we would have been in business.

A total of 64 acres of wetlands were restored or enhanced during 1991 with WEA's. As word got out about what our program covered, we got some better project proposals and the work load increased tremendously by years end. In addition to the wetlands work, a total of 54 wood duck, goose and bluebird nesting structures were given to private individuals.

Figure 11. Dike work on the Ninnescah Springs WEA, Reno County, before filling.
91-BKM



Figure 12. Ninnescah Springs WEA after getting some water. A total of 28 wetland acres restored.
91-BKM

There has been a lot of controversy in Kansas over the wetland determinations made by the Soil Conservation Service, especially in the Playa Lake region. Under threat of a law suit by the National Wildlife Federation (NWF), the national office of SCS undertook a field review of the Kansas determinations in September of 1990. As a result of that review, in which Manager Hilley participated, the SCS established a multi-agency team to reevaluate their wetland determinations in Kansas.

Manager Hilley and ARM Gonzales were team members along with personnel from Kansas Wildlife and Parks and SCS. The team met in March, 1991, to develop conventions for the redetermination of the wetlands in Meade County, KS. The plan was for the team to test the conventions in Meade County, train others to use them and then expand to other parts of the state where wetland questions existed.

A lot of effort was put into the project, but in May everything came to a halt when the SCS Washington office instructed Kansas to wait until the Federal Jurisdictional Manual on Wetlands was approved before doing any redeterminations. Now the farmers don't know what they can or cannot do on these areas and some who were originally told they had no wetlands are destroying habitat while Washington waits.

In January, refuge personnel met with a private landowner and SCS personnel in St. John for, according to SCS, the first minimal effect determination in Kansas. The problem arose from an irrigation system having difficulty crossing a "mudhole". The landowner agreed to construct irrigation travel ways and the first of many minimal effects was history.

Manager Hilley met in April, with personnel from Kansas Wildlife and Parks, The Nature Conservancy, Western Hemisphere Shorebird Reserve Network and Assistant Secretary Mike Hayden for a shorebird management conference. The meeting was to assist the Conservancy in developing shorebird management plans for lands they had recently acquired adjacent to Cheyenne Bottoms.

8. Other

In January, a Tort Claim against the refuge was processed by the Regional Solicitor for damage occurring to an individual's windshield allegedly caused by flying gravel from a refuge dump truck. The individual was seeking compensation in the amount of \$232.48 for the replacement of the windshield. It was the Solicitor's opinion that there was no negligence on the part of the refuge and the individual's claim was denied.

In February, the individual's insurance claims representative submitted a request to the Regional Solicitor to reconsider the official opinion, in which the individual's claim was denied. The Solicitor, in April, decided that it was better to pay, than fight for what's right, so the claim was approved.

Manager Hilley delivered the Refuge Revenue Sharing payment checks to Rice, Reno, and Stafford County treasurers as appropriate. Payments totalled \$31,872; a 15% increase from last year, and 93.55% of entitlement.

Assistant Secretary of the Interior Mike Hayden visited Quivira several times during the year. In March, he visited while awaiting appointment to the Interior position. Mr. Hayden visited again in May, just prior to going to Washington and in December, he once again took a tour of Quivira. His support of Quivira has always been appreciated, both while he was Governor of Kansas and in his present position.

Senator Robert Dole visited Stafford in August and was given a special "thank you" from the local citizens for his efforts on behalf of Quivira NWR.

Managers Hilley and Schaad assisted Kansas Wildlife and Parks with a wetland tour for staff members of the Kansas Congressional delegation on September 4th. The three day tour covered water problems at Quivira and wetland issues throughout the state and was designed to give the staff a better background. The media was also invited and some very positive press was received. Congressional staffers expressed their appreciation for the tour and hopefully have a better understanding of the issues.



Figure 13. Five members of the refuge crew received Special Achievement Awards in 1991 for work they did on the Rattlesnake Bridge in 1990. (L-R): Marks, Kramos, King, McNickle, Hall.
91-DH



Figure 14. Dave Hilley received a Special Achievement Award for "superior effort during the year". See, you can fool the Regional Office !
91-DRS



Figure 15. Carl Marks passed a milestone in his career when he received his 20 year length of service certificate and pin.
91-BKM



Figure 16. On June 6th, Managers Hilley and Schaad gave a refuge tour to members of the Playa Lakes Joint Venture who were meeting in Great Bend, KS. 91-DRS

Candy Reckling, Special Projects, RO, was given a refuge tour on June 11. Candy was working on a project proposal for some land acquisition adjacent to the refuge.

Mike Hines, Region 6 Realty, visited in June to work on a reappraisal survey for refuge lands in Stafford, Rice and Reno Counties.

In July, John Cornely, Regional Migratory Bird Coordinator, visited to meet Kelli Stone, Coop graduate student to discuss her shorebird research project.

In December, Ken Fox, Regional Construction Representative, visited to review several MMS projects.

F. HABITAT MANAGEMENT

1. General

The year 1991 was a very tough one for Quivira and the critters that depend on the refuge. In late August, Rattlesnake Creek went completely dry due to lack of rain and heavy pumping by irrigators along the watershed. Rangeland conditions were poor as many grass species failed to produce seed due to drought conditions. The refuge grazing program is designed to handle such conditions but by late summer it was hard to supply water to keep the rotations on schedule. Cropland conditions were fair for the wheat harvest but spring planted milo was almost nonexistent and fall wheat planting was a big gamble, to say the least.

2. Wetlands

Water diversions from Rattlesnake Creek totalled approximately 2,588 acre feet; a noticeable decrease from the 6,788 acre feet of water diverted during 1990.

Early in the year there was some water available for diversion and during the spring migration conditions were good for the birds. By April, most refuge wetlands had some water and flows in Rattlesnake Creek were holding steady. But this was just the beginning of the end. No water diversions were made after early June because of drought conditions. We attempted to hold all of the creek flow in the Little Salt Marsh but the high temperatures, strong winds and lack of precipitation were against us.



Figure 17. Drought conditions plus heavy use for irrigation within the watershed caused Rattlesnake Creek to go dry in late August.
91-BKM

Wetland conditions continued to deteriorate as the year progressed and the rains still did not come. In September, the Little Salt Marsh, our main storage basin went completely dry. By October, the only water remaining in any of the refuge wetlands was about 40-50 acres in the middle of the Big Salt Marsh.

Figure 18. Dan Schaad shows
the effects of the drought
on the Little Salt Marsh.
91-DH



Figure 19. Wheat was drilled
into portions of the Little
Salt Marsh to reduce wind
erosion.
91-DRS



Figure 20. A broadcast
seeder was used in areas
too wet for the tractor
and drill.
91-DRS



The attempt to plant wheat for wind erosion control was successful for the areas where the seed was broadcast. Where it was drilled, the seed just pickled in the ground due to the salt content.

In October, after the irrigation season, the water again started to flow in Rattlesnake Creek. The first water reached the refuge on October 27 but we were still a long way from full.

Because of an upthrust of bedrock near the Big Salt Marsh, ground water normally flows to the surface and helps fill this unit. Generally this flow starts when the irrigators stop pumping and after a freeze has stopped uptake of water by most plants. This normally occurs in September but in 1991 the water did not start flowing till late November.

By years end, conditions had improved considerably for the refuge wetlands. Flows in Rattlesnake Creek had increased to 7.8 cfs, not a flood, but far better than August. The Little Salt Marsh had approx. 700 acres of surface water and the Big Salt Marsh had over 1200 acres by the end of December. We are optimistic for 1992 but only time and the weatherman will tell.

Lack of precipitation caused some rethinking of our wetland management program. In the past several years we had attempted some moist soil management and been very successful. In 1991, the moist soil units had good growth of desirable waterfowl food plants but when time came to reflood there was no water available. Plans are now to hold as much water as possible in most units in the spring and let them drawdown naturally through evaporation. Hopefully enough water will be available to "top-off" the units before the fall migrants arrive.

Murray Laubhan, Moist Soil Specialist, Gaylord Memorial Lab, MO visited in July and reviewed our moist soil management program. Murray made recommendations to help us deal with fluctuations in available water and still continue producing waterfowl food.

Even with the lack of moisture some wetland improvements were conducted. In March, 15 acres of cattail choked marsh in Unit 24 were mowed and flooded to control the cattail. In June, a Special Use Permit was issued to Turley Floral Company, Galena, KS to harvest cattails around the Little Salt Marsh. The cattails are used in flower arrangements and the openings cut in the cattail stands are ideal wildlife use areas.



Figure 21. Cattail cutters harvested several acres of cattails around the Little Salt Marsh and opened the stands for wildlife. 91-DRS

Water quality samples were continued by the refuge staff, twice a month at five points on Quivira throughout the year. This is part of a Service-wide effort to provide baseline data as mandated by Congress to establish water quality standards for wildlife. The testing may also help to identify possible contamination problems.

4. Croplands

Four refuge cooperators continued to farm 1345.2 acres on the refuge during 1991. Of this total, 454.7 acres were in winter wheat, 380.6 acres were in milo (grain sorghum) and 429.6 acres were scheduled to be summer fallowed. Because the refuge is pesticide free on all croplands, we have had problems with cooperators not undercutting or working their summer fallow and letting the weeds go to seed, creating problems for the next year. To alleviate this problem we now require the cooperators to work the summer fallow. We have also added cowpeas to the rotation to help crowd out some of the weeds and to enrich the soil.

During 1991, 80.3 acres of the summer fallow ground was planted to cow peas which were allowed to overwinter as wildlife food. In addition, 39.8 acres were planted to cowpeas in the spring, with the peas turned under in the fall for green manure, prior to winter wheat planting.

All farming on the refuge is dryland and the drought conditions took a toll on the harvest. The wheat harvest was fair to good (33-40 bushels/acre), due to adequate moisture early in the year. Crops, such as milo, that were seeded in the spring did not do as well. Several fields of milo on the refuge were not harvested or only partially cut, because the permittee could not get enough grain to justify the time and effort. Fall planted winter wheat was "dusted in" with a hope for rainfall.

In addition to the farming done by cooperators, the refuge force account farmed 68.3 acres south of headquarters that had been former cropland. This area had been retired from the farming program and allowed to "go back" to grass. Unfortunately, annual weeds had taken over the area and since it was adjacent to headquarters and viewed by the public, we decided to seed it to a good mix of native grass. To reduce the weed competition, the area was disced and seeded to sudan grass in 1991 to prepare for the native grass seeding next spring.

