

REVIEW AND APPROVALS

DESOTO NATIONAL WILDLIFE REFUGE

Missouri Valley, Iowa

ANNUAL NARRATIVE REPORT

Calendar Year 1993

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Project Leader	Date	Wildlife Associate Mgr.	Date

<u>Susan Haseltine</u>	<u>4-24-94</u>
Regional Office Approval	Date

## INTRODUCTION

DeSoto National Wildlife Refuge is located midway between the farming communities of Blair, Nebraska, and Missouri Valley, Iowa, on U. S. Highway 30. The refuge is situated astride the Missouri River, 20 miles north of Omaha, Nebraska. It lies in Harrison and Pottawattamie Counties, Iowa, and Washington County, Nebraska.

The refuge was established in 1959 to preserve habitat for migratory waterfowl. Acquisition was authorized by the Migratory Bird Conservation Act and Migratory Bird Stamp Act. It serves as a seasonal resting area for up to one-half million waterfowl, primarily lesser snow geese and mallards. It has also become an important wintering area for up to 120 endangered bald eagles.

The 7,823-acre refuge lies in the wide, fertile plain of the Missouri Valley Basin on the former meanders of the Missouri River. Portions of the refuge are characterized by cottonwood bottomlands. Approximately 2,500 acres are biologically managed as croplands and grasslands under ten cooperative farming agreements. Warm-season native grasses have been reestablished on over 400 acres to provide additional diversity.

The focal point for both man and wildlife is a former oxbow of the Missouri - the 788-acre DeSoto Lake. Recreational demand for its use has remained high since refuge establishment. The refuge provided active recreation throughout its early history, including fishing, picnicking, boating, waterskiing and swimming. Approximately 16-million-dollars worth of facilities have been developed to accommodate public demand by up to 500,000 visitors annually. Within the last decade, management emphasis has been redirected toward a more balanced program between man and wildlife, emphasizing wildlife-oriented recreation.

The 1968 excavation of the steamboat Bertrand, which sank in 1865, adds a major historical emphasis to the refuge program. The 200,000 artifacts in the Bertrand Collection provide one of the most significant assemblages of Civil-War-era artifacts in the Missouri River region. The collection constitutes a time capsule of national and regional attraction.

In 1981, the DeSoto Visitor Center was opened. The visitor center is the permanent home of the Bertrand Collection. The five-million-dollar, 26,000-square-foot building contains exhibits interpreting the importance of the Bertrand and the historical development and ecological change that occurred within the Missouri River Basin. In addition to environmentally controlled artifact storage and museum exhibit areas, the building houses a laboratory for artifact treatment, a collection records area, and a reference library.

The visitor center also provides exhibits depicting the natural history of the area and its wildlife. Viewing galleries overlooking DeSoto Lake provide excellent opportunities to observe waterfowl and bald eagles during the spring and fall migration periods. A variety of audio-visual equipment provide effective interpretation to an average of 160,000 visitors who pass through the center each year.

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Nothing to Report

A. HIGHLIGHTS

Wild weather occurred this year, with lots of precipitation and a major flood along the Missouri. Section B.

Final reports on two of the refuge's field studies were completed. Section D.5.

DeSoto Lake flooded to a record level, five feet above operational level. Section F.2.

The fall migration of snow geese was atypical, but up to a half-million birds were here for awhile. Section G.3.

Public use was way down, below 300,000 people, due to rainy summer weekends and flooded facilities. Section G.1.

The administrative staff occupied temporary quarters throughout the year, while a new headquarters/shop complex began to take shape. Section I.1.

The leaking visitor center roof was replaced under contract by the end of the year. Section I.2.

Good progress was made on the restoration of Boyer Chute wetlands and planning for public use facilities. Section J.1.

B. CLIMATIC CONDITIONS

1993 WEATHER DATA  
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Month	Precipitation (inches)*		Snowfall	1993 Temperatures(F)	
	1993	Average**		Max.	Min.
Jan.	1.62	0.95	11.55	45	-04
Febr.	1.31	0.89	11.25	47	-09
March	1.86	2.33	4.00	74	03
April	3.60	3.02		74	20
May	6.23	4.11		89	37
June	8.83	4.36		95	54
July	7.47	3.77		90	57
August	5.01	3.45		95	49
Sept.	1.60	3.76		90	34
Oct.	2.73	2.52		86	16
Nov.	0.81	1.46	5.20	61	02
Dec.	0.48	1.26	4.79	61	01
TOTALS	41.55	31.88	36.79	95	-09

\* Includes snowfall

\*\* 30-year average, 1964-1993.

The year started with several snow and ice storms, totalling nearly 12 inches of snow. January's temperatures fluctuated from a high of 45 degrees to a low of -4 degrees.

February continued with additional snow and ice storms, and considerable fog early in the month. Snowfall totalled over 11 inches. Temperatures

fluctuated from a high of 47 degrees to a low of -9 degrees, which was the low for the year. Ice depth on DeSoto Lake averaged 10 inches.

March weather varied greatly, as expected. Temperatures ranged from a high of 74 degrees to a low of 3 degrees. Precipitation totalled 1.86 inches. Water levels in the lake, and adjoining wetlands were already very high. Ice finally broke up on the lake by month's end.

Spring was late in arriving this year. Precipitation totalled 3.6 inches. Temperatures during April reluctantly hit a high of 74 degrees, and remained near a low of 20 degrees during the majority of the month, shortening the local mushroom season.

May continued the trend of cool and wet weather. Rainfall totalled 6.23 inches. The average for May is 4.11 inches. One warm day on the 27th did reach a high of 89 degrees. The coldest temperature was 37 degrees on the 20th. Both the lake and Missouri River water levels crested at or near flood stage most of the month, necessitating drawdown of the lake as conditions permitted.

June was very humid, with several storms. Precipitation totalled 8.83 inches, the third wettest June during the 34 years of DeSoto's existence. June's average rainfall is normally 4.36 inches. The wettest day came on the 11th, with 2.63 inches of rainfall. The high temperature was 93 degrees. The low for the month was 48 degrees.

Unfortunately, July was more of the same, with 7.47 inches of unwelcome moisture, and heavy wind damage resulting during thunderstorms on July 8th. This was the third wettest July on record. Temperatures fluctuated between 90 and 57 degrees. The Missouri River crested at Omaha at 115,000 cfs on July 10th, with really heavy flooding downriver. The lake level reached 994 feet above mean sea level, due to heavy farmland runoff, some five feet above operational level...a record!

The wet weather pattern continued to unload heavy amounts of rainfall on the midwest. The August precipitation total was 5.01 inches. This was the most rainfall recorded during the summer in 118 years. The high temperature was 95 degrees (high for the year), and the low was 52 degrees. Lake levels were being drawn down as conditions allowed.

September finally produced a monthly rainfall below average, with only 1.60 inches. The high temperature was 90 degrees, and the low was 34 degrees.

Rainfall again was above average in October, with 2.73 inches. The high for the month was 86 degrees, and the low dropped down to 16 degrees.

The nearly year-long wet weather pattern finally subsided in November, with only 0.81 inches recorded. Temperatures reached 61 degrees, and dropped down to 2 degrees by month's end. The refuge received 5.2 inches of snowfall on the 14th, which was the first measurable snowfall of the winter. The Thanksgiving weekend brought an ice storm.

Snowfall for December totalled 5.2 inches, providing 0.48 inches of precipitation for the month. The highest temperature recorded was 61 degrees, with a low of 1 degree. By the end of the month, windchills fell below minus-20 degrees. Surprisingly, ground conditions were quite dry by the end of the year.

In summary, this was undoubtedly one of the wettest and coolest years on record. We ended up receiving nearly 10 inches of precipitation above

the 30-year average, a grand total of 41.55. We are currently in the third year of this wet cycle.

### C. LAND ACQUISITION

#### 4. Farmers Home Administration Conservation Easements

DeSoto's Private Lands responsibility includes 18 counties in western Iowa, as well as assisting Region 6 in several counties in eastern Nebraska. The Farmers Home Administration (FmHA) started the year off by submitting pre-inventoried property easement requests to the FWS, to determine if we had an interest. So, when a Service interest was indicated, FmHA then had the option to sell the property without giving us the opportunity to officially request an easement. Once FmHA was informed that we would no longer inspect pre-inventoried properties, very few requests were made.

The proposed 70-acre R. Burson easement in Taylor County was sold to the Page/Taylor County Conservation Board on the 22nd of April. The Service had posted, fenced, and seeded portions of the tract, and had hopes of transferring its management to the County anyway. They will be managing this partially hardwood-timbered, rolling hillside for wildlife, and as a public hunting area.

The R. Barry property in Harrison County was sold to Brad Bothwell, Mondamin, Iowa, on May 19th, which includes a 47.02-acre timbered creek bottom FWS easement in the Loess Hills. This former FmHA property has been surveyed and posted. The conservation easement should be permanently recorded in the County courthouse in the near future.

Refuge Operations Specialist Van Riper inspected the FmHA property of Steve and Betty Marxens in Adams County on August 19th for easement potential, and to conduct a contaminant survey. An initial 57-acre easement was proposed after the Area Soil Conservation Service's (SCS) Soil Scientist determined that there were more wetlands than in the original determination. This redetermination and request for a change in the wetland statute was reversed later by the Council Bluffs Area Conservationist. His determination was that the slope, width, and depth of the proposed wetland bottom was outside of the criteria used for wetland determinations. Thus, supposedly, no wetland sites existed, even though surface water, hydric vegetation, and evidence of hydric soils were observed! This determination went up to the State SCS Office and back again to the Area SCS Office before they made their decision.

A request from the Grand Island Field Office in Region 6 sent ROS Van Riper to Washington County, Nebraska, in September to evaluate the Wayne Dein FmHA-inventoried property. A contaminant survey and a more indepth inspection was completed later in the month. A proposed 271-acre easement was provided to the Grand Island Office on this primarily wooded upland site.

In Woodbury County, ROS Van Riper, along with SCS District Conservationist Neil Stockfelt, inspected the J. Nikon FmHA-inventoried property in October. Considerable trash and contaminants containers were evident, prompting a level-II contaminant survey. A request was submitted for a 35-acre

easement, which includes two SCS-developed wetlands, with water-control structures in place.

To finish up the year, the D. Flanigan FmHA easement in Monona county was flagged for boundary determination and surveying during November. The FmHA approval took two years from our initial inspection. Several other easement requests are waiting for a five-year lease agreement that FmHA has with the former owners or tenants.

The following table is a listing of 1993 FmHA easement activities within the refuge's District:

FmHA Easement Status Report For 1993

<u>Former Owner</u>	<u>County</u>	<u>Date Proposed</u>	<u>Date Accepted</u>	<u>Posting Status</u>	<u>Acres</u>
Burson	Taylor	04/91	09/91 (sold)	Yes	70.00
Barry	Harrison	04/91	05/93 (sold)	Yes	47.02
Flanigan	Monona	12/91	11/93	No	70.00
Marxens	Adams	09/93	denied	---	57.00
Nikon	Woodbury	12/93			35.00
Dein	Washington	10/93			271.00

D. PLANNING

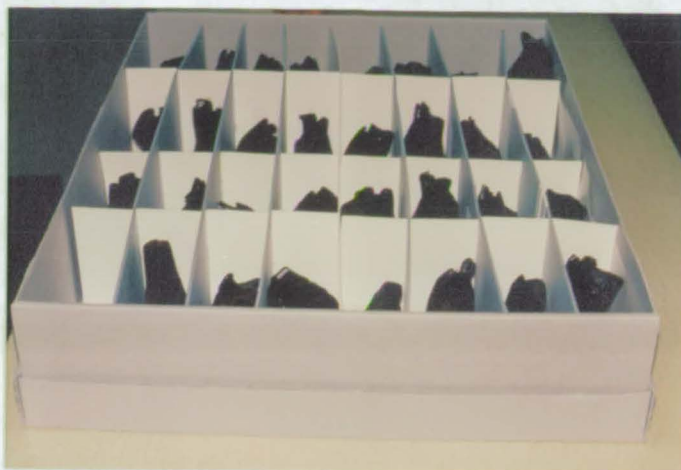
4. Compliance with Environmental and Cultural Resource Mandates

Compatibility determinations were made for the refuge's consumptive recreational program at year's end, and filed.

Our continuing work on addressing the last items on the list of museum accountability problems encountered by the 1990 Inspector General's survey was concluded this year. After the completion of a 100-percent inventory of the collection (which took a year and a half), an inventory of missing objects was sent to the Regional Office's Board of Survey. One hundred and fifty-six lots of objects were accounted for as lost since 1978, compared to the reported 174 items carried on our books. A total of 77,132 objects have been counted, excluding miscellaneous lots of materials measured in stacks, pounds, bags, boxes, etc.

Our conservator forged ahead in her efforts to abide by the Comprehensive Bertrand Collection Conservation Plan, part of an agreement between the Service, the National Advisory Council for Historic Preservation, and the State Historic Preservation Officers of Iowa and Nebraska. The plan calls for active conservation of the collection to fulfill our obligations under the Antiquities Act of 1906, the National Historic Preservation Act of 1966, and the Archeological Resources Preservation Act of 1979; implemented by 36 CFR, parts 79 and 800. We completed the required Annual Report for this Programmatic Agreement.

The conservator completed the documentation and treatment of 971 objects, which included mostly children's and ladies' shoes. In addition to cleaning and stabilizing these materials, a total of 38 compartmentalized boxes were created for sets of footwear. M-892 JO



Also completed were the documentation and treatment of four coats, and one jute roll or runner. Condition evaluations and assessments were continued from last year's work. Almost 8,000 objects were inventoried in the first three months of the year, completing the required work on the whole collection of over 77,000 objects. 49-174-93 JO

This information, along with identifying the predominant materials that make up each object, was computerized, making conservation assessments easily accessible for future work.

The National Park Service's Harpers Ferry Center conservators, Toby Raphael and Jane Merit, having visited the site at the end of last year, completed their reports about leather and textile objects. Through Ms. Merit, articles were acquired on rubber deterioration and preservation from the Conservation Analytical Laboratory at the Smithsonian Institute. Plans also were laid for a visit to Harpers Ferry by Conservator Harold in 1994. A memo was sent to Harpers Ferry Center Division of Conservation requesting aid in developing a conservation treatment for buffalo boots, the first conservation priority established after Raphael's



visit. These boots and a pair of leggings are very greasy, and have developed a rancid odor.

Micro-Biologist Dr. Larrie Stone, in addition to his annual survey of food items for microbial contaminants, treated foodstuffs from the Town Exhibit, as well as any questionable materials he found during his survey.  
49-171-93 JO



Loss of freon in the Cargo Storage Area's walk-in cooler caused condensation to occur in an encapsulated bandanna piece stored there. The artifact was air-dried slowly, and encapsulated again. The conservator spent some time surveying other bags in this area for further condensation but, luckily, found none.

##### 5. Research and Investigations

The Station's funded IPM study is included in Section F.4, Croplands.

DeSoto NR - 84 - "A Field Investigation to Evaluate the Impact of Various Sewage Sludge, Compost, and Commercial Fertilizer Land Applications on Refuge Wildlife, Soils, and Crop Production".

This study was completed in 1990, with the sixth and final cropping year of the study. The 104-acre site has been reverted to warm-season grasses - a large prairie tract, which was envisioned as early as 1986. See also Section F.5.

The final report was completed by Ecological Service's Rock Island Field Office in February, 1993, as part of Region 3's contaminants program. This cooperative program between the refuge and the city of Omaha resulted in a number of conclusions and recommendations, which are described in the published report. While little bio-accumulation was observed in this study, field managers are well advised to incorporate groundwater analyses in any future monitoring studies for land application of sewage sludge. It is worth noting that contaminant analyses are very expensive and,

while sludge and compost materials may be readily available to a refuge free, or at minimal cost, their applications are highly labor intensive. Also, sludge storage and its composting will compound the inconvenience of handling. The use of commercial fertilizers is far less expensive, when the cost of specialized machinery, materials, and labor are considered. Also, commercial fertilizers generally only require one pass over a field, so soil compaction is held to a minimum.

DeSoto NR-91 - "Activities and Impacts of White-tailed Deer at DeSoto National Wildlife Refuge".

The goal of this project was to determine biological mechanisms of habitat selection, habitat use, and movements of white-tailed deer (*Odocoileus virginianus*) in and around DeSoto. The field work for this project was completed by the primary researcher, Kurt VerCauteren, in April. Changes in individual deer home ranges in response to seasonal change, agricultural activities, recreational activities, and other stimuli were analyzed. The importance of refuge areas as winter cover for midwestern deer also was examined. Results and implications from this project can help federal and state land managers, as well as private landowners, to better manage deer populations.

The study concentrated on the adult doe segment of the population, because deer adopt matriarchal social family groups that are led by adult does. During the two-year study, researchers from the University of Nebraska at Lincoln had over 17,000 contacts, visually and through radio-telemetry, making this one of the most intensive deer studies to date. One collared does' movements were recorded on 1,040 separate occasions.

The researchers identified the degree of movements in and out of the refuge area relative to parturition, human activities (mushroom picking season and hunting season), and crop development and harvest. Seventy-two deer were captured and marked, including 36 which were equipped with radio transmitters, and located 12,307 times. Fifty-six percent ( $n=14$ ) of radio-equipped does were year-round residents of the refuge, and 44 percent ( $n=11$ ) were transients. Annual home ranges of residents averaged 170 ha  $\pm$  65 S.D. ( $n=14$ ). The activity of morel mushroom hunters was found to temporarily disturb deer, but did not influence the size or location of home ranges. Home ranges reduced in size with the onset of parturition. Also, home-range centers shifted an average of 299 m  $\pm$  276 S.D. ( $n=14$ ) as 80 percent ( $n=10$ ) of the does selected specific fawning areas. Deer damage to corn peaked at the tasseling-silking stage of development, which took place during mid- to late-July. Home-range centers shifted an average of 174 m  $\pm$  128 S.D. ( $n=14$ ) closer to cornfields at this time. One adult doe remained in corn exclusively for about 3 weeks during this time. After corn harvest, home-range centers shifted away from crop fields, and deeper into areas of permanent cover. Home-range sizes increased significantly as deer were forced to use other sources of cover and search for alternative food sources. Resident does, which caused local crop damage during the growing season, were available to be harvested in the same area where they caused damage. Resident does had a high degree of fidelity toward their home ranges throughout the year. Over 90 percent of doe emigrations occurred in the spring. They averaged 22 km  $\pm$  18 S.D. ( $n=11$ ), and ranged from 3 km to 56 km. Transient does established home ranges in linear strips of riparian habitat which were surrounded by row crops and pastures. Thirty-six percent of



transients ( $n=9/25$ ) were legally harvested, whereas 19 percent of residents ( $n=9/47$ ) were harvested. Migratory does returned to the refuge after being exposed to state firearm and archery seasons, and before the DeSoto Refuge hunt. A key to reducing crop damage caused by resident deer around larger local areas of permanent cover (and, yet protect transient deer) may be to hold depredation hunts, or disseminate depredation permits, before migrators return.



Kurt's Master thesis is entitled, "Home Range and Movement Characteristics of Female White-tailed Deer at DeSoto National Wildlife Refuge". A copy is on file at the refuge. No less than a dozen professional presentations followed.

39-73-93 SV

NETV spent considerable time here getting footage for a half-hour documentary. (Note the ear tag on the above buck). And, as a result, he has been contracted by the NRA to participate throughout the midwest in their Great American Hunter's Tour, with a popularized video version of his study. So, the DeSoto study has received widespread acclaim.

It had been hoped that the study could continue, and proposals were prepared for grants, but funding did not materialize. Over a dozen collared does remain at large. One was reported near Omaha on December 7, and two were taken during the December muzzleloader hunt.

#### 6. Other

Manager Gage was actively engaged in planning for the nearby Boyer Chute National Wildlife Refuge, covered under Section J.1., Cooperation.

As is the case in any major construction project, a great deal of time and effort went into the day-to-day decision-making for demolition of the old headquarters, relocation of facilities, excavation of the construction site, and the constant adjustments, corrections, realignments, and negotiations in design and construction of the new complex. While staff had insisted on a CORE from the Regional Engineering Office to oversee the project, he was only available to be here for an occasional inspection, and the constant nursing and coercing of contractors fell to the field staff.



E. ADMINISTRATION1. Personnel

First Row: L to R: Gage, Marquardt, Root, Harold, Tuttle, Harbottle, Sheets, Storm, Cunard, and O'Barr

Second Row: L to R: Tillma, Cooper, Nielsen, Myer, Hall, Weber, Case, Van Riper, and Porter

Missing: Martin and McDonald

<u>Name</u>	<u>Title</u>	<u>Grade</u>	<u>Status</u>
George E. Gage	Refuge Manager	GS-13	PFT
Terry A. Root	Sup. Refuge Op. Spec.	GS-12	PFT
Stephen Van Riper	Refuge Operations Spec.	GS-11	PFT
Bruce Weber	Outdoor Recreation Plnr.	GS-11	PFT
Melinda Sheets	Refuge Operations Spec.	GS- 9	PFT
James O'Barr	Museum Curator	GS- 9	PFT
Jeanne Harold	Museum Specialist	GS- 9	PFT
Kenneth Jones (Transferred 2/6/93)	Law Enforcement Officer	GS- 7	PFT
Dean Wyckoff (EOD 4/4/93)	Law Enforcement Officer	GS- 6	PFT
David Reilly (Transferred 8/21/93)	Law Enforcement Officer	GS- 5	PFT

Randy A. Porter	Admin. Officer	GS- 9	PFT
Wanda Harbottle	Admin. Technician	GS- 5	PFT
Nellie Weldon	Automation Clerk (Registrar)	GS- 4	PFT
(Retired 7/31/93)			
Sarah Tuttle	Museum Tech. (Registrar)	GS- 5	PFT
(EOD 12/12/93)			
Cindy Myer	Automation Clerk	GS- 4	PFT
Joan Martin	Information Recep.	GS- 3	PPT
Barbara Nielsen	Information Recep.	GS- 3	PPT
Mark Cunard	Heavy Equipment Operator	WG- 8	PFT
Monty J. Storm	Automotive Worker	WG- 8	PFT
Kenneth E. Marquardt	Maintenance Worker	WG- 8	PFT
LeRoy McDonald	Maintenance Mechanic	WG- 9	PFT
(EOD 5/3/93)			
Susan Cooper	Tractor Operator	WG- 6	PFT
Loren Hinkel	Maintenance Helper	WG- 5	PFT
(Resigned 5/29/93)			
Anthony Case	Maintenance Helper	WG- 5	PFT
(EOD 7/26/93)			

#### Temporary

Jeff Tillma	Biological Technician	GS- 5	TFT
Christina Hall	Automation Clerk	GS- 2	TI

#### Personnel Actions

Refuge Officer Ken Jones transferred to the Bureau of Land Management in Cuba, New Mexico, on February 6, and received a promotion to a GS-9 law enforcement position.

Dean Wyckoff EOD on April 4 as our replacement Refuge Law Enforcement officer, coming to us from the National Park Service at Ellis Island.

Christina Hall, Presidents-Stay-In-School enrollee, was upgraded to a GS-2 on April 14.

Robert Kraushaar, Maintenance Mechanic, went out on disability retirement with a cancerous brain tumor early last year. In May, he finally passed away after a long, hard battle, leaving a wife and two teenage children.

LeRoy McDonald EOD on May 3 as the replacement Maintenance Mechanic for the visitor center. LeRoy came to us from an engineering position at a hospital in David City, Nebraska.

Maintenance Helper Loren Hinkel resigned on May 29 to find outdoor work.

Intern Volunteer, Anne Drake, a fisheries and wildlife major from Penn State University arrived for a ten-week assignment on June 16.

Maintenance Worker Ken Marquardt returned to work on July 22, after six weeks of leave for foot surgery.

Tony Case EOD as a Maintenance Worker (to replace Loren) at the visitor center, coming to us from Crab Orchard NWR on July 26.

Automation Clerk (Registrar) Nellie Weldon retired on July 31, after 22 years of faithful service at DeSoto.

Refuge Officer David Reilly transferred to the National Park Service in Fort Laramie, Wyoming, in August.

Jeff Tillma, a GS-5 Biological Science Technician, EOD in a temporary flood-assistance capacity on October 31.

Refuge Law Enforcement Officer Wyckoff was upgraded to a GS-6 position on November 14.

Maintenance Mechanic McDonald was absent extensively throughout the later part of the year due to medical complications. He remains in a LWOP status, a participant in the leave-share program.

#### Awards

Refuge Manager Gage received a Special Achievement Award in August for his continuing work on Boyer Chute planning and coordination.

#### Travel/Training

Refuge Manager Gage attended a two-week OPM Total Quality Management training course in Denver, Colorado, during January 4-15.

Administrative Officer Porter and Supervisory Refuge Operations Specialist Root attended Fire Line Training in Minneapolis during the first week of March.

Station law enforcement officers attended LE Refresher in Des Moines, Iowa, during the last two weeks of March.

Supervisory Refuge Operations Specialist Root traveled to Phoenix, Arizona, to participate as a panel member to critique a presentation on Integrated Pest Management by members of the Upper Level Management Program in April; then, he returned to assist in developing an IPM Plan during their June Project Leader's Meeting.

First aid and CPR training was given to the staff on-refuge on April 7.

Refuge Manager Gage attended Fire Management For Line Officers Training in Charleston, South Carolina, the week of April 26.

Supervisory Refuge Operations Specialist Root traveled to Patuxent, Maryland, for Instructor Training involving an IPM program in June.

Administrative Officer Porter traveled to Cypress Creek NWR for a WAM-2 station evaluation during June 21-25.

Refuge Law Enforcement Officer Dean Wyckoff attended transition training in Fargo, North Dakota, during August 16-18.

Supervisory Refuge Operations Specialist Terry Root served as an instructor at the National Contaminants Workshop in Corvallis, Oregon, during the week of August 9.

Refuge Manager Gage traveled to the Regional Office for a flood assessment meeting on August 6, and again on October 26-27.

Refuge Operations Specialist Van Riper attended the Symposium on Prairie Ecosystems, Wetland Ecology, Management, and Restoration in Jamestown, North Dakota, during the week of August 17.



Refuge Manager Gage attended the Project Leader's Meeting during the week of August 23, and enjoyed Minnesota Valley NWR's hospitality.

Outdoor Recreation Planner Bruce Weber attended the Association for Volunteer Administration Training in Little Rock, Arkansas, during October 6-9.

Supervisory Refuge Operations Specialist Root participated in the Regional flood response and strategy analysis workshop on November 9-10.

Supervisory Refuge Operations Specialist Root traveled to Sacramento, California, to attend the National Pest Management Coordination Meeting from November 29-December 3.

## 2. Youth Programs

The 1993 Youth Conservation Corps (YCC) summer began June 14th and ran through August 6th. The four youths, a male and a female from both Iowa and Nebraska, were an excellent work group. The enrollees were the most responsible and hardworking youth group that the DeSoto staff had seen in a long time.

Safety was a major concern of the program. Every Monday morning started out with a safety film. Hazards of each new project were discussed before the work began. During the course of working on a project, if an unsafe incident appeared likely, work stopped and the enrollees discussed the situation. All this paid off. No accidents occurred.

The enrollees spent the majority of the summer working on two major projects; moving the headquarters and shop materials out of the old building into temporary quarters, and visitor center maintenance.

The DeSoto headquarters/shop was scheduled to be torn down during the summer. As soon as the enrollees arrived, they began work on moving 30-years-worth of accumulation out of the building. This was a major undertaking, and, at times, seemed overwhelming. However, they did prevail. Everything was out by the time the wrecking crew showed up.

The two-man maintenance staff in the visitor center dropped to none at times, due to a vacancy and sickness.

The enrollees helped to ease the heavy workload in the center. They also gave the museum specialist a lot of help in completing Bertrand Collection projects.  
30-145-93 MS



Numerous other projects also were completed by the YCC, including litter pick-up, nature trail maintenance, lake monitoring, thistle control, etc. Due to the heavy workload of the refuge maintenance crew, many of these projects would not have been done, if not for the YCC program.

Several environmental education programs were given to the group, including a refuge orientation, CPR and first aid training, cultural resources (the Bertrand), waterfowl management, hunter safety course, and they were involved in Canada goose banding. The kids gained a lot of knowledge and enjoyed these environmental education activities.

This year's group was unique and diverse. Unlike recent groups, the four became great friends from the first day on. They worked long days, teased each other, gave lots of support, and laughed hard together. They gained a lot of experience and had a great time doing it.

### 3. Other Manpower Programs

Harrison County placed two male Iowa youths at the refuge through their Summer Youth Employment and Training Program. This program is designed for economically disadvantaged youths, ages 14-21 to provide career exploration and practical work experiences. The young men, Marvin Jones and Jeremiah Jones (not related), worked on a wide range of projects, mainly at the visitor center. This program is provided at no cost to the refuge.

### 4. Volunteer Program

A half dozen DeSoto volunteers, the mainstay of our environmental education program, remained active throughout the year as interpretive guides on the trails and in the visitor center.

Overall, we had 18 regular volunteers, 32 Audubon volunteers, and 6 students involved in the UNL deer study who contributed a total of 2,584 hours. They were involved in a variety of specialized tasks, such as spring and winter bird counts, artist demonstrations, observation tower and entry station assistance, and field research. Volunteer Bob Horton produced a fantastic four-minute video about DeSoto wildlife that will play on a visitor-activated monitor in the Refuge Viewing Gallery. Rudy Evans, a professional designer, designed a poster and a new auto-tour brochure, and continues to work on the illustrated Steamboat Bertrand book, The Bertrand Stores. Ione Werthman shared her mushroom knowledge with the public through a special program.

Jennifer Kasuboski, an interim from nearby Dana College, put in many hours during the fall, helping with resource projects, and at the visitor center. DeSoto has been the recipient of the Omaha Audubon's Adopt-A-Refuge program for many years. Nearly three dozen Audubon Society volunteers joined our regular volunteers to contribute 480 hours during the spring and winter bird counts, and fall waterfowl counts.

Anne Drake, a fisheries and wildlife major at Penn State University, volunteered 10 weeks during the summer as a student intern at the visitor center. Anne provided assistance with maintenance, interpretive, and resource projects, and got a good idea of the variety of challenges the Service and DeSoto Refuge,



in particular, offer. "Expect the unexpected", she was told. Sure enough, mid-summer brought the Great Flood of 1993, and she was forced to abandon her tent-site at Wilson Island for the remainder of the summer. Fortunately, Anne didn't lose anything as the waters suddenly rose at 3 a.m. in the morning darkness on July 9th.

#### 1993 VOLUNTEER SERVICES

<u>Activities</u>	<u>Hours</u>
Volunteer Program Coordination	4
Exhibit Work	5
Audio Visual	8
Off-Refuge Programs	11
Trail Work	15
Collection Conservation	16
Data Analysis/Compilation	23
General Maintenance	24
Conducting Tours	28
Training	34
Special Exhibits (set-up)	66
Wildlife Management	95
Graphic Design	170
Waterfowl Rehab	255
Environmental Education Activities	367
Visitor Information and Assistance	309
Habitat Survey	520
Population Censusing	634
Total:	2,584

A volunteer recognition luncheon was held at DeSoto on December 10. The overall volunteer program and its highlights were discussed. Mugs and calendars were presented to each volunteer at the luncheon. The "Volunteer of the Year" Award was presented to Jack Brownrigg, a 72-year-old retired insurance executive from Mutual of Omaha. He has been volunteering at DeSoto since May of 1984.



Jack Brownrigg has helped with a multitude of activities, and contributed 1,529 hours during that time. Many youths and teachers know Jack because of his conspicuous involvement with Prairie Appreciation Week and environmental education tours....  
45-152-93 BW

.... but, he also has distinguished himself by working behind the scenes doing wildlife population counts, creel surveys, and conducting the refuge's flowering plant survey. Jack has found and photographed almost 200 different wildflowers at the refuge. He was presented with a DeSoto sweatshirt and his name is now engraved on the "Volunteer of the Year" plaque in the visitor center.

We were sorry to lose volunteer Bob Starr in September, a 78-year-old former banker, who served DeSoto with distinction as a Volunteer Naturalist and Bird Count Organizer. Bob had contributed 2,669 hours at DeSoto since 1981. Several major newspaper articles were written about Bob and his image was featured on the 8'x10' illuminated volunteer exhibit developed by WASO during 1992. Bob's image also was used on the Service's volunteer brochure. He was the perfect role model for the Service's volunteer program. Bob touched the lives of the DeSoto staff, and he will be missed. But, most of all, it will be the thousands of school children who'll miss the opportunity to go out on the trails with this kind, knowledgeable volunteer, who had an ever-present smile and a twinkle in his eye.