Six small strips of cropland south of the Bunkhouse were removed from the cooperative farming program and force account planted to experimental crops. This allows the testing of different crops for the refuge soil and climate, prior to putting them in the program. The crops planted in 1991 were varieties of cowpeas, sudan and millet.



Figure 22. Discing and drilling sudan grass in the Headquarters field in preparation for a future native grass seeding.
91-PDG.



Figure 23. Even the refuge manager got to drive a tractor while working the Headquarters field. "Sorry, I didn't have time to get that report to the RO.....
Sneaky Photo taken by JLT.

5. Grasslands

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

Overall, the refuge grasslands did fair during 1991. Production on cool season grasses was good with the adequate early moisture. However, the rains were absent when the warm season grasses needed them, and as a result very little grass seed developed. By the end of the summer, the effects of the drought conditions were apparent as grasses that normally would be waist high or taller were stunted and wilting.

Normally, we have seed harvesters clamoring to harvest native grass seed on the refuge. In 1991, these companies were forced to go elsewhere. This will delay the refuge grass seeding efforts because we had anticipated using our share of this harvest to reseed several areas.

7. Grazing

Cattle grazing was used again this year as the primary management tool as we continued with a high intensity, short duration rotation strategy. This was the sixth year in which we have practiced this strategy which appears to be working well. Before this system was implemented, most areas on the refuge were either "understocked and overgrazed", or over rested. In the past, relatively small numbers of livestock were placed in large areas for a period of five to six months during the growing season, and basically forgotten about, until it was time to remove the cattle from the refuge during the winter. This resulted in severe overgrazing of some plants and under utilization of others. Invading trees and brush were able to encroach as a result of this type of grazing, along with very little prescribed burning.

The last several years have involved intensive facility development to provide a means to better manage the time that the grasslands are exposed to the cattle. Most development has been directed toward building single strand electric fences within large units to subdivide them into smaller more manageable areas; one unit in particular has been divided into as many as 32 paddocks.

Most important for the grazing program has been the establishment of strategic watering facilities for the cattle to allow better distribution. Windmills and cased wells with electric submersible pumps have been developed to spread out the grazing pressure. All windmill facilities are equipped with shallow overflow areas to provide water for wildlife. Four windmills in different areas of the refuge were "winterized" this year, so that wildlife will be provided with water year round.

Upon completion of the developments, the plan is to graze approximately half of the area in each grassland management unit in a given year; the remaining areas being rested to provide high quality cover for resident wildlife and ground nesting birds. The rested areas will also serve as a safeguard, should extreme conditions such as fire or drought occur, which would require changing of a grazing program in process. Eventually, each grassland management unit in a given year will have a high degree of diversity, as there will be many paddocks present which differ in growth due to different amounts of rest and grazing.

Special Use Permits are issued annually to current grazing permittees, if they desire to continue grazing cattle on the refuge. We issue the permits annually because it keeps the authority within our arena, and seems to help keep the permittees cooperative.

Seven grazing permittees brought cattle onto the refuge in 1991, for the grazing season from May 1 through October 1. Cattle were moved by the permittees on an average of 3 to 6 days. The grazing fee for this year was set at \$9.30/Animal Unit Month (AUM); although we continued with offering economic incentives to the permittees, by reducing the costs per AUM, if they were successful in moving the cattle as scheduled. Total grazing fees for the program during 1991 was \$32,416.13. Table 5 summarizes the 1991 grazing program.

In May, Soil Conservation Service personnel began a range condition and trend survey on the refuge grazing units. This survey will be compared to a similar survey conducted prior to the start of the present high intensity/short duration grazing program. By years end, most areas had been covered and SCS was working on the report.

Table 5. Quivira NWR Grazing Program, 1991

| Permittee | Grazing Period | Livestock # & Class | AUMs | Acres Grazed | AUMs/acre |
|------------|----------------|---------------------|-------|--------------|-----------|
| Hamilton | 5/01-10/1 | 118 C/c | 875 | 1,647 | 0.53 |
| Hildebrand | 5/01-10/1 | 70 C/c | 325 | 790 | 0.41 |
| Hornbaker | 5/01-10/1 | 37 C/c | 219 | 448 | 0.49 |
| McMurphy | 5/01-10/1 | 72 C/c | 532 | 811 | 0.66 |
| Miller | 5/01-10/1 | 130 C/c | 875 | 1,410 | 0.62 |
| Schweizer | 5/01-10/1 | 80 Y | 282 | 943 | 0.30 |
| | 5/01-10/1 | 100 C/c | 875 | 928 | 0.94 |
| Turner | 4/21-9/21 | 85 C/c | 563 | 880 | 0.64 |
| Totals | | | 4,546 | 7,857 | 0.57avg. |

* C - Cow, C/c - Cow with calf, Y - Yearling

We occasionally receive complaints from the general public concerning the grasslands, such as the refuge is hard to hunt because the grass is too tall and thick, or we are creating a tremendous fire hazard by producing grass which is waist high or taller in many areas. However, for all things considered, these are acceptable tradeoffs which we are willing to contend with for the benefits received.

In 1991, another type of complaint surfaced that had a more sinister nature. Several "accidents" occurred such as gates being left open, fences cut, or cattle moved to areas with no water access. Signs from organizations opposed to public land grazing appeared in several areas of the refuge. No real harm was done by the "accidents" but the potential was there especially when depriving cattle of water during a Kansas summer. We have tried to educate the public about our grazing program and explain the benefits but some people don't want to be bothered by the facts.

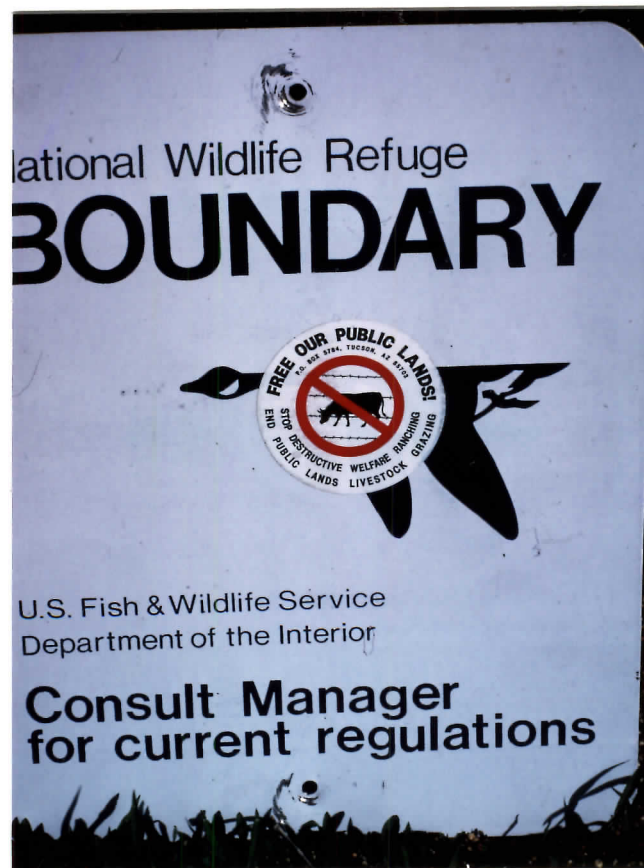


Figure 24. Some individuals took exception to the refuge grazing program in 1991. Hopefully, more educational outreach will prevent this and the associated "accidents" in the future but some people are harder to educate than others. 91-DH.

8. Haying

One haying permit was issued in 1991 for areas within wetland units 29 and 30. The areas to be cut were meandered strips to reduce accumulated mulch and to prepare the areas for flooding, should water become available.



Figure 25. Haying in meandered strips in Units 29 and 30 should provide plenty of edge for waterfowl when adequate moisture returns.
91-BKM

9. Fire Management

In 1990, we were only able to prescribe burn 380 acres of the 810 acre total for which we had approved burn plans. Typically, most of the prescriptions call for burning during the springtime, so that the bare areas which are created by the fires may revegetate quickly. As always the spring weather fails to cooperate and burns are not completed. In 1991, we did not submit any new plans for prescribed burns, instead hoping to finish the burns remaining from the previous year.

In February, a prescribed burn was conducted on Unit 14B in approximately 180 acres of mixed uplands and vegetation choked wetlands. Coverage of the burn was excellent and the resulting thinning of the vegetation and tree removal provided much improved waterfowl habitat.



Figure 26. Canada geese using the recently burned and flooded Unit 14B. Burned salt cedar visible in the background. 91-DRS


On Saturday, March 9th, a wildfire broke out on the refuge at 5:00 p.m., approximately two miles west of the intersection of the Hunter Access Road and County Highway 484. Refuge and other support firefighters from Reno and Stafford Counties, attempted to cut off the head fire by backfiring along the Hunter Access Road and the RCA Canal, 1.5 miles north of the fire's origin. Before the line could be secured, the fire flanked the firefighters and headed north rapidly. At this time firefighters pulled back and began backfiring along the Marsh Road, Wildlife Drive and Hunter Access Road. The fire was finally contained at 3:00 a.m. on Sunday morning after burning over 3700 acres. It is suspected that the fire was caused a hot exhaust or a tossed cigarette thrown by a passing motorist.




Figure 27. Part of the 2 1/2 mile firefront for the 3700 acre wildfire that occurred on Quivira in March.

(Photo donated by Ned Marks, concerned local firewatcher)

[illegible]

 WILDFIRE

 PRESCRIBED BURN

A second wildfire occurred on the refuge during the afternoon of April 10th, (same date as last year, and same area). The fire started on the north side of County Highway 484, burned northward, and was stopped at the "City Service" access road. Stafford County firefighters assisted with fire suppression made difficult by strong winds. This wildfire was directly east of the March wildfire. The fire was probably caused by someone passing through the refuge who may have discarded a cigarette which ignited grass along the roadside. An estimated 400 acres burned during this fire.

Things were quite firewise until September 14th. The successful bidder for the haying available on Unit 29 had a bearing get hot on his baler which started a wildfire. Four refuge personnel responded but the permittee put out the fire with his tractor loader before the refuge crew arrived. The refuge lost about 3 acres of grass but the farmer was not so lucky as his baler was a complete loss.

Total wildfire loss for 1991 was 4103 acres. The refuge submitted a Fire Rehabilitation Plan to cover the losses of fences, gates, signs and other facilities during the two larger wildfires. In June, we received approximately \$7000 from fire funds to cover repairs to damaged facilities.