#### 5. Funding

The following table details total funding targets for the past five years:

Subactivity	1994	1993	1992	1991	1990
O&M	933,621	857,624	820,386	669,187	739,200
YCC		5,800	6,300	0	6,800
Flex Funds		0	0	0	2,000
Quarters	0	0	0	0	0
Other	16,000 <sup>1</sup>	39,600 <sup>2</sup>	36,780 <sup>3</sup>	33,988 <sup>4</sup>	30,700 <sup>5</sup>
Fee Receipts	0	0	0	0	0
Maint. Mgt.	71,000	248,400 <sup>6</sup>	105,000	40,000	75,000
Total	\$1,008,621	\$1,151,424	\$968,466	\$856,688	\$783,733

<sup>1</sup>Funding for a \$8,000 cost-share-matching fund project for development of an interactive computer program; \$3,000 - Volunteer program; \$2,000 - Fire Operations; \$3,000 - 9120 Fire Presuppression.

<sup>2</sup>This figure includes \$3,100 for Volunteer programs; \$7,500 - Fire Management; \$10,000 for Private Lands monies; \$5,500 - Challenge Grant; and \$5,500 - Watchable Wildlife funds.

<sup>3</sup>This figure includes \$5,200 - Volunteer money; \$17,500 - Fire Management; \$10,000 of Private Lands funds; \$1,580 - FmHA easement, and \$2,500 - Law Enforcement.

<sup>4</sup>Funding for \$1,700 - Volunteer Program, \$5,000 - Farm Bill; \$12,500 - Fire Management; \$6,000 - Coop Education student; \$1,988 - FmHA; and \$6,700 - Law Enforcement.



<sup>5</sup>Funding for \$5,000 - 1120 repurchase of BLM semi-truck; \$15,400 - 1241 purchase of fire truck; \$8,000 - 1230 wetland restoration, and \$2,300 - 1261 FmHA easement work.

<sup>6</sup>Includes \$130,000 - for VC roof replacement; and \$58,000 - for relocation of headquarter's utilities.

As a result of damages to the refuge during the 1993 flood, this station received an additional \$95,105. This special two-year Congressional Appropriation will be used to: repair roads \$12,405; repair boat ramps and parking \$20,675; repair water control structures/pumps and equipment \$45,485; and for debris clean-up \$16,540. An additional \$85,000 is expected to be released by the Washington Office to this station in FY 1994 for road repairs.

The refuge presented checks totalling \$45,532 to local counties under the Refuge Revenue Sharing Act. Harrison and Pottawattamie counties in Iowa received \$15,102 and \$3,564, respectively. Washington County in Nebraska received \$26,866 in lieu of taxes. This amounts to 81.65 percent of their entitlement under this program, down 7.85 percent from last year.

#### 6. Safety

Safety topics are assigned to individual staff members who are responsible for providing programs for monthly safety meetings. Topics this year included: seatbelt safety, winter driving, AIDS, tornadoes, sexual harassment, material data safety sheets, motor vehicle safety, and self-defense protection.

Quarterly safety inspections were held. Several items were reported and arrangements made to correct identified problems.

In January, Owen Moe, the Safety and Occupational Health Specialist from the Regional Office, visited and reviewed our facilities. He was impressed with the safety planning and organization of the museum laboratory.

In March, Automotive Worker Storm injured his back lifting a piece of iron. Only one day of lost time was recorded. No vehicle accidents occurred this year.

Several of the refuge staff participated in rehearsal drills for the nearby Fort Calhoun Nuclear Power Plant in May and June.

A safety program was provided for the staff on the use of our new 4x4 ATV. A 17-minute video on safe ATV riding was shown by the Polaris distributor. The staff reviewed ATV policy and were introduced to the station's new Snell 90 helmets at the same time.  
36-142-93 BW



## 7. Technical Assistance

Historic data, photographs, and/or artifact information - Over 38 inquiries about the Bertrand Collection were received. Information about objects, collection history, administration, or conservation were addressed by staff on-site, or in correspondences. Inquiries ranged from professional archaeologists to museum curators, graduate students in archeology and living-history aficionados, amateur experts in clothing and bottles to museum curators of glass, and professional writers from popular historical magazines to romance novels! Several museums inquired about loans. One in particular may prove quite exciting. The Western Pennsylvania Museum of History hopes to mount a major exhibit of glassware produced in Pittsburgh, the source of most of our glass materials. This effort could shed a great deal of light on the collection in terms of knowledge, as well as notoriety. Several state and local institutions have asked for information about the collection, including institutions in Illinois, Montana, Iowa, Nebraska, and Massachusetts. Several National Park Service sites' staff requested information about the collection or tours of the facility. Contact with professionals from private historic collections occurred, also; notably, the Steamboat Maple Leaf in Jacksonville, Florida, and the Arabia in Kansas City, Missouri. Two Canadian inquiries came in, as well, from a university professor in Saskatchewan, and a museum designer in Alberta.

The Forest Service also requested the cooperative assistance of our conservator (their cost) for a conservation assessment of a CCC-era dam they are attempting to preserve at Park Falls, Wisconsin (Chequamegon National Forest). Conservator Harold determined the conservation needs of the wooden and metal objects removed from Round Lake Dam, which is on the National Register of Historic Places. She composed and submitted three separate reports on the various Forest Service collections. Their accounts of her visit were glowing in that she provided some damn good dam information.

Other - The staff responded to 52 technical assistance requests, in addition to the above cultural resources requests. Many dealt with the Wetland Reserve program, which kept Refuge Operations Specialist Van Riper actively traveling throughout the western counties of Iowa, speaking to farmers and state and county resource people.

A significant endeavor was spreading the word on integrated pest management. Contacts ranged from local farmers to inter-regional officials. Due to his expertise, Supervisory Refuge Operations Specialist Root was invited to participate with Service managers in Phoenix (twice), Corvallis, and Sacramento.

## 8. Other Items/Donations

A refuge postage meter was installed in April. We find that this additional responsibility consumes a great deal of administrative time. Total postage cost for this station for the first eight months was \$3,396. That's a lot of 29-cent stamps.

Sarah Tuttle, of the National Park Service, finally signed on as our new museum technician (registrar/conservation technician) in December. We replaced the clerk-typist with a restructured multi-disciplinary museum technician (registrar) position. We then sent notification to 22 institutions and placed an advertisement



(through the Midwest Interpretive Association) in History News. Ms. Tuttle has a Masters Degree in Archeology and experience as a conservation technician with the NPS at the Western Archeological and Conservation Center in Tucson, Arizona.



Unhappily for us, happily for her, Nellie Weldon tendered her retirement papers and left us on August 1, after working twenty-two years with the Bertrand Collection! She generously made notes and discussed odd-and-end references to the collection which we have not yet grasped - priority projects, and "fall through-the-cracks-they-meant-to-do's-but-left-before-they-got-the-chance" curatorial missions. We bid her the fondest of farewells. M-720 LP

#### F. HABITAT MANAGEMENT

##### 1. General

DeSoto lies like an island in a "sea of corn", a remnant of the past's lost landscapes. Everything in the fertile Missouri Valley Basin which is in private ownership has been drained, stripped of its bottomland cottonwoods, and is under intensive agricultural management. As the tractors got larger, so did the cornfields, and out came the hedgerows and fencelines. Fall tillage after the harvest now blackens the earth - buries all vestiges of vegetation. No food or cover remains on the barren land. Even farmstead shelterbelts are now looked at with suspicion. And, these same tillers of our earth are the first to ask, "Where have all the wildlife gone?"

It is unlikely that the Missouri River's riparian cottonwood forests will continue to replace themselves as they did since glacial times now that the natural river systems have been eliminated by dams, channelization, and a myriad of other developments. One of the impediments to natural flooding of riverside bottomlands are the numerous agricultural levees which block the flows. And, of course, the degradation of the river has been so extreme that even during floodstage, the river rarely rises above its bank along this section of the Missouri.

Thankfully, we have been able to maintain some semblance of natural habitats at DeSoto and restore others for future generations to enjoy. But, we are subject to the highly modified and manipulated environment which surrounds us. We are impacted



by the channelized waters which rush by us in the Missouri River, and the contaminated and degraded groundwater, which flows under us. And, we are impacted by the precipitation that falls on us. There are times when habitat cannot be managed. And, 1993 was one of those times.

## 2. Wetlands

- a. DeSoto Lake - The management strategy for DeSoto Lake is a combination of waterfowl management, fishery management, and public recreation objectives. Winter levels are kept high, around 989.0 to 989.5 msl, to reduce the possibility of a sport fish winterkill. To accommodate spring runoff, elevations are brought down in the late winter. The optimum summer elevation is 989.5 msl, to make the best use of boat ramps, docks, and fishing jetties that have been constructed around the lake for fishing access. Ideally, water levels are slowly reduced through mid-summer evaporation to 987.0 msl by mid-September. This level helps concentrate predator and prey fish species, and it promotes the growth of aquatic vegetation along the shallows. This lower water level also exposes the shoreline during the fall to provide loafing and gritting areas for waterfowl and shorebirds.

The only way to maintain desired levels is to use water from the inflow ditches from adjoining farmlands, and to release water into the Missouri River by gravity-feed, as conditions permit or warrant. During the spring and summer, little opportunity usually exists to lower the lake, due to the high river levels required for navigation purposes. In contrast, good opportunities exist for water level management during the river's winter drawdown and during periods of low dam releases within the Missouri River Basin.

The aeration system was started on January 28, and ran until March 29. During this time, dissolved oxygen readings at the south end of the lake were 4.8 ppm at the surface, and 2.6 at the bottom.  
28-86-93 MS



Forty yards from the open water of the aeration site, under the ice, the dissolved oxygen levels were 7.1 ppm at the surface, and 6.3 ppm at the bottom (24-foot depth).

The outlet gates were open for a record 121 days this year to vacate excess water. The lake was locked in ice until



the last few days of March, but drawdown was underway before the ice even began to break up.

By the beginning of March, the lake was 1.5-feet above planned levels. Therefore, the outlet was opened on the 3rd. The drawdown could not keep up with the heavy rains, which came in May, June, July, and August, with 6.23, 8.83, 7.47, and 5.01 inches, respectively. All this rain caused extensive flooding throughout the midwest.



By June, the lake rose 2.6 feet above desired levels. This put all the fishing jetties and the docks at the Small Boat Ramp and South Gate facilities under water, as were their corresponding parking lots.  
27-95-93 BW

In July, the lake rose to an all-time high of 994 feet above mean sea level (over 5 feet above normal levels). This resulted in Whitetail Drive, the Missouri Meander Trail, Bertrand Trail, and Wood Duck Trail all being flooded, and subsequently closed for an extended period.

The lake's shoreline suffered erosion as the water rose above the top of the rip-rap (set at 993 msl). Large sections of the bank were eroded away or undercut, and fell into the lake.  
27-97-93 BW



Some rip-rapping repairs will be required to protect the shoreline.





The rock fishing jetties also sustained damage. The high water covered the jetties and washed away the gravel on top. Believe us.....there is one down there somewhere!  
27-98-93 SV

Damage apparently occurred to the outlet structure during the flood. The extent of damage and required repairs will be assessed during the non-navigation season, when the river is several feet lower due to low flows. Both outlet gates now leak excessively and the control mechanism on the outer gate is broken. The extent of roughfish intrusion is unknown.

During the flooding, the river level rose so high that water was forced to back up through the fish barrier building and out the door. The door on the building had to be removed to allow the water to run out of the building. The lake's outlet tube was opened whenever river levels allowed thereafter. By the end of October, the lake was back within planned levels.  
27-101-93 GG







The Small Boat Ramps, with adjoining handicapped-access pier, went under. Then, even the parking area (behind Steve) soon followed. 27-99-93 BW

The same scene prevailed at the South Gate boat-launching facilities. As the water rose higher, even the signs were removed to protect them. 21-102-93 TR



At the new Missouri River Overlook, only light siltation and erosion occurred, whereas, in the flooded woods, the deposits were much heavier. 27-100-93 GG

Silt deposits from this flood were less than those during the 1984 flood, averaging only six to eight inches in depth, as compared to up to 18 inches in the previous flood. The flood level along this section of the Missouri was at 1,003 msl, three feet below the top of the levee. The levee was not breached. Flows were very similar to the July, 1984, flood, which sustained a peak of 120,000 cfs. The official peak at Omaha was 115,000 cfs. The flood of record here was the 1952 flood. So, unlike the Mississippi, we weren't hit too badly. But, there were two similar peaks, on July 10 and July 19, so this flood had a much longer duration.

Lotus beds, phragmites patches, and cattails were drastically reduced this year due to the very high water. Some lotus beds from last year did not even appear.

DeSoto Lake monitoring was conducted throughout the year to determine changes in water clarity, water temperature, and dissolved oxygen at specific depths and locations. The decline in water clarity that had been prevalent over several years prior to 1991, began to reverse itself in 1992, and the upward trend continued this year. Secchi disk readings in early June averaged around 1.25 meters. Readings began to drop off in late June to lows of 0.5 meters. July's readings averaged 0.47 meters. Disk readings dropped again to 0.3 meters in August, but improved steadily thereafter.

Lake temperatures averaged 25 degrees (Celsius) in June, and 27 degrees in July. These average temperatures were three degrees cooler than the five-year averages for those months. The average temperature at the start of September was 23 degrees, with dissolved oxygen readings at the bottom of 3.8 ppm. By mid-September, the temperature dropped to 18 degrees and dissolved oxygen levels fell to 0.03 ppm at the bottom. The highest dissolved oxygen readings occurred during July and August, with surface readings of 13 and 15 ppm, respectively.

- b. Managed Marshes and Potholes - DeSoto has eight managed wetland units and one moist-soil unit, with another nearing completion. Runoff is held in these units to the fullest extent possible, in season.

Wood Duck Pond is a major focal point for environmental education and it possesses a favorite nature trail for the public. It also is a good spot for Canada geese. They brought off a brood on this pond again this year. Because of all this, water is kept on the pond year-round. Wood Duck Trail was closed down in July, due to water over the trail. The unit can not be gravity drained into the lake. However, we did pump some water out of it, and up into Buchardt Pond. Buchardt does not hold water as well as some of the other units. A total of 10.5 hours of fall pumping helped fill it, and eased Wood Duck's level somewhat.

The Visitor Center Ponds are comprised of three interconnected units: Coyote, Scoot's, and Osprey. All three can be recharged via Crisafulli pumping from the lake into Coyote Pond, and by gravity-feeding therefrom. Water levels can be individually controlled because each pond is



separated by stoplog structures. Osprey Pond also can be recharged via a feeder pipe connected to the visitor center's water cooling system. The system uses over an acre-foot of water per day during the peak of the cooling season, which can be exited into the pond as needed. The wet spring kept the units full, and no spring pumping was required. Plans were underway to try to eliminate the cattail growth in Osprey. This unit had been drained in December of 1992, in hopes of disking the unit in the spring and through the summer. However, due to the extremely wet weather, the unit never came close to drying sufficiently to get a tractor into it. If the weather allows, the unit will be disked in 1994. Waterfowl use in Coyote and Scoot's was good again this year. A brood of Canada geese were produced on Scoot's. These two units required only 28 hours of pumping in the fall to return to optimum capacity.

No spring pumping was required on Willow Pond, and only four hours were needed to bring it up to desired levels in the fall. Willow is a hot spot for nearly every species of waterfowl and shorebirds that pass through DeSoto. A pair of Canada geese brought off a brood on this pond, also.

Young's Pond is managed for breeding and brood habitat, and as fall migration habitat. The levee, which had been damaged by muskrats, was repaired in August. The ground was so saturated that only four hours of pumping were required to recharge the unit.

No management was conducted on the Missouri River Pond. This pond is of low priority for recharge because of its rapid water loss, due to highly permeable soils in close proximity to the river.

The Boat House Pond required no pumping due to the wet spring and summer. This pond also is seep-effected by the level of the lake. DeSoto Lake was high through most of the year, which kept the unit full.