During the year, the Cooperative Agreement between the Stafford County Fire Dept. and the refuge was renewed. We attempted to get a similar agreement with Reno County but were unsuccessful in satisfying their lawyers so the agreement was in doubt at years end.

10. Pest Control

Pesticide reduction and eventual elimination remains as a long standing goal at Quivira and we have just about realized this goal. A total of 1.75 gallons of mixed product, Banvel Cut Stump Treatment (Dicamba), was used during 1991 to treat 1.5 acres of cut russian olive stumps.

This action was necessary as a last resort, as we prefer to try controlling young trees with grazing and/or fire. 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.

The best time of year for this activity is during the late summer or early fall before the trees achieve dormancy. At this time of year, the vascular systems within the trees are transporting photosynthetic products down into the roots, which the plants will use during overwintering. If the application is timed correctly, then the chemical will be transported into the roots as well, and an effective kill will be achieved. Red cedar trees are problem invaders too, although they will not resprout after shearing, and they are easily controlled with fire.

Cooperative farmers are not allowed to use pesticides while farming on the refuge, unless they request in writing, and those requests must be approved at the Regional Office level. Cooperative farmers have not submitted any requests for pesticides in several years. Crop rotations and mechanical treatments have proven successful in most situations to control pest species.

The drought conditions during 1991 were conducive to an army cutworm outbreak and many local farmers sprayed their fields with everything they could. The refuge cooperative farmers sprayed nothing and did not have a cutworm problem.

11. Water Rights

The main source of water for Quivira is Rattlesnake Creek, which flows into the refuge on the southwest corner. Since the early 1970's, irrigation development within the watershed has increased and the resulting depletion of groundwater has affected the surface flow of the creek. The refuge has a 22,000 acre feet water right on the creek and we have informed the state of our intention to protect that right.

The Service has undertaken a research project with Kansas Geological Survey to determine the impact of irrigation on the creek flows and to develop a water model. (See Section D-5)

Cheyenne Bottoms a state wildlife area 35 miles north of Quivira is experiencing the same problem with irrigation development and reduced flows in Wet Walnut Creek. This controversy has created a lot of media coverage and has made the irrigators along Rattlesnake Creek very nervous. The irrigators have formed a group called the "Water Protection Association of Central Kansas" or "Water PACK". Manager Hilley has met with the Board of Directors and members of Water PACK several times to discuss problems and to try and stop rumors before it is too late. A good working relationship has developed and hopefully this will keep everyone working toward a solution instead of preparing for a fight and not talking.

A five hour meeting was held on the February 15th, at refuge headquarters, to discuss water issues concerning the Rattlesnake Creek watershed. Attendance included Manager Hilley, Regional Office personnel (Water Resources, Water Rights), Kansas Geological Survey (KGS), Great Bend Groundwater Management District #5 (GMD), and members of "Water Pack". Discussions during the meeting included:

1. Future stability of the quantity and quality of the creek water, and what impacts may be presented to the refuge overall.
2. What knowledge there is concerning the Rattlesnake Creek watershed, and its groundwater, specifically in the eastern portion of Stafford County.
3. GMD #5 discussed the District's concerns and plans for future projects in this area.
4. KGS discussed past and present ongoing studies, as well as project proposals and costs for three additional years of work.

On April 28th, Manager Hilley hosted a refuge tour and dinner for members (and families) of "Water PACK" and their lawyers. The gathering had a positive atmosphere and during the tour, lots of wildlife were observed using the wetland areas.

Kansas Water Resources personnel met with refuge staff on July 9th to discuss water use on Quivira in preparation for certifying our water right on Rattlesnake Creek.

Jana Mohrman, Refuge Hydrologist and Dave Schmitt, Water Rights Specialist were on station in October to tour the refuge, observe water use practices and patterns of historic water use and meet with personnel of the Groundwater Management District #5 and the Kansas Division of Water Resources, in Stafford, KS. This visit was in preparation for having the refuge water rights certified.

12. Wilderness and Special Areas

Portions of the Santana Research Natural Area were grazed again during 1991 as part of the refuge grassland management plan. Upon acquisition of the refuge, the 362 acre area was set aside to serve as an example of the original prairie that was present when the pioneers first arrived in this area of Kansas. The prairie remnant contains stabilized sand dunes and 15 acres of century old cottonwoods originally planted as a timber claim.

Years of absolute non-use have resulted in an invasion of brush species; the most common plant being sandhill plum. Through prescribed fire and controlled grazing the refuge is now attempting to restore this area to it's original condition. Results have been slow but are encouraging, as it appears that a greater density of native grasses are taking hold.

G. Wildlife

1. Wildlife Diversity

Quivira National Wildlife Refuge lies in the transition zone of eastern and western vegetation types, providing diverse habitat for a variety of wildlife. Some 252 species of birds, characteristic of both eastern and western North America, are known to use the refuge.



Figure 28. All portions of the refuge are used by a diversity of wildlife, even the eaves of the office, outside the manager's window. 91-DH

2. Endangered and Threatened Species

The wetlands and adjacent tall grass prairie of Quivira provide food and habitat for five endangered species including the whooping crane, interior least tern, bald eagle, peregrine falcon and piping plover. The entire refuge has been designated critical habitat for the endangered whooping crane.

Whooping cranes began to arrive for their spring migration on April 17, when three were spotted. The next day 10 more cranes were on the refuge, and the spring migration peaked at 13 birds. The birds were gone the next day with strong southerly winds. This is typical as the breeding instinct pushes the birds rapidly northward. Generally, sightings for spring migrating whoopers in south-central Kansas are not as common as in the fall.

The first fall migrating whoopers were observed by reliable members of the public on October 31, flying over Zenith, KS, 8 miles south of Quivira. A lone adult was observed on November 4, also flying south of the refuge. On November 6, two adults and one juvenile were recorded on a milo field, two miles west of the refuge. Three adults were using Quivira on November 11 and on November 12, two adults and one juvenile were sighted on the Little Salt Marsh. The birds on the Little Salt Marsh were probably the same birds recorded in the milo field but without bands we can not be sure. This family group stayed on the refuge until November 22. Whooping crane use was down for Quivira in 1991, probably due to poor wetland conditions.



Figure 29. This family group of whooping cranes was feeding in a refuge neighbor's milo field in November. 91-DRS

On November 5th, the refuge received a frantic call from a citizen that there was an injured whooping crane in a road ditch NW of St. John, KS. The person was sure it was a whooper and we should hurry. After making a mad dash to the area, we find the local Conservation Officer has already picked up a sick and very mad white pelican. So much for wildlife identification learned on "Wild Kingdom".

Dr. Boyd of Baker University, Baldwin, Kansas, continued research on interior least tern population densities and reproductive success on Quivira NWR (see Section D.5) During 1991, a total of 27 nesting pairs, down 7 pairs from 1990, were documented to be using Quivira NWR. A total of 35 nests were located, 22 fewer nests than were located last year.

The earliest nest hatched on June 21. In the following seven days, 20 of 25 successful nests hatched. Of the successful nests, 18 were on one of the artificial nesting pads inside the electric fence enclosure. Of the total 35 nests located, 30 (86%) were inside the electric fence, and all but 5 were constructed on nesting pads. In the past least tern production has been reduced by shallow flooding from thunderstorms and coyote predation on the nests. Over 200+ small nesting pads consisting of egg rock and gravel have been constructed, by volunteers, within a four-strand polywire electric fence. Refuge staff coat the bottom wire of the electric fence, using a paint roller, with a mixture of dog and cat food and vegetable oil, in hopes that a direct shock to a coyote's nose as he investigates the odor will prevent future disturbances.

The efforts to lessen the impacts of predation and weather have been successful. On July 22, 38 fledglings were counted during a single survey. This is the largest number of fledglings ever produced at Quivira in the 11 years of this study. In October, an additional 135 pads were placed in the north flat area and 30 were placed in a new area, where nesting activity had been observed, south of the Marsh Road (See Section E.4).

Quivira continues to be an important wintering area for bald eagles in Kansas. The first fall arrival of a bald eagle on the refuge occurred on October 25. Because of poor wetland conditions and resulting low waterfowl numbers, only two bald eagles were using the refuge at years end.

Peregrine falcons were spotted on the refuge several times throughout the year. Piping plovers were observed on the refuge during both the spring and fall migrations.

In May, Refuge personnel along with Kansas Department of Wildlife and Parks and Fish and Wildlife Enhancement, sampled springs south of the Big Salt Marsh and discovered a population of Arkansas Darters. There were several hundred of these fish found in a small area of bubbling springs with a high percentage of young. Currently the Ark Darter is listed as threatened in Kansas, and is listed as a category two candidate species and is under review for possible federal protection.

3. Waterfowl

The year started with cold weather and all wetland units iced over. During the mid-winter waterfowl survey in January only 85 Canada geese and no ducks were using the refuge. Warmer weather brought in 3300 ducks, mostly mallards, and 1150 geese, Canadas and white-fronts, during February. By March, ducks peaked at 7800 with 2000 geese. Ten tundra swans were using the Little Salt Marsh on March 5th. By April most of the migrants had passed through the refuge.

These numbers are considerably lower than previous years but during 1991, the weather warmed up rapidly and the waterfowl did not stage up at Quivira. We feel we had a lot of birds go through the refuge but the peak numbers do not show these birds. As new birds arrived from the south, other birds were leaving to head north and the surveys figures remained low. We feel this way from watching the flocks as the birds always behaved like new arrivals.

The resident Canada goose flock continues to grow and 1991 was a good year for goose production. Part of the reason for the production is that the refuge increased the number of artificial nesting structures and the geese have readily accepted them.

Fall migration began early with 5,300 ducks counted on September 10. The first white-fronts arrived on Sept. 30. What the fall migrants found were dry marshes, both on Quivira and on the nearby Cheyenne Bottoms State Wildlife Area. By November, 6500 ducks and 5200 geese were using the refuge, compared to 24,000 ducks and 22,000 geese at that same time in 1990. By the end of November, Rattlesnake Creek had been flowing back into the refuge for a month and groundwater inflows were putting some water into the Big Salt Marsh, making the area look a little better to migrants. As the habitat continued to improve, 13,300 ducks and 15,600 geese were recorded in December.