- c. Moist-Soil Unit - The primary unit is comprised of four sections, connected by PVC tubes, with stoplog structures. Water is pumped into ditches beside the unit. Gravity-flow tubes then fill each section of the unit. The lower two units have an extensive invasion of cattails. Plans were made in the fall of 1992 to drain the units at the end of the year and disc them to eliminate the cattail growth. The units were drained in late December, 1992. However, the extremely wet spring and early summer kept any work from being done on the units. The two units were drained again in December of 1993, and, if possible, they will be disked in the spring. The levee which separates Section I from II requires work to repair muskrat damage. Sections III and IV will continue to be managed strictly for moist-soil plant production.

In 1991, work began on a new 45-acre moist-soil unit. Standing water from spring rains and high soil-moisture conditions have delayed further construction on this unit for the second year in a row. However, as soon as moisture conditions permit, levee construction will continue and placement of the stoplog structures will be completed.

### 3. Forests

"Cotton" floated everywhere this summer. This was a great year for the cottonwoods, as well as fruit-bearing shrubs and nut-bearing trees. The acorns under the bur oaks in the adjoining hills laid two-inches deep in some areas this fall.

For many years, the refuge has experienced a die-off of native cottonwoods, with essentially no regeneration to replace existing stands. This problem was addressed in a 1990 Forest Management Plan. Proposed forest management strategies included protection of existing mature cottonwoods as perching and roosting habitat for bald eagles, development of a forest management program to ensure a sustained source of roosting and perching trees for bald eagles, promotion of cottonwood regeneration in old grasslands targeted for this management, and systematic flooding of identified reverted croplands to promote cottonwood regeneration.

Some experimental flooding was attempted along the east dike in June, 1990, with excellent results. Consequently, additional flooding was planned for 1993, but extensive soil moisture prevented tillage and construction of small levees. Alternative sites were planned by Mother Nature. Flooding is planned for 1994, if funds and habitat conditions permit.

### 4. Croplands

- a. Cooperative Farming - Cooperators farmed 2,283.7 acres, using a one-third/two-thirds crop-share system, to provide food and loafing areas for migrating waterfowl, and food, cover, and edge for other species, as summarized below:

Crop	Biological Rotation	Conventional Rotation
Corn	629.6	184.5
Soybeans	480.4	203.4
Clover/Oats	435.9	
Alfalfa	82.7	
Wheat	96.7	
Milo	60.7	
Other*	109.8	
Total	1895.8	387.9

\*Includes alfalfa/oats and clover seeded into wheat.

The refuge also reimbursed two cooperators for aerielly-seeding winter wheat on 154.8 acres south of the visitor center and on Center Island. The results were very good because of the wet weather in the early fall.

Yields for this year varied dramatically, both within and between crop rotations. For example, yields on individual corn fields ranged from 26 to 160 bushels-per-acre and from 20 to 54.2 bushels-per-acre for soybean fields. The overall

yields on refuge were very good compared to most of the river valley. In fact, the refuge only lost the majority of one corn field to river flooding, and that field had already been designated for removal from cropland, but was being farmed until we could afford the grass seed for conversion.

The most dramatic impact of the wet year was in the difference between average yields for each rotation. As noted in the table below, biological-rotation corn out-yielded conventional-rotation corn by over 40 bushels-per-acre. This tremendous difference is not due to variations in soil types, but rather in the difference of access to nitrogen during the growing season. Conventional methods of nitrogen application result in one or a maximum of two applications of nitrogen which often get leached down through the soil profile in wet years - making much of it unavailable for the plant. In contrast, our biological-rotation corn receives its nitrogen from the decomposition of clover which was put down the previous fall or that spring. This type of nitrogen is available through the entire growing season because of the decomposition and conversion process which takes place. Consequently, as the existing nitrogen is leached down or out with a heavy rain, more becomes available shortly, and, in a wet year, the plant demands even more nitrogen than on an average-rainfall year. This advantage of biological-rotation farming over conventional is invariably evident in any wet year, but was really exemplified this year due to record rainfall during the whole summer. This 40-bushel difference in average yields raised the biological rotation over the conventional for the fifteen-year average. In addition, biological-rotation soybeans once again exceeded conventional-rotation soybeans by over six bushels-per-acre, with a fifteen-year average of 2.5 bushels higher.

Crop	1987	1988	1989	1990	1991	1992	1993	1979-1993 Avg.
Conv. Corn	107.5	88.7	88.6	125.5	80.1	146.5	88.8	99.5
Biol. Corn	120.2	72.2	68.0	117.8	102.3	146.7	129.0*	101.5
Conv. Beans	35.3	26.1	35.5	35.4	34.7	46.1	34.7	34.3
Biol. Beans	35.9	24.1	34.1	40.5	39.1	49.5	40.9	36.8

\*Excluding one 28-acre field flooded by the Missouri River in July.

- b. Food Plots - Fifteen food plots, each generally containing three cover types, and totalling 169.1 acres, were grown and left unharvested for wildlife use. Of these, a total of 60.7 acres were in milo, 59.2 acres were in fall-planted wheat, 8.0 acres in second-year clover, and 41.2 acres were in wheat and clover (fall-planted wheat from 1992, with clover interseeded in the spring of 1993). The primary objective of food-plot management is to provide food for

resident and migratory non-game wildlife in locations where public viewing opportunities exist. This objective continues to be accomplished, with 100-percent utilization of available food, year after year, by deer, upland game species, and non-game birds.



In addition to the rectangular food-plot seen in the left-center of this photo, approximately 192 acres of the refuge's share of corn was left standing in fields...  
28-87-93 TR

... or chopped for use by migrating waterfowl and resident game. This includes approximately 8 acres of corn strips left standing for concealment of blinds for our Iowa controlled waterfowl hunting program. Milo also was grown and left standing on 14.7 acres as the refuge's share on one cooperator's corn fields.

- c. Excess Grain - Each year, the refuge stores 1,200-plus bushels of corn for potential depredation or disease management problems per existing management plans. Any additional grain stored in refuge bins is used to initially attract waterfowl to the vicinity of the visitor center during the fall migration, and for the center's songbird feeders. When spring arrives, any held-over grain is inter-elevator transferred to other stations.

<u>Refuge</u>	<u>Dollar Value</u>
Fort Niobrara	\$5,001.00
Shiawassee	4,006.26
Blackwater	5,000.00
Tamarac	1,025.59
Sand Lake	1,523.09
Great Swamp	1,616.65
John Heinz NWR @Tinicum	150.00
Crescent Lake	1,415.00
Agassiz	2,000.00
Medicine Lake	7,000.00
Swan Lake	10,000.00
National Elk Refuge	23,451.69
Benton Lake	<u>1,500.00</u>
Total:	\$63,689.28

Under the current crop-share system, the refuge's entire share of soybeans and some corn is harvested, and the monies

used to reimburse cooperators (per the Iowa Custom Rate Survey) for refuge farming activities, such as food plots. Any excesses are made available for inter-elevator transfers to other refuges for their banding, feeding, or farming needs, on a first-come, first-served basis.

- d. Integrated Pest Management - During 1988, the refuge entered into an integrated pest management project with the Iowa State University Cooperative Extension Service. This three-year project was funded through a grant by the Leopold Center for Sustainable Agriculture. The Center was founded by the Iowa Legislature as part of the Groundwater Protection Act. Its program goals were stated in a previous narrative report, as was a description of the project and its specific refuge objectives.

The total funding by the Leopold Center for the three-year DeSoto Demonstration and Education Project was \$63,016. In addition, DeSoto obligated a grant of \$3,000 to the Leopold Center to allow an additional year (1991) of crop scouting to continue, while awaiting chemical analyses data and compilation of the final report. The project was essentially completed in November, 1991. Conclusions of the final report were submitted in the 1992 narrative. DeSoto received heavy demand for copies of the final report. The report was assembled on a MacIntosh computer, given a cover, and 200 copies, were reproduced. The refuge was soon out of copies, so early this year another 150 were reproduced with the \$675 bill cost-shared between Contaminants and Refuges in the Regional Office.

Water-quality monitoring was continued in 1992 with the installation of four more lysimeters and analysis of numerous water samples. The results of these samples were described in last year's narrative.

Numerous questions have been raised by this study regarding impacts to the lake ecosystem from agri-chemicals. Consequently, portions of the water-quality monitoring continued in 1993, in addition to sampling and analysis of the impacts on phytoplankton populations. This aspect of the study involved monitoring algae populations in DeSoto Lake through the summer, along with a control pond (Marquardt Pond) where populations should not have been impacted. This was accomplished by semi-monthly sampling of the lake and pond for herbicides, chlorophyll-a, total phosphorus, organic nitrogen, potassium, ammonia, dissolved oxygen, pH, temperature (water and air), and turbidity (secchi disk). In addition, baseline samples were collected for algae identification and surface water samples were collected (when possible) for rainfall events exceeding one inch.

A further portion of this algae study was conducted at the Iowa Hygienics Laboratory where toxicity tests were performed on the algae Selenastrum, using Atrazine, Bladex, and Dual, the three most common herbicides found in DeSoto Lake. These tests were conducted using laboratory water and laboratory cultures of the algae. To conduct all of the aforementioned sampling and studies, the Rock Island Field Office (RIFO) set aside \$18,080.

Crop scouting also has proven to be an invaluable asset in our cropland program and an integral part of IPM. Consequently, \$10,000 (also from the RIFO) was transferred in a grant to the Iowa State University Extension Service to hire a crop scout and conduct crop scouting on refuge during the growing season. This scout also would be responsible for most of the water quality and algae sampling mentioned above. Consequently, James Huser, a University of Nebraska at Omaha graduate student, was hired in early June to conduct this work, and he spent the entire summer at DeSoto. The final analysis of this year's study has not been completed, due to a temporary reassignment of RIFO personnel to river flood problems. However, the following are preliminary results to date:

- (1) A total of 14 samples were analyzed from DeSoto Lake during a four-month period. Three herbicides, atrazine, cyanazine (Bladex), and metolachlor (Dual) were detected in every sample. In addition, alachlor (Lasso) was detected in the ten samples submitted during June and July.  
  
Concentrations of atrazine ranged from 1.2 ppb to 2.4 ppb, Bladex from 1.2 ppb to 2.9 ppb, and Dual from .14 ppb to 1.8 ppb.
- (2) Marquardt Pond was sampled four times and the associated eight samples revealed no detections of herbicides or their residual compounds.
- (3) Numerous low D.O. readings occurred in the above pond. It will take more sampling to determine if these readings are correct or aberrations caused by equipment failure.
- (4) Nitrates ranging up to 22 ppm were detected in the lysimeters. No comparisons of biological versus conventional-rotation detections have been completed.

The crop scout was responsible for scouting fourteen corn fields, (ten on-refuge and four off-refuge), and seven soybean fields, (all located on-refuge). As in past years, all major insect pests were observed, but none reached economic threshold levels. The potential for weed problems was extensive with the wet summer, but early tillage and limited chemical use kept most problems at bay.

In addition to the above, the crop scout also completed a stand-density survey on sweet clover, a musk-thistle survey, and soil-nitrate testing on sites where corn followed clover. Soil-nitrate data varied from field to field, but could be directly related to stand densities during the previous year. The bottom line is, the higher the stand count, the more available nitrogen for growing corn.

The DeSoto IPM project has become nationally recognized as a model for all refuges with pest management problems. As a result of this recognition, and to achieve an initial objective of outreach, SROS Root answered numerous inquiries by mail or telephone regarding the project. In addition, he was a panel member for an Upper Level Management Committee presentation on Servicewide implementation of IPM held in



Phoenix in April. Two months later, he assisted Region 2 in Phoenix for a workshop where each Region 2 project leader began development of an IPM plan for his or her station. In August, he was an instructor at the National Contaminants Workshop in Corvallis, Oregon, and represented the Region 3 Refuge Office at the pesticide meeting held at Sacramento NWR in early December.

5. Grasslands

No grasses were planted in 1993 due to the extremely wet soil-moisture conditions. In fact, these conditions prevented timely mowing of the clover in the 104-acre native grassland demonstration site until early fall, resulting in what appeared to be total mortality to the warm-season natives. These natives were planted in 1992 and appeared to have a good start. The specifics will not be known until next year. This also is true of portions of several cool-season grasslands where water stood for various periods of time.

6. Other Habitat

Approximately 1,800 lineal feet of the former North Beach shoreline, the three-acre peninsula north of Sandbar, and the 35-acre Sandbar area were disked once for vegetation control to promote potential nesting by endangered least terns and/or piping plovers.

8. Haying

The refuge currently maintains 82.7 acres of alfalfa hay, not including a 17.4-acre field planted to alfalfa/oats this year. Management of alfalfa changed in 1992, with all alfalfa hay on refuge cash-rented to one cooperator for \$18-per-acre. This rate remains consistent for the three-year agreement, and is based on a five-year average. In addition, the cooperator is limited to two cuttings between June 20 and September 10, annually. However, due to unusually wet conditions, the season was extended until September 20th this year, to allow the cooperator to get his second cutting.

9. Fire Management

The weather actually cooperated for awhile this spring, and all planned prescribed burns were completed. Fifteen native grass fields, totalling 146.2 acres, were burned.  
32-232-93 SC



Results on the units were excellent in killing woody vegetation. The fall was another story. Due to the very wet summer, the cool-season grass fields never dried sufficiently to allow burning.

During the spring burning, a visitor reported to the fire crew that there was a wildfire about four miles down on the refuge. Fortunately, the crew had finished mopping up the unit that they had just burned and they hurried off to the reported fire. They arrived to find a small segment of a native grass field burning. Luckily, the fire was on the downwind side of the unit and the fire was moving slowly. The crew quickly put it out. The fire had been started where the native grass meets the brome buffer strip, which borders a paved road. No one was in the area when the visitor first spotted the fire. Oddly enough, this unit was the next field scheduled for burning.

Meredith Weltmer, Regional Fire Coordinator, arrived on the refuge as the smoke cleared from the spring burns. He delighted in the blackened fields. He does that! Meredith was visiting the refuge to inspect the refuge's fire equipment.

A new Model F-384 Ford (heavy-duty F-350) was delivered in June for use as a fire truck. This 4-wheel-drive vehicle was outfitted with a custom-built flatbed and side-storage boxes. No money has become available for a 300-gallon pumper to mount on the truck, yet. The truck also doubles as a road sander in the winter.

#### 10. Pest Control

Regional herbicide management changed in 1988, with a list of approved herbicides being supplied by the Regional Environmental Contaminants Office. This list now includes 26 non-restricted-use herbicides, which can be used on station upon approval by the Project Leader. This list was further reduced here in 1990 by three herbicides which are not feasible or acceptable for use in this area. Cooperators applied ten herbicides for control of sunflower, cocklebur, buttonweed, foxtail, shattercane, and other weeds in agricultural fields. Roundup was applied twice on the gravel along the entrance road to control invading vegetation. This chemical also was used to kill vegetation in existing cracks on the paved road and for controlling invading cool-season grasses in the visitor center's lawn, which is a buffalograss/blue grama mixture. Other weed control included hand-removal and mowing of musk thistle prior to blossoming.

The invading phragmites along inflow ditches and DeSoto Lake was not treated this year due to record high lake levels. In fact, many of the plants were under water, so its survival this season is unknown.

Baygon bait was applied around the visitor center to rid the area of roaches, crickets, millipedes, and spiders. In addition, due to insects exceeding threshold levels and an infestation of carpenter ants, Ficom D was applied to the library window casements and Commodore WP applied in the museum office, lab and crawl-space areas.

#### 14. Farmers Home Administration Conservation Easements

The 6.3-acre H. Langstraat easement in Sioux County was surveyed for a wetland restoration project by SCS personnel and ROS Van



Riper in July. A two-acre wetland has been designed into the project, funded with fiscal year 1993 monies.

15. Private Lands

The Private Lands program continued to build upon itself, with increased interest in the Partners for Wildlife Program (PFW). Wetland restoration requests and their contracts, PFW programs, challenge-grant opportunities, swampbuster/channelization determinations, and the new Emergency Wetland Reserve Program (EWRP) all required considerable time for the one staff person primarily responsible for our 18-county Management District in Iowa and our assistance in eastern Nebraska.



During the year, a total of 34 wetland restoration or enhancement projects were accessed for possible funding within 16 different counties, totalling 1,236 acres. Pictured is one of our successes, completed last year. 34-193-93 SV

Nine of these have been funded, all with cost-sharing assistance provided by conservation groups, government agencies, or private landowners, which amounted to 50 acres in five counties. Four of these have been contracted and the work completed, totalling 20 acres of wetland and upland habitat in four counties. 34-192-93 SV



Considerably more acres and projects would have been completed, if it had not been for the extremely wet weather that occurred throughout the majority of the year.





An 800-plus-acre wetland site, Honey Creek Lake, owned by several different landowners, has been evaluated, and currently is being considered by several agencies for possible acquisition. Most of the site is farmed wetlands, which have been under water most of the last three years. All landowners are now willing sellers. 21-104-93 GG

Technical assistance was provided throughout the year in 14 different counties, regarding both wetland and upland habitat management practices. Minimal effect requests required 13 visits to five different counties. Eight denials were delivered, two were granted with mitigation, and three were reviewed from previous years. There also were six wetland determinations requested and inspected in four counties.

The Emergency Wetland Reserve Program (EWRP) included eleven different requests for flood-damaged land determinations in four counties. We received one of the 35 EWRP grants for the program in Iowa. This was in Plymouth County, totalling 65.2 acres.

Nine different private lands programs were presented during the course of the year, in five counties. Slide shows, videos, and talks/discussions on the Partners for Wildlife Program were presented, promoting understanding of wildlife and its habitat needs.

Work continued on one of the two challenge-grant projects that were funded through the Regional Office last year. The Iowa School for the Deaf's wetland project in Pottawattamie County was completed, in spite of all the inclement weather. A windmill was erected to assist in recharging the 2-acre outdoor classroom site. However, the soils, as was expected, appear to be inadequate to hold water sufficiently. A bentonite sealer is planned as the next step. The other challenge-grant project, the Little Sioux Park wetland in Woodbury County, was completely inundated during the course of the flooding this summer. This project may be held up for a year or more, before the water table dries up sufficiently for heavy equipment use.

Nine other projects were funded during the year, with a large part of that coming from Union Slough National Wildlife Refuge's Private Lands budget. Thanks to their generosity, we were able to assist with the funding of six additional projects, that otherwise would not have been earmarked for funding in 1993.

A Cooperative Agreement between the Monona County Soil and Water Conservation District (SWCD), Monona County Conservation Board, and the Service was developed and signed during the year. This agreement was used to transfer \$6,000 from the FWS to the SWCD for

the development of a demonstration project for the Soil Conservation Service's watershed structural rehabilitation of siltation basins in Monona County. The intent of this project is to demonstrate that aging silt basins that have served their intended purpose, once refurbished, can provide excellent wildlife habitat through shallow-basin wetlands. The Soil Conservation Service is currently finishing up the designs for the water-control structures.

Fourteen minimal-effect requests from the Lyon County SCS Office for channelization or some other form of wetland fill have been submitted to this office for review in the last three years. Twelve were denied, as the landowner refused to provide some form of mitigation. The other two were granted as minimal effects. However, two of the above denials, were elevated to the SCS State Office in Des Moines, where both decisions were reversed. Neither reversal was given substantial justification for the change. The concern in this corner is that an unfortunate precedent may have been established that allows landowners to elevate any decision that they don't agree with, until they get one that does. These cases have been documented and submitted to the Region's Private Lands Office, and hopefully, to Washington, to make them aware of how some SCS offices are interrupting the Food Security Act Manual.

#### G. WILDLIFE

##### 1. Wildlife Diversity

All that remains today of the historic Missouri River bottomland ecosystem is small fragmented "islands". DeSoto now stands as one of these islands, perhaps the only local one large enough to be of real significance. The natural bottomland cottonwood ecosystem did not have a lot to offer wildlife. An open understory of rough-leaved dogwood, poison ivy, and equisetum did not provide enough cover or food to attract diverse populations. Over time, a variety of rather-intense management manipulations have resulted in a diversity of edges and ecotones which now support over 240 species of birds and a variety of wildlife. Some species, like turkeys and giant Canada geese, have even been successfully reintroduced here. Other "native" species, like piping plovers, will probably never be seen here again, despite our best efforts. Management practices augmenting this biodiversity are: development and expansion of waterfowl breeding pair and brood habitat; placement of wood duck boxes and improvement of nesting habitats; shrub and tree plantings; native grass seedings; intensive grassland, cropland, and water management practices; moist-soil development; and other more routine habitat manipulations which maximize edge and habitat diversity for wildlife.

##### 2. Endangered and/or Threatened Species

January and February temperatures were severe. Only three to five bald eagles stayed through the winter. By mid-March, eagle numbers climbed to 22. Less than a month later, all bald eagles had left the area. The eagles returned again by mid-October. By early December, bald eagle numbers peaked, with 28 birds present. This was a fairly low number for this refuge. Perhaps, the eagles were more dispersed, remaining off-refuge with the ducks in the many wetlands made available by the frequent rains and summer flooding.

On May 10, Manager Gage inspected the old Nathan's Lake, north of N.P. Dodge Park, while visiting Boyer Chute. A peregrine falcon was present, diving repeatedly on a blue-winged teal. The teal mimicked a pied-billed grebe and the supersonic falcon finally left in search of easier prey. This is the first time refuge staff has seen a peregrine in the wild since 1978, although Omaha has been attempting a hacking program on the downtown Woodman Tower for several years, with limited success.

Again, this year, efforts were made to attract endangered interior least terns and threatened piping plovers. Roughly 1,800 linear feet of the former North Beach shoreline, 35 acres of the Sandbar area, and two acres of Sandbar point are maintained as potential nesting sites. Tern decoys also are placed on these areas to try to lure in the birds. Project Leader Gage spotted a least tern on the refuge on May 13th. No other terns or plovers were observed.

### 3. Waterfowl

#### Winter Period (January - February)

DeSoto Lake was covered with six inches of ice at the start of the year, except for a small hole kept open by the waterfowl. On January 4, the weather turned extremely cold and 80,000 snow geese could not find room in the small remaining opening, so they all loafed in a field beside the lake. These geese only spent the night before pushing on south. Several thousand mallards, and 1,200 Canada geese stayed. By mid-January, the Canada's remained, but only 200 mallards endured the harsh weather. Less than two weeks later, the lake was completely frozen over and all the birds had moved out.

Common mergansers and mallards were seen dodging the ice flows on the Missouri River during the month of February. Many of these birds also began to use the open water at the lake aeration site.

#### Spring Period (March - May)

By March 8th, approximately 500 ducks and 400 Canada geese were utilizing the open water at the aeration site. A week later, over 2,000 Canada geese and 4,000 ducks were crowded in the small opening. The lake finally began to open up the last few days of March. However, by this time, most of the waterfowl had left the refuge. Large flocks of ducks and geese were seen off-refuge in the expanse of flooded agricultural fields.

The Canada geese began establishing territory on nesting structures and on muskrat mounds during the month of April. At least five structures were utilized, and several geese used muskrat mounds for nesting. The first brood was seen on May 3rd. There also were several broods of mallards and a brood of pied-billed grebes. While a number of blue-winged teal were present as breeding pairs, no young were seen.

Numerous wood ducks nested on the refuge, utilizing natural cavities and some of the 65 nest boxes. The nest box program has been active since 1967. Dump nesting was a tremendous problem until 1989, when the boxes were hidden in the timber. Since then, the percent hatching success has been very good. However, the number of boxes that were not used by wood ducks has risen, from a low in 1989 of 46 percent, to a high during the past two years of 75 percent. The problem seems to be that screech owls are using



the boxes, not just for their nests, but year-round. One owl will use three to five boxes in his territory, storing dead mice and birds in each one. We're not sure exactly what to do, if anything. It is possible that there is such an abundance of natural cavities, with all the dying cottonwoods, that the wood ducks are using these instead of competing with the owls for the boxes.

A lone common loon was seen for several weeks on the lake. During the last several years, there have been solitary loons sighted on the refuge. They are always crowd pleasers.

#### Summer Period (June - August)

The Canada geese and their young did well, with the lake almost exclusively to themselves. The public greatly enjoyed the sight and sounds of the Canadas.

Again, this year, the YCC crew helped personnel from the Iowa Department of Natural Resources band 47 birds, including 27 young of the year. One late brood was too young to band. This is always an enjoyable project for the YCC youths. 29-132-93 TR



#### Fall Period (September - December)

Duck numbers were low again this year, but they stayed longer. The refuge used to receive peaks as high as 750,000 (1969). Duck use-days this year were 927,559, which is much lower than the five-year average of 1,574,924 use-days. Wetlands in the surrounding area were full this year. The ducks seemed to be very dispersed, utilizing flooded croplands, farm ponds, creeks, etc.

The fall migration really began here in mid-October, with 7,000 ducks arriving. Their numbers climbed until they peaked on November 17th, with 55,000 mallards. Their numbers dropped quickly, and, for the remainder of November, only about 10,000 ducks were observed. By the end of December, only 500 remained. Only 11 species of ducks were observed, this fall.

The first flocks of snow geese were spotted on October 29th. Strangely, a large flight of geese (950,000) arrived around Eagle Lake, Texas, about the same time. They must have picked up thermals and overflowed traditional stopovers in the midwest. Their passage was neither seen nor heard along the Missouri Corridor. We suspect the agricultural flood damage in the lower valley may have impacted their flight.





By mid-November, over 440,000 were using the refuge. The snows peaked on the 24th, with about 500,000 birds. The weather turned cold on the same day and the lake began to freeze. The geese did not waste time and began to push on south in large numbers. By the first of December, only 15,000 snows remained. 1-143-93 SV

The number of geese on refuge during December, bounced between 30 and 43,000 birds. The refuges north of us had lost all their birds long before this time, and Squaw Creek was frozen over. So, we had no idea where the birds were coming from. Most agricultural fields surrounding the refuge were harvested and disked before the concentrations of geese arrived.

The geese tried to feed off-refuge during the period, but could not find adequate food in the valley due to heavy fall disking after the harvest. So, they fed heavily on the refuge, and took long feeding flights into the hills, off to the west and northwest.  
1-142-93 MS



A group of 300 to 500 Canada geese took up residence at the South Gate end of the lake throughout the fall.

Total goose use reached a high of 15,348,152 use-days. Total waterfowl use-days were 16,275,711, which, although lower than last year, is higher than the thirty-year average of 11,356,795.

On November 10th, four tundra swans were seen on the refuge in the vicinity of the visitor center. A very unusual occurrence, but a beautiful sight for visitors.

#### 4. Marsh and Water Birds

Several great blue herons, green-backed herons, black-crowned night herons, great egrets, snowy egrets, American bitterns, eared



grebes, and pied-billed grebes were observed on DeSoto Lake. At least one pied-billed brood was observed.



Up to 380 pelicans and dozens of double-crested cormorants made their usual spring and fall stops on the refuge again this year.  
11-140-93 BW

This summer, about 40 immature cormorants stayed on the refuge. There was one dead cottonwood tree, which overhung the lake, that became their favorite roosting site.

5. Shorebirds, Gulls, Terns and Allied Species

Numerous killdeer seemed to be nesting everywhere, including gravel parking lots. Ring-billed, herring, and Franklin's gulls, along with Forester's, common, and black terns were observed on the refuge. Other sightings included: greater yellowlegs, lesser yellowlegs, solitary sandpipers, spotted sandpipers, water pipit, and common snipe.

6. Raptors

Several species of hawks were observed throughout the year, including: northern harriers, rough-legged, Swainson's, Cooper's, and sharp-shinned hawks. Many other raptors were seen, including: osprey, merlins, American kestrels, turkey vultures, and bald eagles. Red-tailed hawks were seen in substantial numbers throughout the year. Several pairs nested on the refuge.

This year, as in the past, several eastern screech owls were seen in the wood duck nesting boxes when the boxes were checked. Great horned owls were quite numerous, and nest here. An occasional barred owl also was spotted or heard.

7. Other Migratory Birds

The Spring Bird Count was held on May 1st. Many local Audubon members participated in counting 108 species.

The headquarter's shelterbelt continues to be a thriving mourning dove metropolis. The doves nest everywhere, including on heavy equipment and propane tanks. Barn swallows aren't picky about nest sites either. These parents built their nest on the south gate kiosk, where they dove on the law enforcement officers every evening as they checked the traffic counters.

Woodcock, common crows, belted kingfishers, bluebirds, tree swallows, and northern rough-winged swallows were frequently observed during their respective nesting seasons. It is suspected that some swallow and kingfisher bank nests were lost during the July flood.

The Christmas Bird Count was held on December 19th. Auduboners, again, brought this count off. A total of 57 species, and 17,218 individuals were counted.

8. Game Mammals

The only big game animal that resides on the refuge is the white-tailed deer. Snow cover was sufficient on February 23rd for an aerial count of the herd. A total of 233 deer were counted. However, several prime deer areas were missed on the flight, and with this in mind, the two staff members doing the count felt the deer population was right at 300 animals. A ground transect count was made prior to the muzzleloader hunt in December, and 167 deer were counted on Center Island. The herd appears healthy, and their habitat is in good condition.

10. Other Resident Wildlife

Numerous raccoons and coyotes roam the refuge. Neither species displayed any disease problems this year.

The turkey population is "taking off". The original 14 turkeys released on the refuge in the 1986 have flourished, even spreading to refuge land on the west side of the Missouri River.

The pheasant population is in good shape. Quail numbers had been building well until ice and snow storms last year. Several broods were seen this summer, so hopefully they will recover quickly.

Muskrats continue to flourish in and around DeSoto Lake. Their mounds can be seen throughout the cattail beds, and several pairs of Canada geese used them for nesting. Beaver have built several impressive lodges around the lake, much to the delight of the public. The beaver kept the staff busy on several occasions, tearing out dams built on inflow ditches. The ditches have to be kept clear so off-refuge agricultural fields will not be flooded.

An otter was reported in April and an otter's tracks were observed by refuge personnel along Boyer Chute in May.

11. Fisheries Resources

The DeSoto Fishery Coordination Committee "met" through a conference call during the early part of the year to discuss management strategies and plans for the coming year. Stocking rates, habitat needs, electro-shocking surveys, aeration system, and fish barrier concerns, as well as the future of DeSoto Lake, were some of the topics covered.

The refuge fisheries program felt the pinch of budget cuts this past year, with a shortage of available fish from the Region's fish hatchery sources. Generally, we receive northern pike, walleye, largemouth bass, and channel catfish each year. The total number of sportfish stocked in DeSoto Lake since the 1985 renovation is now over 32.7 million. This year's stocking included:



<u>Date</u>	<u>Species</u>	<u>Number</u>	<u>Size</u>
4/20	Northern Pike	3,100,000	Fry
9/27	Northern Pike	762 (1,219 lbs)	10"

Commercial fishing permits were issued to three individuals, with only one actively pursuing DeSoto Lake's abundant roughfish population. Permits were issued on April 15th, and were extended until the 15th of November. The roughfish harvest this year amounted to 27,150 pounds, compared to a total harvest of 43,219 pounds in 1992. Indications from commercial fishermen and electro-shocking results are that the size and numbers of larger carp and buffalofish may have diminished over the last several years.

Several big-head carp (Hypophthalmichthys nobilis) from the Missouri were brought in by commercial fishermen. This introduced species seems to be spreading.  
40-208-93 SV



During the week of October 4th, FAO Project Leader Jim Milligan, along with Nebraska and Iowa fishery biologists, electro-shocked and surveyed DeSoto Lake to monitor species composition and relative abundance of the fish community, and to conduct a mark-recapture population estimate on largemouth bass. Results indicated that largemouth bass recruitment may have improved over the last year, with fair survival over last winter. Walleye age classes also looked promising, with a good diversity of size and age classes recorded. However, their success, as well as those of northern pike, is only sustainable to the extent that hatchery stocking is successful.

Channel and flathead catfish apparently are reproducing here, and have settled into their own niche, from what the commercial fishermen have indicated.

On the downside, northern pike were apparently depleted in the 1989 and 1990 ice fishing seasons, and are now few in number, with little recruitment observed. Bluegill and crappies remain small, and apparently are not finding sufficient food and nesting habitat for their success. Carp and bullhead numbers appear to be declining as their average size increases, but another cyclic surge in reproduction and recruitment can be expected as larger fish are removed from the populations.