Figure 30. With the return of water in the Big Salt Marsh, the waterfowl also returned to the refuge. 91-DRS

4. Marsh and Water Birds

The first sandhill cranes started to show up in February and by March 19th, 12,250 were on the refuge. The annual coordinated sandhill crane survey was conducted on March 26 and found only 794 cranes still on the refuge. This was considerable different from 1990, when 30,000 cranes staged at Quivira, waiting for better weather further north.

The first sandhill crane of the fall migration arrived on September 26 and found very poor conditions due to the drought. By November, 5,300 sandhills were using the refuge but most of the cranes just overflowed Quivira due to the dry marshes.

King, sora and Virginia rails are frequently observed at Quivira during the summer. The elusive black rail continues to attract numerous birders to the Big Salt Marsh area, however there were no confirmed sightings. People using recorded black rail calls got responses but the birds did not show themselves.

White-faced ibis are commonly seen during the summer particularly on the Big Salt Marsh, however no nesting was confirmed.

Great blue herons, little blue herons, great egrets, snowy egrets, cattle egrets, pied-billed grebes, eared grebes, and double-crested cormorants are commonly observed. A common moorhen was observed on Unit 20 on June 11.



Figure 31. As the drought lowered the water in the Little Salt Marsh, fish were easier to obtain for the white pelicans who took advantage of the situation. 91-DRS

5. Shorebirds, Gulls, Terns and Allied Species

Quivira has a diverse shorebird population, with up to 33 species recorded using the refuge. The more common shorebirds at Quivira include American avocets, Wilson's phalaropes, dowitchers, yellowlegs, snowy and semipalmated plovers, and Baird's, western and white-rumped sandpipers.

Dr. Susan Skagen and her field assistants from the National Ecology Research Center (NERC), Fort Collins, Colorado, conducted 24 shorebird surveys from April 1 through June 7 and from August 24 through October 9, 1991. This effort is part of the shorebird research project described in Section D.5. Additional surveys were conducted during the spring and fall migrations by personnel with Fish and Wildlife Enhancement, Manhattan, Kansas.

The maximum count for the spring migration was 5,477 birds on May 1 (Table 6). More than half of these (3,587) were small shorebirds (peeps), including least sandpipers, semipalmated sandpipers, and white-rumped sandpipers. As in 1990, fewer birds were present in the fall than in the spring (Table 7), with a maximum count of 3,601 birds on August 29 (only 296 peeps).

Species composition also differs between fall and spring migrations. Western sandpipers occur only in the fall, whereas white-rumped sandpipers occur only in the spring. Semipalmated sandpipers were more common in spring than fall, and least sandpipers more common in fall than spring. Buff-breasted sandpipers and pectoral sandpipers stop at Quivira in the fall.

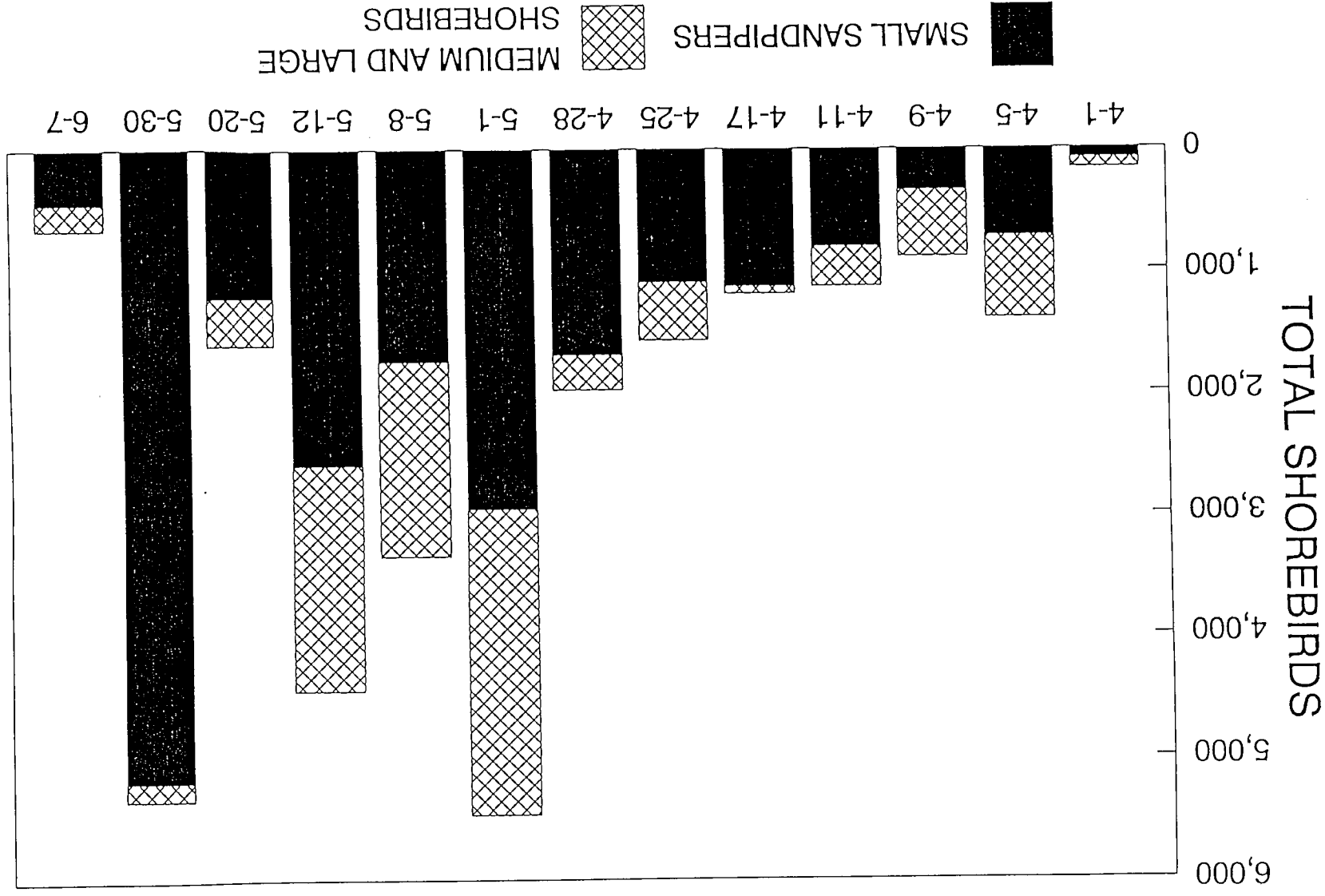
In August, a curlew sandpiper was discovered on the mudflats that once were the Little Salt Marsh. This sighting caused quite a stir with local birders since this bird typically migrates from West Africa east to New Zealand. The curlew sandpiper is a casual visitor to Kansas. This species has been previously observed on four occasions at Cheyenne Bottoms Wildlife Area by Ed Martinez during the late sixties and early seventies.

6. Raptors

Red-tailed hawks, northern harriers and great horned owls are present year around. Screech owls are commonly heard but rarely seen. Three short-eared owls were observed in November near North Lake. Sharp-shinned hawks are frequently observed preying upon songbirds at headquarters and residence feeding stations throughout the winter. For the fourth consecutive winter, a dark-phased red-tailed hawk was present near the refuge headquarters. Ospreys and golden eagles are occasional visitors. There were no observations of golden eagles in 1991 but an osprey was spotted in Unit 22 on April 17, another recorded on the Big Salt Marsh on April 30, and a third osprey observed September 17 over the Little Salt Marsh.

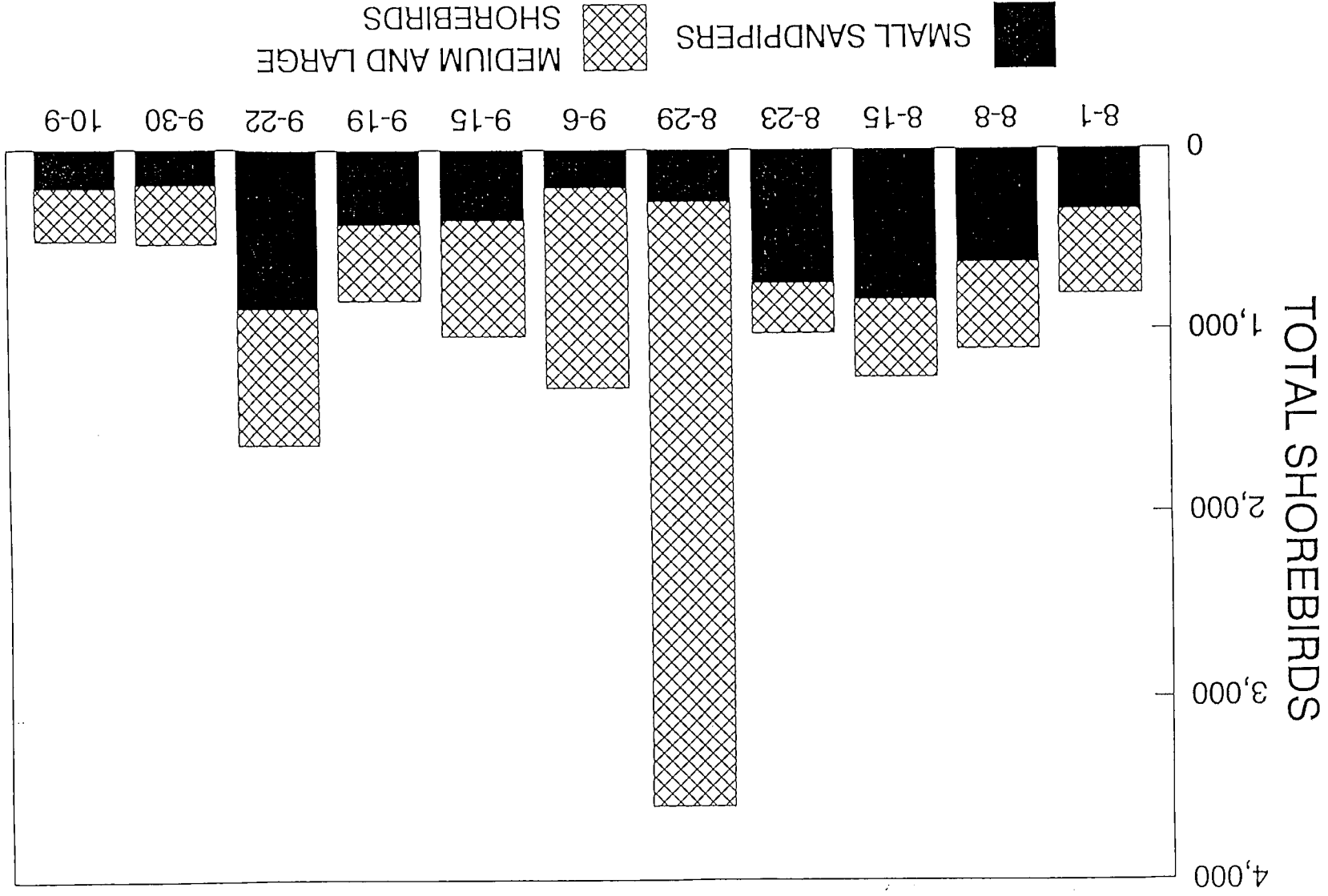
QIVIRA NWR SHOREBIRD SURVEYS 1991

TABLE 6.



QUIVIRA NWR SHOREBIRD SURVEYS 1991

TABLE 7.



Mississippi kites are summer residents and occasionally nest on the refuge. A fairly large number of Mississippi kites nest in large cottonwood trees in the nearby community of Stafford, Kansas, providing good viewing opportunities for the public.



Figure 32. Injured owls and hawks are often turned over to the refuge. We are lucky to have a rehab specialist nearby who can take care of these birds. 91-BKM

7. Other Migratory Birds

Mourning doves are common during the summer and visible in large groups along refuge roads and field edges. No surveys were conducted to determine production or population levels.

Black-billed magpies are occasionally seen on the refuge. They have been known to nest here but no known nesting occurred this year.

Thousands of blackbirds use the refuge each fall. These 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.

Unusual sightings for 1991 included three lark buntings in May near the Wildlife Drive, and 15 mountain bluebirds seen east of Unit 7 in November.

8. Game Animals

White-tailed deer are seen frequently on the refuge. Mule deer use the refuge but are not as common as whitetails. A 2x2 mule deer buck was seen north of the prairie dog town in November. Although not hunted on Quivira, the deer do wander on an off the refuge and thus provide good hunting opportunities on private land adjacent to the refuge. Spotlight surveys were initiated in 1989 in an effort to monitor the refuge deer population and were continued in 1991. Four surveys were conducted before, during and after the Kansas regular firearms season. The results of these surveys are in Table 8.

Table 8. Spotlight Deer Surveys, Quivira NWR, 1991.

| <u>Date</u> | <u>Doe/Buck Ratio</u> | <u>Total Deer</u> |
|-------------|-----------------------|-------------------|
| 11/05 | 2.5/1 | 140 |
| 11/19 | 5.2/1 | 96 |
| 12/12 | 2.4/1 | 150 |
| 12/18 | 5.4/1 | 148 |
| Avg. | 3.9/1 | 151 |

Cottontail rabbits and fox squirrels are the only legal game mammals at Quivira. Both are usually hunted incidental to upland bird hunting, in accordance with state regulations.

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. Five bobcat sightings were recorded during 1991. A bobcat was seen several times checking out the meal possibilities near the headquarters bird feeder.

Ring-necked pheasant and bobwhite quail are common on the refuge. There is a lot of interest in these species because they are legal game on the refuge. Pheasant numbers were equal to or slightly above 1990 levels while quail numbers continued to increase.



Figure 33. Ring-necked pheasants were abundant in 1991 in refuge grasslands and shelterbelts. 91-DH



Figure 34. Wild turkeys are common with approximately 250 to 300 using the refuge and adjacent private land. A flock of over 100 used the large cottonwoods west of headquarters as a winter roost site. 91-DH

A prairie chicken was seen near Unit 14B in March, one near Unit 29 in September and a flock of five near Salt Creek in October. Prairie chickens have been heard booming north of the refuge but a lek site has not been located on Quivira.

Quivira has in the past had two prairie dog towns that drew a lot of visitor attention. In the winter of 1989-1990, the southern town died out for some unknown reason. No dogs appeared in the spring. Because of the popularity of this site to visitors, prairie dogs were live trapped on private land and from the remaining dog town and reintroduced to this site. In 1991, three additional dogs were added to the seven already using the reintroduction site. By spring, young prairie dogs were visible at most holes and the public was happy once again.

11. Fisheries Resources

By early fall the drought conditions had resulted in a complete fish kill for all refuge units. Water remained in the Big Salt Marsh, but the salt concentration was too high for fish survival. This situation had occurred before but fish had retreated to Rattlesnake Creek and survived to restock the refuge. In 1991, however, the Creek also dried up and compounded the problem. We can only hope some pockets of water remained or farm ponds along the Creek provided some habitat.



Figure 35. "SCRATCH AND SNIFF PHOTO" Hold nose near photo and experience what it was like on the north end of the Little Salt Marsh during a south breeze. 91-DRS

In addition to the loss of carp, other species such as plains killifish, red shiners and fathead minnows were lost. These species are used by the endangered least terns as a food source and unless remanent populations survived somewhere in the watershed, the terns may have trouble in 1992.

15. Animal Control

In the past, beavers have created problems with water management on the refuge by chewing flash boards and plugging up water control structures. However, problems with water management facilities were limited in 1991 and no relocation/removal efforts were necessary.

17. Disease Control

On April 3rd, a euthanized sandhill crane was shipped to the National Wildlife Health Center, Madison, Wisconsin, for necropsy. The bird had been reported to refuge personnel by a member of the public, when the bird was seen behaving sickly. The results reported that the bird had become ill initially due to lead poisoning, but would have died from other complications brought on by the weakened state.

H. Public Use

1. General

Over 500,000 people are located within a 1 1/2 hour drive of Quivira. The refuge receives a lot of visitors but they seldom stop at headquarters because the building is inadequate and doesn't have space for exhibits or displays. When the FY91 budget was announced it contained a cure for this problem.

Senator Robert Dole, after conferring with refuge staff, was successful in obtaining a \$800,000 congressional add-on for development of facilities on Quivira. Of this money, \$200,000 was to be used to improve the water management capabilities on the refuge. The remaining \$600,000 will be used to provide more public use facilities. New facilities planned include an office addition to house wildlife interpretive exhibits and a public meeting room, interpretive pull-outs along the refuge roads, an observation tower on the Little Salt Marsh and self-guided nature trails. During 1991, plans were being developed by the Regional Architect for the new facilities.

During 1991, 25 states and two foreign countries were represented by those signing the guest register at headquarters. Visitation decreased with the lowering of the marsh levels. Actual visitation is unknown but was estimated at 8-10,000 people for the year.

2. Outdoor Classroom - Students

Quivira provides a diversity of wildlife and habitats, making it an ideal site for environmental education. In March, Earlene Swaan, National Ecology Research Center, Ft. Collins, CO met with refuge staff, Kansas Wildlife and Parks personnel and local teachers to plan the filming of an educational video for kids on wetlands. The video featuring Stafford children was filmed on the refuge on April 22-23. Approximately 35 local school kids participated, and two cinematographers, (one private and one State) shot approximately eight hours of film during the project. Additional filming was done in Denver and later in the fall again on Quivira. The 20 minute video should be available for distribution to schools, refuges and other agencies in early 1992.

One interesting note to the video filming occurred in the planning stage. Teachers from Macksville, KS, a small town in western Stafford County, were invited to participate in the filming. The Macksville school board refused to let their students participate. The reason given was, that due to the water rights conflict between Quivira and local irrigators, they didn't want the refuge filming their kids enjoying and learning about wetlands and using the film in court against them.

Figure 36. Local school students played movie star for the filming of the wetland video. 91-PDG



Figure 37. Ken Brunson, KW&P, gave students a close look at wetland "critters". 91-PDG



Figure 38. Students learned as the filming progressed and provided some great footage. Now the problem is what to edit. 91-PDG



Quivira hosted the southcentral Kansas Future Farmers of America land judging contest on October 3rd. The contest was sponsored by the Stafford Schools and the Soil Conservation Service. Students examined several sites on the refuge and judged them by slope, drainage, soil type, etc. as to their suitability for different kinds of development. Over 200 students and coaches attended the event.



Figure 39. Manager Hilley greets the participants in the FFA Land Judging Contest. 91-BKM



Figure 40. Students judged refuge sites for imaginary developments. Over 70 schools participated in the contest and the cook out following the event. 91-BKM

In 1991, the FWS entered into a Memorandum of Understanding with Kansas Wildlife and Parks and the City of Wichita for the development and construction of a Wichita National Environmental Center. The facility, located adjacent to the Chisholm Creek City Park, will be the center for environmental education for the three agencies in the Wichita area. The land and building will be constructed by the FWS, with congressional add-on funds, provided through the help of Senator Bob Dole. The State will provide \$1 million for exhibits and interior fixtures and the City will provide \$500,000 for landscaping and modifications to the park.

This is a unique endeavor and will provide more opportunities than for any agency alone. FWS personnel at the Center will be supervised from Quivira, 78 miles away. During 1991, the Service purchased 8.68 acres for approximately \$400,000 and efforts were started to design the facility.

In September, the Hutchinson Ducks Unlimited Chapter sponsored a "Greenwing Field Day" at Quivira. Participants viewed a refuge slide program, assisted with building wood duck nest boxes and were given a retriever demonstration. A cook out followed and because of a small turnout, every Greenwing present won several door prizes provided by DU.



Figure 41. Ducks Unlimited Greenwing participants built several wood duck nest boxes during their field day on Quivira.

91-DH

4. Interpretive Foot Trails

As part of the Congressional add-on funding, the refuge plans to develop two self-guided nature trails. One trail will be hard-surfaced and accessible to handicapped visitors, originating near headquarters and traveling along the shore of the Little Salt Marsh. A longer, more primitive trail is planned near the environmental education classroom. By years end, some interpretive signs had been received and trail designs were being developed.

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

The refuge participated in the Stafford County Fair from July 24-27. A booth describing Quivira and its public use opportunities was manned by staff and family. Approximately 1,500 people visited the booth.

For the fifth consecutive year, Quivira staff, along with personnel from Flint Hills and Kirwin NWR, participated in the Kansas State Fair, Hutchinson, KS. An exhibit describing the three national wildlife refuges in Kansas was used along with wildlife mounts, wood duck nesting boxes, and a touch and feel table for kids. The fair provides an opportunity to tell people about the refuges, answer questions and to promote our private lands program. A total of 27,728 people visited the booth, up over 7,000 visits from 1990.