Bigmouth buffalofish are probably at carrying capacity, with just enough survival and recruitment to maintain current levels. It remains to be seen if species composition will change or if any new species were introduced when Missouri River water backed up through the outlet structure during the flood.  
40-207-93 GG

Fishery-habitat was improved this year, with additional rock added to jetties on the east side of the lake, and another multi-plastic-bucket structure built by Boy Scout Troop 429 from Omaha and submerged at the South Gate Recreation Area.

No evidence of any fish die-offs was observed during the year.

#### 17. Disease Prevention and Control

A very sick immature bald eagle was found on December 11th by a muzzleloader deer hunter. The eagle was captured by refuge staff and transported by volunteers to the Raptor Recovery Center in Lincoln. The bird was diagnosed with secondary lead poisoning, and successfully treated.

No problems with avian cholera were encountered by the migrating flocks at DeSoto this year. There were problems at the nearby Fontanelle Forest Nature Center with epizootic hemorrhagic disease or blue tongue, but no problems were observed with the refuge deer herd. The herd at Fontanelle is heavily stressed from overcrowding, and at least 40 deer died in this suburban setting in August and September.

### H. PUBLIC USE

#### 1. General

Long-lasting poor weather caused declines in public use. We had the third wettest June in the 34 years of DeSoto's existence. The wettest day came on the 11th, with 2.63 inches of rainfall. July and August also were abnormally rainy. There were 13 consecutive weekends on which it rained during the summer. And, of course, most of the refuge's public use facilities were inaccessible after the flood, and the adjoining Wilson Island Recreation Area was closed for an extended period.

The refuge had 297,274 visitors, 10 percent less than last year, and well under the ten-year-average of 364,065. The ten-year average for the visitor center is 166,383 visits. This year, the visitor center hosted only 143,041 people, an all-time low.



The fall snow goose migration was short, but superb. They concentrated on the lake in front of the center, and the crowds came. November is normally the busiest month of the year. Last year's visits to the refuge in November totaled 50,128. But, this year, some 57,539 visitors came.  
1-144-93 SV



November is often a nightmare of traffic backed out onto U. S. Highway 30, parking lots overflowing, with officers directing traffic all weekend, etc. This only happened on three November weekends this year.  
48-123-93 GG

Generally, visitation was well-paced, and everyone was pleased with the sights and sounds.

COMPARATIVE VISITATION DATA (ACTIVITY HOURS)

	<u>Ten-Year Average</u>	<u>1993</u>
Interpretation	440,118	480,306
Visitor Center	166,757	143,041
Environmental Education	8,060	10,780
Consumptive Wildlife Recreation	38,923	28,491
Non-Consumptive Wildlife Recreation	237,798	298,983
Non-Wildlife Recreation	<u>7,399</u>	<u>5,412</u>
Total Public Use	732,283	823,812

Despite the long periods of adverse weather, people came and participated in a full-range of activities. Environmental education visitation was near an all-time record. Non-wildlife recreation was near an all-time low, because it's not encouraged. A decade ago, people used the refuge for a high level of



sunbathing, swimming, powerboating, and waterskiing. Increasingly, the refuge is attracting those visitors who genuinely appreciate it for wildlife observation and environmental education.

We have several consumptive wildlife uses on the refuge. The hunting programs consist of a controlled waterfowl hunt, a muzzleloader deer hunt, and two archery deer hunts. We had a decrease in waterfowl hunters this year (explained elsewhere in this report) and a decrease in warm-water fishing and other consumptive uses, such as mushroom and berry gathering. The mushroom hunters decreased from over 10,000 visits to 5,687 visits, due to cool, wet weather.

Non-consumptive wildlife recreation is on a gradual increase. These uses, including wildlife observation, trail use, boating, photography, and related picnicking have steadily increased since the 1984 closure of DeSoto Lake to active (non-wildlife) recreation. Peak non-wildlife use in the 1970's was nearly 200,000 people, compared to the few who still use the refuge for family reunions, club picnics, regattas, etc.,.....today.

Summer visitation, through Labor Day, totaled 106,700 people; with 8,568 on Memorial Day weekend, 5,490 on the July Fourth weekend, and 3,993 on Labor Day weekend. In the past, water recreation attracted up to 10,000 people on any of these holidays. Overall, this season's use was 15 percent below last year's, when we had 125,299 visits during the summer. The decrease is due to the cool, wet, overcast weather, and the closing of the adjacent Wilson Island State Recreation Area due to Missouri River flooding. Campers at Wilson Island typically recreate at DeSoto. The frequent television images of the "Flood of the Century" caused many people to avoid the region's rivers and lakes.

The public use season was extended from September 30 through October 14 (like last year) to maximize the potential for fishing, but use remained light during the period, even though the lake was back within its banks. The Thanksgiving weekend's ice and snow froze out any potential use, and, thereafter, the public assumed the geese were gone, although some remained.

a. Entrance Fee System

The cost effectiveness of this program remains poor. A total of \$64,137 was collected in entrance fees during the fiscal year, but collection cost the refuge \$46,070.  
48-124-93 BW





The refuge got to keep \$15,898, but this nowhere near covers the cost. There is no gain for the refuge, and it takes staff time away from more important wildlife and people management responsibilities. In addition to the time spent dealing directly with the receipts, the staff also spends a great amount of time trying to explain the system to the confused public.

This was the sixth year of entrance fee collection. Convenient self-registration stations are located near both entrances to the refuge, and another is located in the visitor center. The fees increased this year. New signs explaining the fee "menu" were updated and improved.



The fee booths cause traffic tie-ups during busy November weekends, and, on one occasion, they had to be closed for public safety as long traffic lines formed, backing traffic out onto high-speed U. S. Highway 30.  
48-126-93 GG

#### FISCAL YEAR ENTRANCE FEE DATA

Year	Refuge Cost	Receipts	Permits Issued	Refuge Visits
1988	\$19,483	\$60,534	30,267	382,003
1989	\$23,039	\$61,750	30,876	386,030
1990	\$20,145	\$56,087	28,044	390,929
1991	\$23,590	\$48,684	24,342	371,139
1992	\$26,167	\$54,317	27,159	313,584
1993	\$46,070	\$64,137	18,689	297,475

Entry fees collected were up 18-percent this year; indirectly because we were required to raise the daily fee from \$2 to \$3, and group/commercial (bus & van) fees an additional \$5. While sales of these single-day permits and group/commercial permits was off 19-percent and 26-percent, respectively, the public reacted by buying 50 percent more Golden Eagle passes and 27 percent more Federal Duck Stamps (224 duck stamps were actually sold through the NGP licensing outlet in Omaha). Regrettably, our entry fees drive away many potential visitors who pass right by our entrance on busy U. S. Highway 30, and who live in nearby



towns. Nearby Iowa parks (Wilson Island included) don't require fees.

#### ENTRANCE FEE PERMITS

Type of Permit	Number	\$ Receipts
Single Visit	16,127	48,382
Groups/Commercial	59	1,460
Golden Eagle	126	3,150
Golden Age	1,554	NA
Golden Access	80	NA
Federal Duck Stamp	743	11,145
Total	18,689	64,137

#### b. Public Information

The staff responded to 13,103 public inquiries, about the same number as last year. This includes 10,958 telephone responses, and 2,145 written responses. All of this keeps the phones ringing and the computers humming.

Thirty-five news releases were sent to news media in Iowa and Nebraska, as well as major Kansas, Missouri, and South Dakota media resources. Our mailing list consists of 225 television, radio, and newspapers; this covers the major small towns in our two-state area. Special information was provided to the Omaha World-Herald, Blair Enterprise, Missouri Valley Times News, Des Moines Register, Council Bluffs' Nonpareil, and Lincoln Journal-Star newspapers.

Fifty-two interviews were granted to newspapers and magazine representatives by DeSoto staff. Topics included goose migrations, art show, fishing, openings of the summer season and auto tour, and the 25th anniversary of the Bertrand excavation. Several taped messages were recorded by radio stations and several visits by TV stations resulted in features on the Bertrand and the snow goose migration.

#### c. Public Relations

Most of our television coverage this year was focused on waterfowl and the deer study, as were a lot of the newspaper articles. But, the Bertrand Collection got some attention as well.

Articles appeared in the Des Moines Register, the daily Nonpareil of Council Bluffs, Iowa, and a variety of smaller weekly newspapers after we circulated a news release about the 25th anniversary of the Bertrand's excavation in February. The articles

touched on the Bertrand history, collection preservation, curation, and interpretation.

The museum curator could not stand in the wings as some misrepresentations were made about the collection in an editorial in the Washington Post, alleging that no public funding was used for the Bertrand project. His letter appeared to correct the statement, along with a missive by our a former conservator, Ed McManus, now a conservator for the Smithsonian Air and Space Museum.

Government Executive Magazine in Washington, D. C. carried a story about federal museum collections and included information and photographs about the collection.

George Montgomery, Editor, National Maritime Archeology Newsletter, wrote a feature article about the collection, its excavation, and subsequent museum program, for that organization's newsletter.

Sluiceway News, a newsletter by Friends of the Round Lake Logging Dam, ran an article about our conservator's work for the Chequamegon National Forest.

Programs, exhibits, and assistance with public relation matters were provided to other Service entities, outside agencies, and public forums. Numerous questionnaire responses and information packets were sent to Iowa and Nebraska tourism office, plus AAA units.

A total of 51 slides were loaned to individuals, organizations, and publications.

d. Off-Refuge Programs

The curator presented a talk to the Harrison County Genealogical Society during a special program hosted by that institution, "Transportation in Harrison County", co-sponsored by the Iowa State Historical Society.

In early February, the staff prepared an exhibit for the 13th Annual Sportsman's Exposition at the Civic Auditorium in Omaha. The booth was staffed by station personnel and volunteers.  
42-157-93 BW



Several members of the staff and many volunteers traveled far and wide to give 14 off-refuge programs to 1,798 people.



The programs were given to service clubs, history clubs, libraries, and schools, ranging on a variety of requested topics.

The staff participated in a career-day program at the Ft. Calhoun High School and Dana College.

The refuge's film library did some traveling, also. The staff loaned out 28 films and videos, reaching a combined audience of 2,342. Films were loaned to schools, the Iowa Department of Natural Resources, scout groups, historical societies, senior citizen centers, and other national wildlife refuges.

e. Signs and Publications

Demand for refuge brochures is high. GPO generally prints 50,000, which lasts us less than two years. We sent off 5,000 copies to 20 separate offices and agencies.

The self-guiding auto tour brochure received a completely new appearance through the computer genius and artistic eye of volunteer Rudy Evans. Rudy works for a design firm in Omaha.

We printed 60,000 fee collection envelopes in April; revamped to accommodate "flattened \$3 bills". We had discovered the smaller envelopes bulked up the collection boxes, because people folded their paper money. The new envelopes have aided our "tellers" in sorting and counting money collected.

2. Outdoor Classrooms - Students

The refuge pulses with student activity throughout the year.

A total of 9,703 students visited and were involved in environmental education programs. This was about 14 percent above last year's use. Teachers also borrowed films, slide shows, and videos to use in their classrooms.  
45-151-93 BW







January through April brought 745 students to the refuge. But, May was, by far, the busiest month, with 3,533 students (168 classes). As part of their two-day EE program on the refuge, the Blair fifth-grade classes even got some instruction in canoeing. The majority of these groups worked on the "Artifacts and Lifestyles" cultural resources packet provided by the refuge as part of their visit.  
46-108-93 BW

During the summer months, we had 48 classes (1,064 students) involved in environmental education. And, in the fall, we had 4,361 students (197 classes) who generally were here to learn about "Birds In Migration".  
45-150-93 BW



The second week in September is set aside for Prairie Appreciation Week. This program teaches the students the importance of prairies, with both indoor and outdoor exercises. Nearly 400 students and a dozen teachers were accommodated in this four-day program. One of the students found this member of the orchid family, nodding ladies tresses (*Spiranthes gracilis*), previously unrecorded at DeSoto. 21-30-93 JO



We gave 30 separate sessions, and used the windmill area as a field site because the traditionally-used Wood Duck area was too wet. Six volunteers helped.

Thirteen college classes came to the refuge, including Dordt College, Hartford College, Tarkio-Westmar College, the University of Nebraska, Iowa State, Iowa Western Community College, Ohio State, Northeast Community College, the University of South Dakota, Luther College, and Hastings College.

Because of limited interpretive staff, we must depend on refuge volunteers to help with most education programs. Volunteers are first assigned to new groups, and then to as many repeat-user groups as can be scheduled.

Outdoor Education - Fishing Clinics - In observance of National Fishing Week, over 80 Omaha boys and 30 minority adult volunteers from inner-city Omaha enjoyed a day of refuge fishing and boating on June 5th.

A dozen agency volunteers from the Service, Iowa Department of Natural Resources, F.B.I., National Park Service, and the U. S. Army Corps of Engineers assisted in providing everything from fish identification to knot-tying and casting, even a Corps boater-safety program.  
18-249-93 MS



The day culminated with a fish fry, in which over 100 pounds of buffalofish were consumed. The kids also caught about 150 pounds of carp during the event. The youths received instruction in fish cleaning and performed a litter clean-up. A second clinic was held on July 24th for 55 female inner-city youths, and, a third clinic was held for over 60 youths on August 21st.

3. Outdoor Classrooms - Teachers

In June, the refuge was the site for nearby Dana College's Technology-Ecology Seminar, a high school science program for 50 "master teachers" from throughout Nebraska.

4. Interpretive Foot Trails

The four refuge foot trails were used by over 63,400 visitors. Volunteers Dorothy and Frank Hardy, did a fourth season of "trail patrol", picking up litter and pruning overhanging branches, plus restocking the Wood Duck Pond and Cottonwood Nature Trail dispensers with interpretive leaflets. Guided tours of the trails were provided to 1,762 visitors. Volunteers provided the majority



of these tours - mostly for conservation-oriented tour groups which called ahead for reservations.



Unfortunately, the summer flooding and high winds on July 8th caused excessive damage and closure of all trails, except Cottonwood Nature Trail, for portions of the summer. Wood Duck Trail remained closed throughout the fall. Here, Intern Anne Drake inspects a broken bench along the Missouri Meander Trail. 27-94-93 BW

#### 5. Interpretive Tour Routes

The auto tour ran from October 15th through November 30th. It coincided with the fall migration. The route has been turned around at the decaying North Observation Tower and people return on the same seven miles of paved road. This change in the route continues to be well accepted by the public, even though it means they are excluded from the unpaved (and dusty) part of the road that continues the loop around Center Island. Of course, there are always some people who think goose viewing must be best in the closed area. This is not so. In fact, the best overall viewing continues to be from the visitor center. We have a management agreement with the geese.

Cottonwood picnic ground was kept open during the auto tour, as was the Bertrand Excavation Site and the Missouri River Overlook. It worked! More than 54,000 people drove the tour route during the 45 days, about the same as last year. The new route reduces law enforcement problems, reduces the amount of special signing which had previously been required, and minimizes traffic disturbance at the eagle roost, since it no longer passes nearby.

#### 6. Interpretive Exhibits and Demonstrations

##### a. Self-guided Exhibits

Visitation at the five-million-dollar DeSoto Visitor Center was 143,041, a five-percent decrease over the previous year, and well below the 10-year average of 166,383. The early months of the year are usually fairly sparse in visitation. Spring use of the center picks up, and, of course, fall use is usually very heavy.

The month of November drew almost 47,000 people to the visitor center, about 33 percent of the year's total. This November's visitation was 20 percent higher than during last November. A total of 4,897 visitors used the visitor center on Sunday, November 21st. This was a new high! Traffic control was required for over six hours on this date.



The orientation films, "Seeds of Change", and "Off the Beaten Path", are shown hourly during the week, and on the half-hour on weekends and during heavy-use periods. A total of 28,111 people viewed this introductory film, in addition to all school groups. A total of 3,982 people saw weekend wildlife films.

The DeSoto Visitor Center contains exhibits on cultural history, natural history, wildlife, conservation, and Service-oriented displays. Two galleries feature displays about the Steamboat Bertrand, which sank in 1865, and the effects of westward expansion on the habitat and wildlife of the Missouri River Basin. There also are two lakeshore wildlife-viewing areas which are often filled to human capacity when the snow geese are present on the lake.

The center's Federal Duck Stamp display was revised for 1993-94. A wildflower photo book and "wildflower of the day" were placed at the Information Desk, during spring through early fall. The book was updated periodically to include photographs of flowers currently in bloom. Taxidermy mounts of waterfowl, information on the flyways, and a waterfowl art exhibit were set up in the fall. The visitor-activated three-minute Bertrand excavation video is viewed on a 21-inch monitor in a "shipping crate" in the Cargo Viewing Gallery. The Panasonic video player generally works well in the "crate", but had to have the capstan motor replaced for \$160. We are building a similar video-viewing unit for the Refuge Today Gallery, where we plan to show a four-minute video of DeSoto's wildlife, produced by volunteer Bob Horton, who has captured hundreds of hours of DeSoto's wildlife on tape.

Binoculars are available to visitors for free use. This service is very popular with waterfowl and eagle observers. Damage to loaned binoculars is infrequent; we keep a driver's license as security. Age and deterioration forced us to acquire several new Minolta binoculars with rubberized coverings. Watchable Wildlife funding provided five of our eight Minolta "loaners". The station also received five copies of the National Geographic's Birds of North America for loan through the Watchable Wildlife program.

#### 1993 VISITOR CENTER EXHIBITS AND ACTIVITIES

January - December	FWS Duck Stamp Exhibit Module
March 1-31	Student Wildlife Art Exhibit
April 19-24	National Wildlife Week (Suitcase for Survival)
May 20 - June 22	Wetland Exhibit
May 22 - June 26	Wildlife Photography Exhibit & Sale
July 1-31	Outdoor Writers of America
August 1 - September 5	Mike Whye's Photography Exhibit
September 11-19	Prairie Appreciation Week
October 2-30	Wildlife Art Exhibit and Sale
October 15-November 30	Wildlife Auto Tour
November 1-December 1	Birds in Migration Taxidermy Exhibit
December 1-30	Don Pogensee's Photography Exhibit

The DeSoto Visitor Center houses a variety of excellent special exhibits. The first notable occurrence is the

Student Wildlife Art Show throughout the month of March. This year was the tenth annual showing. There were 145 works, from 131 classes in 34 Iowa and Nebraska schools (K-12) in the exhibit. Award ribbons were provided and all participants received a personalized certificate. Over 6,800 visitors enjoyed the exhibit in the center's multi-purpose room.

From May 22 to June 26, the center hosted the Tenth Annual Wildlife Photography Exhibit and Sale. The exhibit included 495 photos by 15 Iowa and Nebraska photographers.  
43-125-93 BW



A total of \$880 worth of local photography was sold, with 10 percent going to the co-sponsoring Midwest Interpretive Association.

This was a 46-percent increase in sales over the previous year. More than 11,000 people saw the show.

During September 11-19, Prairie Appreciation Week was held for students. A multi-purpose room exhibit of grasses and wildflowers was set up for environmental education purposes during the weekdays, and also was open to general visitors during the weekends. Volunteers went afield with the students to conduct prairie appreciation exercises. A total of 400 students, primarily fourth graders, participated.

The Eleventh Annual Wildlife Art Exhibit and Sale was held in October. Some 197 two-and-three-dimensional works by 18 Iowa and Nebraska artists were displayed. Sales totaled \$1,352, a 46-percent decline from the previous year. The Midwest Interpretive Association retained 15 percent. Volunteer artist/demonstrators were featured on weekends during the show, sharing their skill and personalities with visitors. More than 17,000 visitors saw this show.

- c. Bertrand Museum - Discussions continued on Servicewide museum standards and needs with WASO's Kevin Kilcullen to update Museum Property Committee members. We worked up a list of museum equipment needs for Kevin, who was involved in developing a Department-wide contract for museum equipment purchases. An assessment of our photo collections was made to ascertain copyright status. The National Geographic Society and a local professional photographer were contacted. A system was devised for future commercial photographic projects dealing with the collection so we may



retain copyright status for our own uses. The curator prepared a summary progress report on the collection for Region 3, Report to Congress on Archeological Activities for FY 1991 and FY 1992. He also developed a brief recitation about the collection for inclusion in the National Park Service newsletter, CRM, for an upcoming issue about federal archeology collections and repositories.

Museum staff split the registrar's duties in the absence of our retired Registrar for the last few months of the year. Filing, preparation of correspondences, filling slide requests, and maintenance of catalog file information was handled by the museum curator. The conservator attended to conservation treatment requests and associated photography.



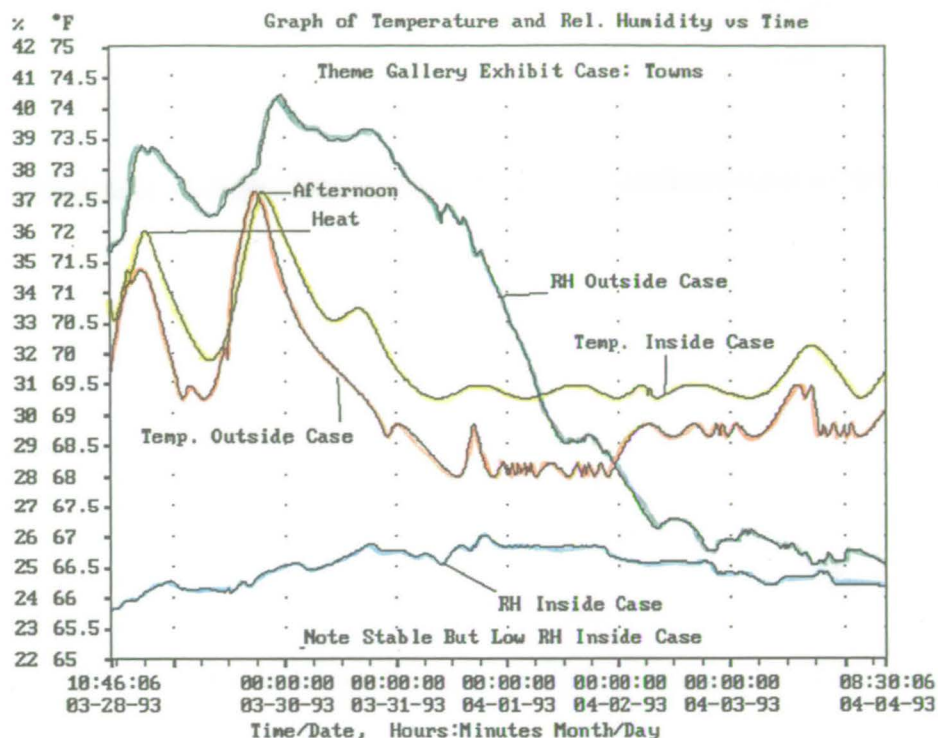
A new Minolta camera provides quality before and after photography of artifact conservation for file reference. This is a close-up of corrosion on an eyelet on an 1865-era shoe fragment.  
49-175-93 JH

The staff completed a grant request to the Iowa State Historical Society Historic Resource Development Program for equipment to computerize artifact, slide and historical images, as well as catalog information. CD-ROM programs would be available to visitors and researchers, both on and off-refuge. Even though that State grant did not come through, the effort may be rewarded by an upcoming program to implement a similar project between the Army Corps of Engineers in St. Louis, the National Park Service Archeological Programs Development in Washington, D.C., and us. The project was initiated by a NPS archeologist from their Washington Office who saw our audio-visual presentation about the Bertrand at the annual conference of the Society for Historical and Underwater Archeology in Kansas City, Missouri, in January. Even though our attendance was nixed, local NPS archaeologists were kind enough to take and set up the program at the conference.

Last winter, exhibit cases in the Theme Gallery were observed to have large cracks due to ten years of extreme humidity fluctuations in that area, and, therefore, the cases were becoming hazardous for the museum objects inside them. The cases were emptied and renovated to provide better environmental control and stability for the exhibited artifacts. One case was fitted with computerized humidity/temperature indicators to observe the long-term condition of the environment inside and outside the cases.



The renovation worked, and the objects are now buffered against extreme fluctuations of humidity, as confirmed by the following graph:



In implementing our Collection Maintenance Plan, quarterly cleaning of exhibit furniture and viewing windows was accomplished, as well as the rotation of displayed objects sensitive to deterioration from incident light. To keep some of the dust and pollutants down, we installed high-quality air filters in the conservation lab and collection storage area's Trane HVAC units. While continuing quarterly monitoring of pest traps in and around the collection, a disturbing pattern of infestation developed this year. Using Integrated Pest Management terminology, "action thresholds" were determined for cockroaches and carpenter ants. After consultation with two pest control firms and the Regional IPM Coordinator, the museum curator researched, prepared clearances, and acquired pest-control services in the museum office, conservation lab, the basement crawl-space, and the Cargo Viewing Gallery. The carpenter ant abatement technician also recommended some maintenance projects in and around the building to inhibit pest entrances. We also interrupted routine management of hydrothermographs and monitoring of the Cargo Storage Area environment this year. The Town Exhibit case and the walk-in cooler in the low-humidity storage area were fitted with computerized "Smartreaders" to measure temperature and relative humidity. Since all areas are now routinely covered by this computerized system, the old manual system of reading hydrothermographs has been discontinued.



This year, a variety of problems were solved in collection storage and exhibit areas. Working with contractors, the staff completed three contracts for augmenting existing exhibit furniture with disaster-preparedness fixtures.

A total of 455 bottles are now protected in wire racks, and another 323 bottles on 35 plastic restraining shelves.  
49-172-93 JH



A major change was implemented in our walk-in cooler storage area for historic foodstuffs. Old cardboard storage boxes holding food containers and bottles were tossed, and replaced with inert plastic bins. Empty bottles, previously stored with their associated lots for convenience sake, were taken out of the cooler and stored on high-humidity shelves. Changes in locations were recorded in the computer inventory. Formaldehyde-soaked cardboard seems to have been a major reason for the high incidence of that chemical in the cooler.

Thanks to the YCC enrollees, we moved and reshelfed over 2,000 artifacts from three sets of shelves in the low-humidity storage area and brought metal artifacts previously misplaced in the high-humidity area, into low-humidity. The project anticipated replacement of cabinets in high-humidity with new cabinets received last year, and recently painted. The new cabinets also were brought in with YCC assistance.

On the interpretive side of things, the staff continued working with a volunteer designer to develop The Bertrand Stores, an exhibit catalog for public use as they view the materials on exhibit in the Cargo Viewing Gallery. Visitors will be able to purchase the booklet from the Midwest Interpretive Association. In addition to editing the designer's work, we have requested the use of historic photos for the new sales item from the Montana, Missouri, and Nebraska State Historical Societies. Copies of the photos were purchased by the MIA. The final product will have a lot of quality graphics and photo which should help to make this a hot sales item.





Volunteer Nancy Torgerson reviewed selected clothing in the collection. As a professional tailor, she specializes in reproducing historic clothing. We videotaped her discussing the clothing within the context of individuals replicating the materials for living history. The tape will provide interpretive information for professionals interested in such projects, without having to pull out the clothing again, thus satisfying researchers without contributing to artifact deterioration. She also completed a reproduction of a woman's coat in the collection. 49-173-93 JO

In spite of the fact that we cannot exhibit the fragments, we can show the reproduction with photographs of the fragile remains of the coat in our exhibits, to show the value of the collection for research to the casual visitor.

Curator L. Jane Richards of Fort Missoula in Missoula, Montana, notified refuge staff that her facility received a grant for \$12,500 from the Montana Cultural Trust to put together a traveling exhibit, featuring materials from the Bertrand. The grant runs through June 30, 1995. She will visit in person this coming spring to determine what objects might be included in the exhibit. The focus of the exhibit, in addition to the collection, is Frank Worden, Missoula businessman and founder, who was one of the consignees of Bertrand stores.

Historic research provided a variety of eye openers this year. Visiting the Nebraska State Historical Society archives and manuscripts division, we reviewed and researched steamboat travel diaries for the 1860's. The Missouri State Historical Society provided us with a copy of 70-page diary written by R. M. Frazier, describing a trip from St. Louis to Fort Benton in 1865 on the Steamboat Deer Lodge. This ship belonged to the same group as the Bertrand, The Montana and Idaho Transportation Company. The manuscript is probably the best description we have of the trip. It mentions the sunken Bertrand and the problems owner Copelin experienced throughout the season with his steamboat company, conditions on board the ship, and military vs. Native American incidents. We also received listings of collections containing other diaries describing steamboat trips in the Missouri State Historical Society collections. We obtained information pertinent to the bandanna material in the collection from NPS conservator



Jane Merit. Information also was received about the Underwood Company (formerly of Massachusetts, bought by Pet Foods and moved to St. Louis), whose food was aboard the Bertrand; this from a former aid to that company's president. Brass matchcase photos were sent to Denis Alsford for his book, Match holders. 100 Years of Ingenuity. The Philadelphia Free Library responded with copies of reference materials to our request for information about a Philadelphia hardware store and trowel maker, represented in the collection. Microfilm copies of the early diaries and business correspondences of James and Granville Stuart, consignors of Bertrand stores, were obtained from Yale University Library. The refuge library also received over fifty-five new titles, mostly associated with archeology, history, and museums, and most, at no cost through the refuge's cooperating association.

We sponsored an archeology talk as part of Iowa statewide programs to celebrate Iowa Archeology Week this year. Working with the State Archeologist's Office, our event appeared on the associated program calendar of events occurring throughout the state for the week. The refuge talk centered around archeology in Harrison County during the same time period as the Bertrand. 43-126-93 JO



The Nebraska Antique Bottle Collectors Association met at the visitor center in April.

The curator sat on the Iowa State Historical Resources Development Planning Grant Review Board.

#### 7. Other Interpretive Programs

The refuge continues to attract an impressive variety of visitors. Our registration book this year records people from all 50 states, plus 37 nations. Two Russian refuge managers studying eco-tourism came in March. Ten Brazilian businessmen came in May. Twenty Japanese exchange students came in August. We could go on and on. The fact is that many of these groups self-tour the refuge and visitor center. We discover they're foreign visitors only accidentally or after they sign the registration book.



Other distinguished groups who enjoyed our interpretive exhibits and wildlife included six crew members of the USS Nebraska, two dozen "Road Scholars" escorted by the President of Iowa State to learn about Integrated Pest Management, and the Deans of the Lutheran Colleges in America.

The staff presented talks and programs to a variety of groups. Other than educational groups, a total of 90 organized groups and bus tours, containing 2,672 persons, visited the refuge. Slide programs, talks on endangered species, the refuge and wildlife management, and the Bertrand, were all subjects of numerous programs given to visiting groups by the staff and volunteers.

"Special" interpretive programs given this year in the visitor center included:

April 22	"Battle for the Great Plains"	film
April 22	"Fabulous Mushrooms" (slide talk)	Ione Werthman
July 31	"Lewis & Clark's Missouri River" (a living-history program)	John Adams
August 7&8	"We Proceeded On The Great Journey of Lewis and Clark"	film
Sept. 12	"Iowa Archeology Week" (talk)	Leah Rogers
October	"Wildlife Art Show Weekends"	demonstrations
November 13	"Renewing the Endangered Species Act" (talk)	Dan Taylor
December 11	"Poetry of the Loess Hills"	Carole Johnston

Weekend wildlife films were enjoyed by 3,982 visitors throughout the year. Many of the same local folks come each Saturday and Sunday to enjoy a film. A "feature" is now shown three times, both Saturday and Sundays. The series included special programs for Earth Day, Prairie Appreciation Week, and Lewis and Clark weekends. Weekend films were discontinued mid-October through November, during the waterfowl migration, on days of high public visitation, just to keep folks moving.

A poster exhibit was designed by Volunteer Evans for promotional purposes in libraries, store fronts, etc. Here, ORP Weber and the Omaha Tourist Bureau's Director prepare for its display in an Omaha Visitor Center.  
42-156-93 BW



## 8. Hunting

- a. Waterfowl - The Iowa southern zone snow goose hunting season ran from October 23rd through January 10th. The daily bag limit was seven geese (Nebraska allowed 10 geese). The Iowa



southern zone duck season ran from October 23rd to October 29 and November 6th through November 28th. The daily bag limit was three ducks.

This was the 20th consecutive year for DeSoto's controlled waterfowl hunt. Due to the poor quality of the hunt, several changes were made this year to try and improve it. The hunt was shortened to four days per week, and two historically unproductive blinds were removed. A total of 72 birds were bagged, which included 42 geese and 30 ducks. Hunters logged 1,136 activity hours during 251 visits. It took an average of 16 hours to bag a bird, and 13 shots to do it. Unbelievably, this was actually better than during the previous year, which required an average of 24 hours and 22 shots per bird bagged.