The Stafford County Museum allowed the refuge to use their large front windows in the museum annex and a downtown office building for displays during Oktoberfest. Quivira informational signs, wildlife mounts, old decoys and historical photos were used, along with engineering sketches of the proposed visitor's center addition. Over 2,500 people attended Oktoberfest and the windows received so many comments that the museum requested we leave the displays up throughout the winter.



Figure 42. Manager Dave Hilley working on the Quivira window displays for the Stafford Oktoberfest. 91-JLT

In April, the refuge obtained a bald eagle carcass from Regional Law Enforcement Division to be mounted for educational purposes. The taxidermy work was funded by the Kansas Wildlife and Parks's Wild Trust with money donated by the family of Priscilla A. Budge. Mrs. Budge was a lady from St. John that had enjoyed visiting Quivira.



Figure 43. Marc Budge, son of Priscilla Budge, presents Dave Hilley with the bald eagle, mounted with donations in memory of Mrs. Budge. The eagle will be used in the Visitors Center and for educational programs.

91-DRS

7. Other Interpretive Programs

Refuge staff spent a lot of time in 1991, presenting programs and giving tours. The effort has paid off with increased public awareness of the refuge and its' objectives. Table 9 a summary of the 1991 refuge interpretive programs.

Table 9. Quivira NWR, Interpretive Programs, 1991

| Date | Program | Attendance |
|---------|---|------------|
| 1/24 | Schaad - Slide show for the St John Lions Club | 25 |
| 2/25 | Turner - Slide show/talk, Leisure Homestead Nursing Home, Stafford | 60 |
| 3/13 | Marks - Interviewed by Sylvia Grade School 7th & 8th graders on Refuge. | 15 |
| 3/20 | Hilley - Wildlife presentation to Learning Tree Pre-school (A), Stafford. | 12 |
| 3/21 | Hilley - Wildlife presentation to Learning Tree Pre-school (B), Stafford. | 12 |
| 4/15 | Schaad - Slide show/talk to Stafford Boy Scouts. | 7 |
| 4/17 | Schaad - "Brown Bag" lunch presentation to Coronado/Quivira Museum, Lyons | 8 |
| 4/17 | Turner - Slide program for PEO Women's Club, Sterling | 23 |
| 4/23 | Hilley - Refuge tour/slide presentation, Southcentral Kansas Tourism Assoc. | 30 |
| 4/25 | Hilley - Slide presentation for Stafford Lions Club. | 25 |
| 6/11 | Turner - Tour, slide show, sack lunch for Stafford, Macksville, Hudson Girl Scouts. | 41 |
| 9/17 | Schaad - Eagle presentation to Stafford Intermediate School, K-6. | 150 |
| 9/18 | Schaad - Refuge presentation to Biology Class, Newton High School. | 30 |
| 9/28-29 | Schaad - Hunter Safety Course | 30 |

| | | |
|-------|--|-----|
| 9/28 | Hilley - DU Greenwing Field Day, Hutchinson. | 6 |
| 10/2 | Hilley - Wildlife Job Presentation, Ag. Intro Class, Hutchinson Comm. College | 40 |
| 10/3 | Hilley - Land judging contest, Hosted by Quivira. | 200 |
| 10/11 | Turner - Video presentation, Senior Citizens, Stafford. | 33 |
| 10/13 | Hilley - Refuge presentation to Stafford Historical and Genealogical Society. | 10 |
| 11/13 | Turner - Slide presentation, Christian Church fellowship group, Stafford. | 41 |
| | TOTAL | 798 |



Figure 44. Approximately 150 people traveled from all over the state on July 17 to attend a Kansas Weed Board Directors meeting at Quivira. The primary purpose of the meeting was to test a new computer software program used to identify plant species.

91-GFM

A part of her coop student work, Kelli Stone started development of several "Discovery Boxes" for use by schools. The boxes contain furs, feathers, track casts, games and other items and ideas the teacher may use with a class to learn about some aspect of wildlife, such as predator/prey relationships or wetland importance. The boxes will be loaned to teachers for use in their classroom or will be available for use in the refuge environmental education classroom.

8. Hunting

Of the 21,820 acres on the refuge, a total of 8,000 acres of Quivira is open to hunting for waterfowl, pheasants, quail, dove, snipe, rails, squirrels and rabbits during the regular Kansas seasons. All other wildlife species are protected. Very little hunting occurs for snipe, rail, squirrel and rabbits, with these species being only occasionally taken incidental to other hunting.

Dove hunting starts on September 1, but due to the refuge requirements 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.

This region of Kansas was divided into three duck season segments for 1991; October 19-27, November 11-December 1, and December 28-January 5. There was no water available in any of the hunting units at the start of the duck season. We spent a lot of time trying to inform hunters so they would not make a futile trip.

By the second segment, the water conditions had improved slightly but most of the ducks had passed us by, for wetter areas to the south. During the last segment there was some water on the north flats but hunter turnout was light.

Dark goose season ran from November 16 through January 19. Goose hunting in 1991 was poor due to water conditions on the refuge. Geese overflowed the refuge or moved to the nearby Ninnescah River, which had some pockets of water.

Pheasant and quail season ran from November 9 through January 31. Because of the thick, native grasslands on Quivira, pheasant hunting is difficult. There are a lot of birds and they have all of the advantage. Pheasant hunting in 1991 was good but more crowded than usual as a lot of waterfowl hunters turned to upland game due to the drought and poor wetland conditions. Quail hunting was excellent and accounted for the majority of the upland game hunting hours.

During 1991, a new handicapped accessible waterfowl hunting blind was constructed on Unit 30. The blind will be available on a reservation system for handicapped hunters and one non-handicapped partner. We did not advertise the availability of the blind in 1991 due to poor waterfowl hunting conditions on the unit (bone dry).



Figure 46. The new handicapped accessible waterfowl hunting blind constructed on Unit 30. We didn't put on the camouflage because there were no ducks to hide from due to the drought.

91-BKM



Figure 47. There is no deer hunting on Quivira but we grow some trophy whitetails that are harvested on surrounding private land. This archery harvested buck is a typical Kansas trophy. (The proud hunter is a typical Kansas Assistant Refuge Manager).

91-DH

9. Fishing

Some fishing by the public normally occurs on the Little Salt Marsh and along Rattlesnake Creek as it enters the refuge. The main species caught are carp, bullheads and some catfish. Because of the fluctuating water levels caused by drought and low flows in Rattlesnake Creek, the maintenance of a viable fishery at Quivira is difficult.

During 1991, some fishing occurred early in the year but as the wetlands started drying up, the refuge experienced an almost complete fish kill. It could be a long time before fishing is again possible at Quivira.

11. Wildlife Observation

Visitation to Quivira continues to increase each year. With the larger cities such as Great Bend, Hutchinson, and Wichita within a short drive, a lot of people take the opportunity to come out to see the wildlife.

The refuge has a good working relationship with several of the outdoor writers in the area. Articles published by these people have helped to spread the word about what Quivira has to offer.

In April, Karen Hollingsworth visited Quivira. Karen and her husband are freelance photographers/writers and are working on a book about the national wildlife refuge system.

In June, Boyd Gibbons, Senior Editorial Staff, National Geographic magazine toured the refuge. He was in the area doing research for a story on the Great Plains aquifer and associated water problems.

12. Other Wildlife Oriented Recreation

On April 19-21, the Jayhawk Retriever Club conducted their 26th annual field trial on Quivira. Approximately 150 people and 130 dogs participated in the event. In 1990, we asked the Jayhawk Club to change the dates for their event due to compatibility problems with waterfowl nesting season and with migration for the whooping cranes. The club requested and were given a year to either change the date or find another area. The Club didn't like the idea and generated several Congressional inquiries. In the end, they were unwilling to find alternative dates, so 1991 was the last Jayhawk field trial on Quivira.



Figure 48. Because of compatibility problems with the date of the event, the 26th and final Jayhawk Retriever Club field trial was held on Quivira in 1991. 91-DRS



Figure 49. In October, Quivira hosted a trail ride for 35 members of the South Hutchinson Saddle Club. Club members were hoping for 150 - 200 riders to participate but due to conflicts with other events rider turnout was low. The trail ride was a fund raiser for the local Boy Scouts. 91-DH

17. Law Enforcement

Each weekend during the hunting seasons and periodically throughout the year, refuge officers conducted law enforcement patrols. A lot of hunters were contacted but most were legal because they have learned that if you hunt the refuge, chances are good that you'll be checked.

Ten violation notices were issued for hunting related activities during 1991, one over limit of waterfowl, seven possession of lead shot, and two for hunting in a closed area (a lawyer and son).



Figure 50. On July 30, a seismic crew was observed on the refuge, approximately one mile north of Unit 63. When contacted the crew did not know they were on a national wildlife refuge even though they had entered through a gate with a refuge sign. The crew was escorted off the refuge and the company, Lockhart Geophysical, Denver, CO, was issued a violation notice.

91-DH

Refuge officers found evidence and received information on two poached deer on Quivira. One deer was shot with a firearm and another poached with archery equipment from a public highway. Night patrols were increased by refuge officers and by the new state conservation officer. We now have a state officer living within 15 minutes of the refuge and the help is appreciated.



Figure 51. Personnel from Kirwin, Flint Hills and Quivira Refuges requalified with their service revolvers at the refuge pistol range.

91-JLT

In October, ARM Schaad travelled to Goodland, KS to assist with law enforcement roadblock operations on I-70. Spearheaded by officers from the Kansas Department of Wildlife and Parks, the operation involved 150 wildlife officers from eight states, the USFWS, U.S. Immigration and Naturalization Service, Bureau of Alcohol, Tobacco and Firearms, Kansas Highway Patrol and sheriff's officers from Sherman and Wallace counties. During the three-day effort, \$31,483 in fines were collected, 1.5 tons of game meat confiscated and 76 citations issued.

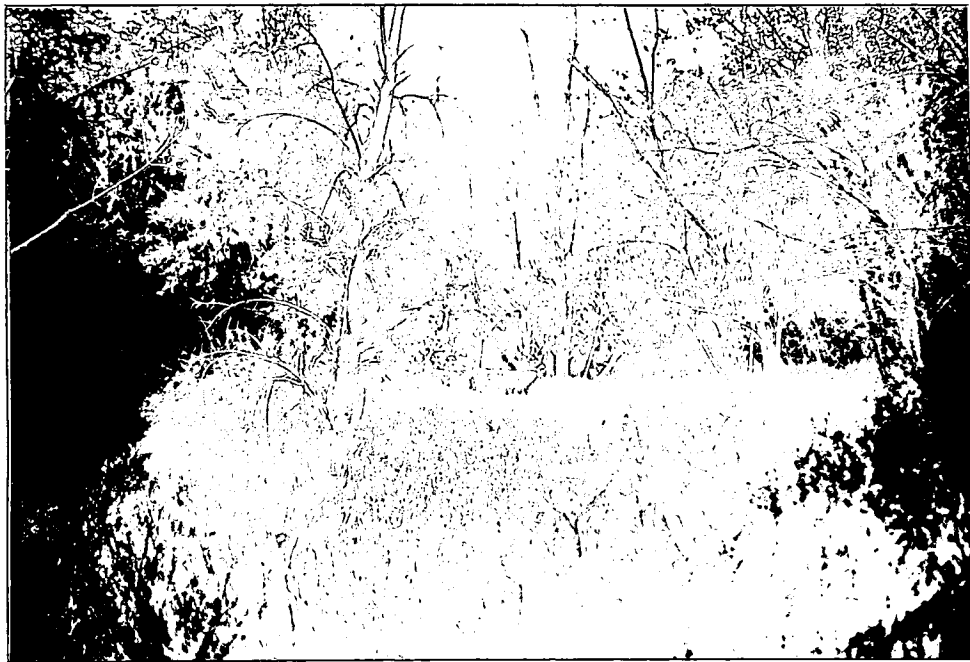


Figure 52. Is it live or is it MEMOREX.....? Refuge Officers Hilley and Schaad assisted KWP conservation officers with deer decoy operations on and adjacent to the refuge. The operation was conducted during the firearms deer season in an effort to curb road hunting in the area. Road traffic was extremely light and no violations were detected. 91-DH

I. Equipment and Facilities

1. New Construction

Part of the Congressional add-on funds were ear marked for a new equipment storage building. In June, Richardson Brothers Construction, Hutchinson, KS, was the low bidder at \$84,220 for the 150'x 45' steel sided building. Work started on the building on October 1 and the final inspection was conducted on October 28. The contractor did an excellent job and the refuge was very pleased with the new facility.

Figure 53. First, pole "A" goes in slot "B".....



Figure 54. Then connect parts "A" and "C" to the main frame.....



Figure 55. An if you follow these simple directions you will have a nice new equipment storage building. 91-BKM





Figure 56. Diane Orf, Regional Architect, visited in October to work on plans and do preliminary surveying for the new Visitor's Center addition to headquarters. Construction should start in early 1992. 91-BKM

A new permanent electric fence was built around the springs on the west side of the refuge where the Arkansas Darter population was discovered. The Ark Darter is a state listed threatened species with work being done to get it added to the federal endangered list. The new fence will allow better livestock control within the grazing unit.

2. Rehabilitation

Rangeland developments, which have been designed to enhance the grazing program, continued during 1991. The major facilities such as electric fences and watering cells are complete at this time. Refuge crews repaired over 12 miles of barbed wire fences, constructed many miles of permanent single-strand electric fence, repaired windmills, water tanks, etc. to make sure the grazing program worked and we got the desired results.

A new handicapped accessible bathroom was installed in the Environmental Education Classroom. This completed the conversion of this structure from vehicle service bays full of junk to a very useful educational facility.

The saga of our underground fuel storage tanks continued in 1991. Following the leaking tank discovered in 1990 and the resulting clean up effort, the final two underground tanks were unearthed in 1991. The oil shed was moved to a new location north of the maintenance shop and concrete pads were poured for new Convault above ground tanks.

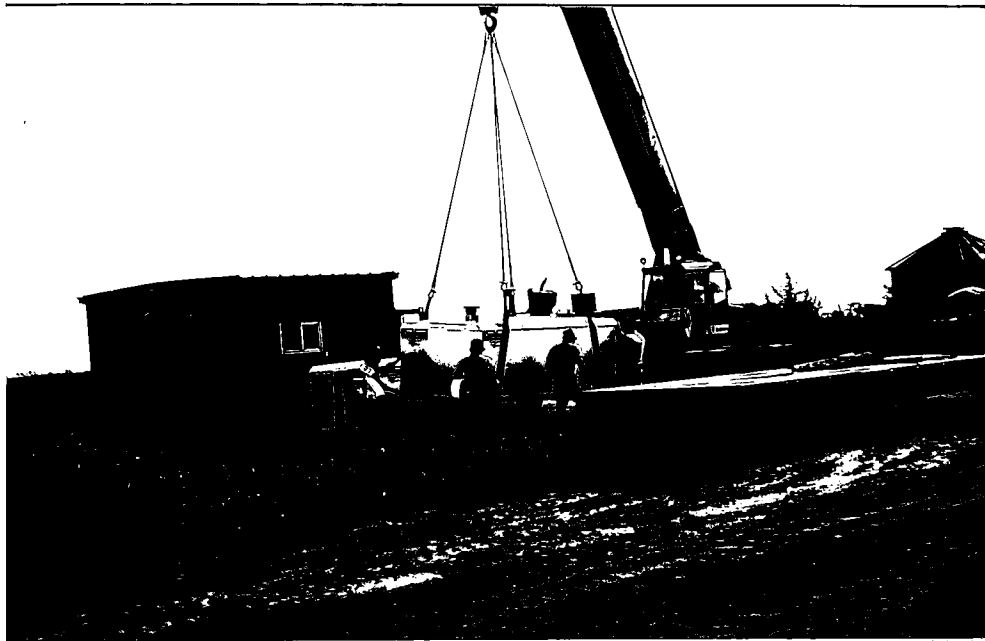


Figure 57. A heavy duty crane was required to unload the new concrete above ground fuel storage tanks. 91-DRS



Figure 58. The relocated oil shed and new fuel tanks provide us with a very efficient fueling station, and, hopefully, put an end to our leaking tank problems for a long time. 91-DRS

During the fall, the road to the old Artesian Gun Club site on the west side of the Little Salt Marsh was rehabed. The road was raised and a new concrete water control structure and cattle guard were installed to replace a culvert that had a history of plugging and washing out. The new structure will allow us to control the water level in an approx. 100 acre wetland, independent of the Little Salt Marsh. The raised road will also allow us to conduct waterfowl and shorebird surveys in an area of the marsh previously inaccessible.

In August, modifications were started on the A-1 water control structure on the Little Salt Marsh to allow more efficient water management. When silt was removed from in front of the structure it was discovered that the concrete aprons had deteriorated badly. Efforts were started to place a four inch concrete cap over the damaged aprons. Upon close inspection, the aprons and several other items on the remaining LSM structures were also found to be in need of repair. So using the philosophy that "When life gives you lemons, make lemonade!" the refuge took advantage of the dry marsh conditions to do the needed repairs. New concrete aprons and wing walls were poured on structure A-1, structure A-3 received a new PVC pipe to replace a rusted out metal one, plus a new screw gate and wing wall. Our major diversion point on the LSM, structure A-2, had the aprons and wing walls replaced to repair erosion problems. Structure C-1 also received new and larger aprons. What started out as a small job requiring an estimated 3 yards of concrete resulted in the refuge pouring over 100 yards of concrete in a six week period. It sure helps to have a quality crew!

Figure 59. The new excavator was used to remove accumulated silt to start the structure repairs on the Little Salt Marsh.
91-BKM



Figure 60. Concrete forms were installed to replace the deteriorated apron walls.
91-DRS



Figure 61. Pouring concrete on the steeply sloping walls was a challenge but the crew succeeded. 91-DRS



Increased soil moisture in December allowed the refuge crew to use the Regional tree spade to plant eastern red cedars and a few deciduous trees around the maintenance buildings. These trees will help visually screen the shop area from the new visitor center.

3. Major Maintenance

This section of Kansas is very sandy, with few rocks, so finding suitable rip-rap material for canals and water control structures is difficult. The refuge worked out a deal with the Reno County Highway Department to obtain the concrete from a half mile of abandoned roadway. The refuge rented a hydraulic hammer and broke up the road surface into usable size chunks and we now have a ready supply of excellent rip-rap for years to come. During 1991, this material was used to rip-rap areas along Rattlesnake Creek north of Unit 24, the Unit 11 dike, the west LSM road, along the creek bridge and on the Wildlife Drive. The new excavator was used to remove silt and place it to cover the concrete riprap along areas visible to the public. These areas were seeded and with grass cover should look more natural to visitors.



Figure 62. Part of the Reno County abandoned roadbed being used for rip-rap along Rattlesnake Creek to prevent erosion.
91-DH

Several days were spent hauling clay fill material and gravel to repair the refuge entrance road. The road was so badly damaged from truck traffic associated with the Texico oil spill on the refuge (Section J.2) that it had to be closed. The road is a township road but we help with maintenance, since it is our main entrance and the township often does not maintain it to very high standards.

A new 800 gallon fiberglass tank, manufactured by Glass King Co., Great Bend, was installed on the IHC firetruck. This tank replaced a stainless steel tank that had developed stress fractures and was leaking.



Figure 63. The refuge bunkhouse/environmental education center received a new coat of paint during the year. Cedar fencing and landscaping were completed on the area to improve appearances. 912-DRS



Figure 64. Using part of the \$38,000 worth of surplus pipe we obtained in 1990, the crew built several cattleguards. The design does not require concrete supports and allows the guards to be somewhat portable. 91-DRS

As always happens when you are busy, things break. During 1991, the refuge dozer required over \$8000 dollars worth of repairs and was out of commission for several weeks. The backhoe had to have the cylinders resleeved, was returned to us after several weeks and immediately bent a push rod. The service shop had used the wrong size rod and paid for repairs, but more delays were required. The IHC stake bed truck dropped a valve and required extensive engine work by the maintenance crew and the IHC dump truck needed major clutch work.

4. Equipment Utilization and Replacement



Figure 65. The major piece of new equipment received in 1991 was the Cat EL200B self propelled excavator. The funds were provided by a Congressional add-on from Senator Bob Dole and the excavator was named appropriately "The Senator" by the refuge maintenance staff.

91-DH



Figure 66. The add-on funds also purchased a John Deere 4055 farm tractor and a rice levee plow to be used in our wetland management program. 91-DRS



Figure 67. Fire funding provided a new 1-ton, 4x4 pickup, to haul a fire pumper unit for wildfire suppression and prescribed burning. 91-DRS

Other equipment obtained during 1991 included a 20 cu.ft. freezer to hold specimens, a 4x4 Honda ATV and a 3/4 ton Dodge 4x4 pickup for firefighting, a washer and dryer for the bunkhouse and a new Chevy Suburban for tours and environmental education activities. The refuge also received a TeleVue Oracle 3 spotting scope and tripod from the RO, free, for use in reading neck collars for an Arctic Goose project.

J. Other Items

1. Cooperative Programs

The refuge continues to monitor, each week, the U.S. Geological Survey gauging station on Rattlesnake Creek. The creek levels are recorded and any equipment failures are reported to USGS.

Quivira once again participated in the Audubon Society's Christmas Bird Count. Eleven people participated and identified 58 species (plus 4 additional subspecies) containing 6,707 individuals. This was a decrease from the 71 species and the 13,948 individuals recorded last year. This may have been due to the dry year and a lot of birds overflying the refuge.

2. Other Economic Uses

Interest in oil production on the refuge continued during 1991. In January, Ainsworth Operating Co. re-entered an abandoned well site (Sleeper 1A-5). Work began on the 5th and by the 25th, oil had been struck. The permit requirements to use steel tanks for containing drilling fluids continues to minimize contamination of refuge lands. As an additional safeguard, Ainsworth located it's oil/salt water storage tanks off the refuge on private land.

Territorial Resources Inc., Houston, TX converted the Erickson natural gas well back to an oil producing facility in February.

Davis Petroleum, Inc. (DPI), Great Bend, KS, proposed to drill two oil wells (Eastern Hognose #1 and Sleeper #2) to offset production of the Ainsworth Operating Co. well which was 330 ft. from the DPI lease line. The legal minimum is 300 ft. in Kansas. Both sites were in upland areas but the Eastern Hognose #1 site was near the springs where the population of state threatened Arkansas Darters had been recently discovered.

Because of the Darters, DPI moved the drilling site 300 ft. south of the initially proposed site. If the well was successful DPI would construct additional containment dikes to prevent contamination. Drilling started on Sleeper #2 on August 5th and oil was struck on the 10th at 3576 ft. Production was initially 31 barrels per day but dropped to 13 and remained there. The well we were most concerned about, Eastern Hognose #1, came up a dry hole and was plugged. Sometimes we are lucky.

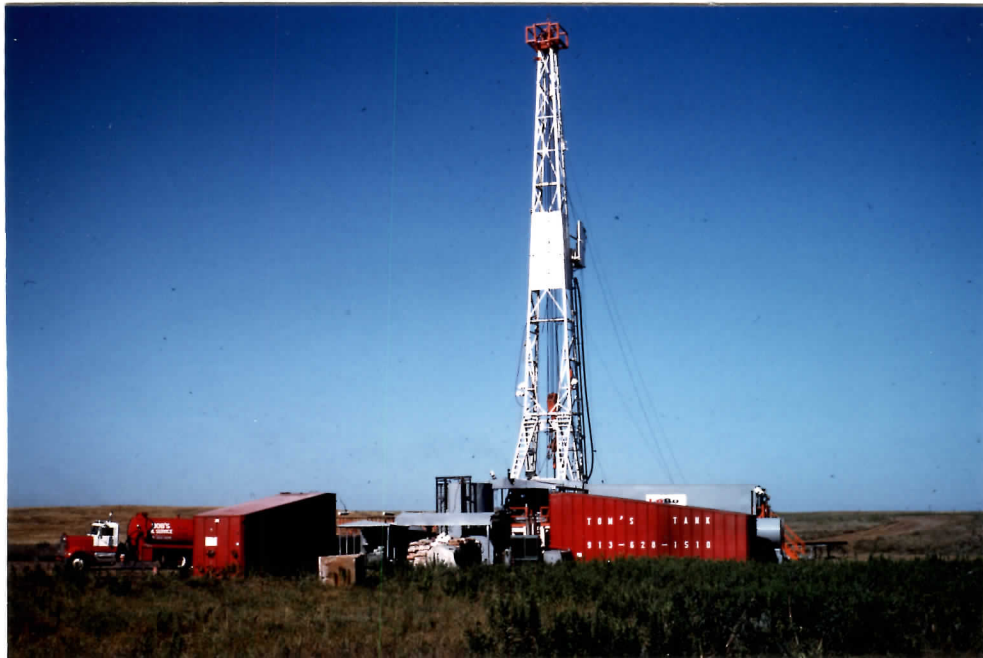


Figure 68. Lobo Drilling Co. working on the Davis Petroleum, Inc. well site (Sleeper #2) on Quivira. Oil was struck and the well was producing 13 barrels a day at years end.

91-DRS

In September, the Flora B oil well (Quivira #10) owned by OXY USA was sold to Rama Operating Co. of Stafford.

In October, Hallwood Energy Co. (HEC), Denver, CO submitted a proposal to drill two wells on their Sleeper lease. Initial sites chosen were in wetlands but because of permit hassles, HEC decided to directionally drill from an existing salt water disposal well site. The drilling permit was delayed until the end of the year and the waterfowl and whooping crane migration had been completed for Quivira.

In 1990, Texico Trading and Transportation, Inc had a pipeline leak west of headquarters. The leak was repaired, the site cleaned up, and the pipeline was later abandoned and everyone thought that was the end of the matter. In June, 1991, the refuge crew was digging south of the abandoned pipeline site, for clay fill material, and discovered oil seeping to the surface. After closer inspection by refuge and Texico representatives it was discovered that oil had migrated through the porous sands during the 1991 spill and pooled underground, undetected during the first cleanup. Over 5000 cu.yds. of contaminated soil was removed by Texico and disposed of off refuge. Costs of cleanup and rehab of the area was over \$25,000 for Texico. The company was excellent to work with on the spill and did a good job on the site.

Figure 69. Oil, seeping to the surface, from the Texico pipeline spill west of headquarters. 91-DH



Figure 70. Over 5000 cu.yds. of oil contaminated soil were removed from the refuge during the cleanup. 91-DRS



Figure 71. Once the oil contaminated ground water was reached, hay and adsorbents were spread on the surface and skimmed off by hand. Fun was had by all. 91-DH



During December, a routine check of oil and gas facilities revealed a leak in the saltwater disposal well (Quivira Well 34) operated by Aspen Drilling Company, Great Bend, KS. A pipe connection had failed and allowed approximately 40 barrels of salt water (no oil) to spill. Fortunately all fluids were contained in the spill pit. Company reps were contacted and repair was immediately made on the pipe connection and the salt water was pumped and removed from the refuge.

3. Items of Interest

Gary Meggers, Range Tech, was certified as a Commercial Pesticide Applicator in January.

Gonzales and Schaad attended a Wildlife Disease Workshop in Manhattan, KS on March 2-3.

Managers Hilley and Schaad travelled to Denver, CO for S-390 fire training on March 11-15.

Range Tech Meggers attended a Holistic Resource Management training session in Albuquerque, NM, on March 13-15.

Jan Turner, Refuge Assistant, travelled to Kansas City, MO, and attended a small purchasing course on March 18-22.

Assistant Manager Dan Schaad attended Basic Refuge Management Academy in Blair, NE from April 29-May17.

Jan Turner attended the administrative workshop in Denver, CO, on May 20-24.

Dan Schaad attended Map Info training in Kearney, NE from July 8-12.



Figure 72. Assistant Manager Pat Gonzales and wife Marlene were given a going away party at the Old Barn in July. Pat accepted the project leader position at Lee Metcalf NWR, Montana.
91-JLT

Gary Meggers and Brian Marks attended required aircraft safety training in Manhattan, KS on July 8.

Manager Hilley attended an environmental education workshop, sponsored by the Office of Training and Education, on July 31.

Manager Hilley and Assistant Manager Schaad attended the Zone III Project Leaders Meeting at Lacreek NWR, Martin, SD on August 12-16.

Assistant Manager Schaad participated in the Region 6 training workshop, to test the "Contaminants Monitoring Operations Manual" for the Servicewide biomonitoring program, on August 19-22 at the Rocky Mountain Arsenal, Denver, CO.

Range Tech Meggers attended the Holistic Resource Management tour of the Devore Ranch, Cassoday, KS on Sept 24.

On Nov. 21-22, the refuge hosted a 504 Handicapped Access training session in the Environmental Education classroom. Personnel from Arapaho, Flint Hills, Kirwin, FWE, the RO and Kansas Dept. of Wildlife and Parks attended.

Revenue sharing checks totaling \$31,872 were delivered to Reno, Rice and Stafford Counties.

4. Credits

Refuge Manager Dave Hilley wrote this entire narrative so if there any mistakes they fall on his head. Everyone else edited to make sure Dave spelled everything right. All hands assembled. Photos, taken with refuge and personal equipment, are credited by initials.

K. FEEDBACK

This has been quiet a year at Quivira, between the water rights issues, drought conditions, new developments and personnel shortages, things didn't always run smoothly. Everyone was called on to do more than their share to get the job done. It's a privilege to work with the quality of personnel that make up the Quivira staff. For all of their extra effort and dedication, I want to publicly say "Thanks".

Now to some other matters. Let me be the first to say that I love to read Narratives from other stations. Unfortunately, most of the time I get to do little more than look at the pictures. I know someone spent a lot of time writing the report but when you get 6-8 on your desk at one time you can't do them justice. Maybe it's time to change the Narrative format to make it a little less time consuming to write. We send in Monthly Activity Reports and when time comes to write the Narrative, we rearrange this information, add photos and resubmit it. Maybe it should be decided what is needed in the Narrative and the Monthly Activity Report could be rearranged so all we have to do is bind the entire year's Reports, add some photo pages and the Narrative will be done. The Narrative is an important historical document but with all of the extra things refuges are being asked to do, maybe we need to take a closer look at the time required to produce the Narrative.

Thanks for getting us through this year also goes to a lot of folks in the Regional Office. Diane Orf, Regional Architect, spent long hours designing our new Visitors Center, Water Rights staff kept me from saying the wrong things to local irrigators, and Refuge and Wildlife staff kept the funds available and helped in uncountable ways. We sometimes cussed the Regional Office, but all in all we do appreciate the help. Thanks.



"The End"