Administrative changes also were made to try and lower the cost of running the hunt. Advanced reservations were permitted only during September. After that time, we allowed standbys on the morning of the hunt, similar to state-run hunting programs. The Iowa Department of Natural Resources is also finding the cost/benefit of their Forney Lake hunting program are too low to continue that operation. So, we are hoping to drop our program at the same time. Regrettable, because it provides a recreational outlet which is still in limited demand by the general public. But, if we don't have the means of providing a quality experience, we shouldn't continue. The cost of the hunt (\$3,334.86) did drop by nearly 50-percent, as compared to 1992. But, the hunt proved to be of continuing low quality, and still a relatively expensive operation.

- b. Muzzleloader Deer Hunt - The three-day muzzleloader deer hunt ran from December 11th through the 13th. A "scouting day" was held on December 5th. A total of 85 hunters took the opportunity to look over the hunting area and erect portable tree stands. The Nebraska Game and Parks Commission issued permits to 100 hunters. A total of 94 hunters participated in the hunt, and logged 1,953 hours to harvest 48 deer. The success rate was 51 percent. Some very nice bucks were taken, among the 28 adult males. Students from University of Nebraska at Lincoln weighed and aged the harvested deer.

A large ear-tagged buck was taken by Mike Willis of Herman, Nebraska, during the first five minutes of the muzzleloader hunt on December 11. 39-74-93 SV





c. Archery Deer Hunt -

<u>State</u>	<u>1993 Season</u>	<u>Hunters</u>	<u>Hours</u>	<u>Deer Taken</u>
Nebraska	09/15 to 11/12	207	687	3 Adult Males
	11/22 to 12/31			1 Fawn Male
Iowa	10/01 to 12/03	360	989	8 Adult Males
	12/20 to 01/10			4 Adult Females 2 Fawn Males

The refuge hosts an archery deer hunt for both Iowa and Nebraska residents, during respective seasons. The hunters are requested to voluntarily sign in and report any deer taken or shot. Of course, not every hunter does this. Therefore, our information is sketchy.

9. Fishing

Ice conditions on the lake permitted ice fishing to begin on the 23rd of January, and end on the 28th of February. However, from a winter creel survey that was conducted, the harvest was poor. An estimated 413 anglers averaged 2.9 hours of fishing per visit. The total harvest during the ice fishing season was estimated at 146 fish, with 55 percent consisting of bluegills. Ever since the 1990 ice fishing season, when over 3,725 pounds of northern pike were harvested, the ice fishing has been far from noteworthy.

The public fishing season opened on the 15th of April. The rainy and cool weather kept angler numbers and success lower than normal in April and early May. Warmer water temperatures in May and June did produce better than normal largemouth bass and walleye angling. Numerous catches were witnessed during the early part of the season, especially off the South Beach Recreation Area rock jetties and around pilings at the Middle Boat Ramp. Panfish and northern pike catches were again extremely slow. The fishing season ended on the 14th of October, with only a few die-hard anglers remaining. Fishing visits for the year were estimated at 22,532 anglers and 57,232 activity hours.



Flooding closed the Small Boat Ramp and the South Gate Recreation Area's boat ramps in July and August, leaving only the Middle Boat Ramp for DeSoto Lake access. Portable boat docks were removed and some roads closed, but anglers still found limited access.  
21-106-93 BW



Fourteen registered fishing tournaments were held on DeSoto Lake during the spring and early summer months. Largemouth bass was the species of choice, with many boats weighing in bass ranging from 3-5 pounds. One boater reported a 14-pound northern pike caught on a kernel of corn! Walleye were taken off the rock jetties in May and June, before the jetties submerged.

#### 11. Wildlife Observation

Since DeSoto is within 25 miles of the Omaha-Council Bluffs metropolitan area, there are many people attracted to the refuge's more natural habitats. Wildlife viewing from the visitor center is good in season, especially for waterfowl. The refuge also has a 12-foot-tall wooden tower at the North Lake Observation Area. While heavily used, this tower is in poor shape, and plans are to replace it with a handicapped-accessible facility in the near future. The road remained open to the North Lake Observation Area throughout most of the year. There also is an old photoblind, which is available to the public upon special request, but, in truth, is no longer an optimum place to photograph waterfowl. We've been able to coax the birds further to the west, into close proximity of the visitor center.

More and more visitors are seeing turkeys and coyotes today, while viewing the refuge deer herd has always been popular. Ring-necked pheasants are usually visible. Many local people come out to the refuge toward the end of the day to simply drive through and see wildlife. There are even occasional observations of mink, beaver, muskrats, and opossum.

One of the most sought-after sightings is a bald eagle. Thousands of people come to the refuge in the fall and winter to get a glimpse of one. The eagles cooperate quite well. Not many visitors leave unhappy, even though the eagles are usually farther off than the close-up lenses of TV cameras lead the public to expect. Our new Missouri River Overlook has increased the potential for viewing eagles in season.

#### 12. Other Wildlife-Oriented Recreation

- a. Nature Trails - Cold wet summer weather and icy winter conditions decreased use. There are four nature trails. The Missouri Meander Trail, adjacent to the visitor center, is the most used. Its paved trail is a draw even for the non-handicapped. The Bertrand Excavation Site trail continues to be popular. We also have two interpreted trails, at Wood Duck Pond and Cottonwood Trail. All are looped trails and cross relatively flat terrain, but portions of three of these trails went under during the flood.
- b. Mushroom Hunting - Mushroom hunting is permitted on approximately half the refuge, from April 15 through May 31. This is a popular activity, akin to blueberry or blackberry picking in other refuges. We recorded only 5,687 visits this year, due to the cool, wet weather. A morel mushroom information sheet and a mushroom slide show were provided to reinforce public safety in this activity. False morels also occur here.
- c. Boating, Canoeing, Sailing - Less boating is recorded each

year. Three dozen boats might use DeSoto Lake on good days, half that on other days. It reflects the public's difficult time in catching fish. The lake has a 5-mile-per-hour, "no wake" speed restriction, which discourages the speed boaters who used to race around this seven-mile-long lake.

Canoeing and sailboating use were down, also. The lack of canoeists is unfortunate, because the lake has interesting diversity along its shoreline, which can provide an enjoyable day on the water. The Eastern Nebraska Sailing Association held a regatta on July 24. Fourteen boats participated, even though most of our facilities were under water.

d. Bicycling and Walking -

Many people enjoy bicycling on the refuge roads, particularly people camping in the adjacent Wilson Island State Recreation Area. They usually carry their bikes along in their recreational vehicles.  
41-38-93 BW



Walking is generally only along one of our four maintained trails; none of them over a mile long.

14. Picnicking

More than 100 picnic tables are located throughout public use sites; 50 of these are located at the South Gate Picnic Ground. Most of the use occurs during the summer. The refuge accommodated over 25,609 picnickers, including family groups and school groups. The picnic tables at Cottonwood Nature Trail are used especially by school children on EE outings, and are kept open through the fall auto-tour period. Two wheelchair-accessible picnic tables and pads are available at the Cottonwood and South Gate picnic areas, respectively.

16. Other Non-Wildlife Oriented Recreation

About the biggest event in this category was the Missouri Valley High School Invitational Cross-country Race, attended by 500 people on October 16. Non-wildlife-oriented use is practically non-existent, except for the occasional business picnic, regatta, or walk-a-thon. A decade ago, it was normal to have half of our visitation engaging in mass swimming and sunbathing, waterskiing, and high-speed powerboating...and most seemed oblivious to the refuge's wildlife and its habitat requirements. The cross-country



race described above was a relatively low-impact event. In fact, this activity was restricted to the South Gate Area and other visitors weren't aware it was happening. It was primarily a positive public relations gesture in our home community.

17. Law Enforcement

Refuge officers issued more warning tickets and field violation notices this year than any year in the last nine, with the exception of 1988, when the fee system was initiated. This is significant, especially in light of the fact that we had only one full-time officer during ten months of the year. This shortage of law enforcement personnel prevented off-refuge patrols, resulting in zero off-refuge resource violations.

Refuge officers spent considerable time on enforcement of the fee system, trespass into closed areas during the mushroom hunting and fall wildlife-viewing seasons, and checking for fishing violations. Numerous warning tickets were once again issued for pets on refuge, a constant problem here.

Traffic control continues to be a problem during the peak of the snow goose migration. Officers directed traffic on five days over three weekends. November traffic requires numerous hours of law enforcement by several officers to keep the traffic moving, keep the public from harassing the wildlife, and to ensure a safe, pleasant experience.

Law enforcement officers housed on refuge are required to answer visitor center fire or security alarms during non-business hours. During the year, officers responded to 27 alarms. Having officers available is a constant problem; since often one or more of the three houses is vacant. This was the case in 1993. Often, off-station collateral duty officers are called up by our security dialer and must respond from quite a distance. This has presented a serious problem, and resulted in Officer Root being called in Blair from the Harrison County Communications Center on the evening of Christmas Day due to a fire alarm. Since only one officer was in residence at the time, and he was away from his house, no one had responded to the alarm. Consequently, by the time Officer Root got there, two fire engines were waiting at the gate with eight firemen, and another unit on the way. The alarm was false, having been activated due to a dip in electrical power. This situation was highly embarrassing, and emphasizes the need for refuge housing to be fully occupied with officers.

During 1991, five individuals were convicted of Lacey Act violations for poaching five deer on refuge grounds located in Iowa, and transporting them to Nebraska (see 1991 Narrative). As part of their sentences, all five were placed on three-year's of probation. One of the defendants, James M. Kelly, plead guilty to a "hunting without permission" violation in Iowa State Court in early 1993. The violation had actually occurred on December 1, 1992, one year to the day after his Lacey Act violation. As a result of not reporting this violation to his probation officer, a Federal probation revocation hearing was held on April 9, 1993, and Mr. Kelly was found guilty. He was ordered to serve 150 days in jail, beginning immediately.

John C. Johnson, who was chased down after two vehicle breakins at the DeSoto Visitor Center on March 24, 1992, served some time in Douglas and Lancaster Counties for other crimes, and was released

after serving 11 months in the Nebraska penitentiary. He was tried in Harrison County, Iowa, for our break-ins at mid-year, and is now serving two years in the Iowa State Penitentiary.

Summary of 1993 Violations

<u>Types of Violations</u>	<u>Warning Tickets Issued</u>	<u>Prosecuted Violations</u>	<u>Total Court Fines</u>	<u>Cases Pending</u>	<u>Cases Dismissed</u>
Fishing:					
No License	1	11	1,100	1	1
More Than 2 Lines	2	3	150		
License Not In Possession	7				
Closed Area	1	1	50		
Closed Season	3				
Hunting:					
Closed Area	2				
Trespassing:					
Enter Closed Area	27	28	1,425	2	1
On A NWR		1	100		
After Hours		1	50		
Boating:					
No Life Jackets		1	50	1	
Exceed No-Wake	1	1	50		
Expired Registration	1				
Vehicle Violations:					
Expired License		2	75		
No Registration	1				
No Trailer Lights	1				
Littering		5	250	1	
Entry Without Permit	46	3	100		
Failure To Obey		1	175		
Minor In Possession	2				
Pet On Refuge	35				
Harass/Disturb	3				
Unauthorized Campfire	1				
 TOTAL	 134	 58	 \$3,575	 5	 2

18. Cooperating Association

The Midwest Interpretive Association (MIA) has completed its twelfth year of operation. Revenue received from the sale of a variety of educational books, artwork, photographs, t-shirts, postcards, and posters at DeSoto totaled \$57,869.74. This is a 21.6 percent increase above last year's total, despite bad weather and slow visitation. The Association received its requested three-year, low-interest \$10,000 loan from the National Fish and Wildlife Foundation. Most of these funds were used to reprint the publication, The Steamboat Bertrand, by Jerome Petsche. A new colored cover was added to enhance its look, and there were some minor editing changes made. The remaining funds were used to rebuild low inventory levels and to add new historical and youth publications to the sales area.

Bruce Barkley serves as the MIA's full-time business manager, a non-government employee, operating a \$90,000 business from the DeSoto Visitor Center. Along with Desoto, the Association also



administers outlets at Mingo, Squaw Creek, Swan Lake, and at Lewis and Clark Lake, where the U. S. Army Corps of Engineers operates a visitor center near Yankton, South Dakota.

Outlet	Gross Sales	Percent of Assn. Sales	Monetary Contributions
DeSoto	\$57,869.74	63.7	\$1,224.68
Mingo	9,306.71	10.3	1,753.67
Squaw Creek	11,283.94	12.4	717.72
Swan Lake	1,405.95	1.6	147.28
Lewis and Clark	10,935.22	12.0	540.70
Total:	\$90,801.56	100.0	\$4,384.05

Direct monetary contributions to the refuge totaled \$1,225. This included sponsoring both photography and wildlife art shows, and a fishing clinic. In searching for new sales items, the Association donated thirty-eight new publications, worth \$526.40, to the DeSoto library, this in addition to the other monetary donations. The business manager also participates in DeSoto's operational programs in a variety of ways, and contributes to the refuge's interpretive programs, in person and through his computer skills.

Several donations were received from individuals in memory of loved ones. These donations will be targeted for future publications. Numerous memorials were contributed in memory of our long-time volunteer, Bob Starr, who died of leukemia complications in the early fall. Something special will evolve in his memory.

## I. EQUIPMENT AND FACILITIES

### 1. New Construction

Construction of the new headquarters and shop complex was awarded to Barry Larson and Son General Construction, Inc. of Omaha for \$531,335.

Work began in June with the demolition of the old headquarters/shop. After the shingles were removed from the condemned building, general demolition began in earnest. Roof timbers snapped, brick walls fell, and, almost before we knew it, the old building had been hauled away.  
35-179-93 TR





Asphalt shingles on the structure contained asbestos, which had to be removed by some Ghostbuster-looking guys before general demolition could begin.

The contractual design for this building complex was "completed" by TKDA, Inc. of St. Paul, Minnesota. Well, ok....they left a few things out. Then, the costs came in high, so we had to leave a few things out....like landscaping. But, time is on our side!

Since, we were building our new headquarters and shop on the old site, the specifications required excavation of soil to four feet below the existing floor level. A compacted engineering fill would replace the soil removed to insure a solid building foundation. Unfortunately, when they excavated to the four-foot level, they found the same gumbo soil materials that had been suspected in the heaving and cracking of the old building. Uniform sandy soils were found five foot deeper, and it was decided to continue the excavation. This dramatically, increased the cost of excavation, engineering fill, and compaction required to prepare the site for construction. A change order was approved for \$18,935.



Rough construction progressed rapidly. Foundations, framing, masonry walls, plumbing, and electrical rough-ins all went fairly smoothly, with the only real exception being when heavy rains washed 8-16 inches of mud down into the footings. A week of back-breaking labor with shovels to repair the damage.  
35-175-93 RP

Original time-lines projected that the buildings would be completed by December 31. However, due to the wet summer, and the over-excavation, this date was moved back until early spring, 1994.  
35-176-93 RP





As with any construction project, error and omission in drawings and specifications and unforeseen circumstances will always result in delays, negotiations, change orders, and Excedrin headache number 485. The real key to keeping any project on track is a good contractor. We were lucky on this one. Barry Larson has "bought in" on this project, and wants to do a good job, just as much as we want a good job done. You should all be so lucky in your construction projects!

## 2. Rehabilitation

In preparation for construction of the new headquarter's complex, the water system had to be moved and remain functional to supply the three quarters and the temporary headquarters.



It was finally decided that the best move was a permanent relocation nearby on the west end of the eight-stall garage. One stall was revamped with a floor drain, fully insulated, and enclosed. Since problems had been experienced with the existing system, it was redesigned and upgraded during the move. 35-179-93 SC

The water treatment relocation was effected by C&M, Incorporated from Fargo, North Dakota, for \$82,171. This higher-capacity system seems to be meeting our needs. 35-177-93 MS



In 1990, the three fuel oil furnaces in refuge quarters were replaced with new propane furnaces and associated above-ground tanks. The underground fuel oil tanks were no longer usable, and were finally removed in late summer at a contractual cost of \$1,205.





About the same time as work began on the headquarter's water system, the deteriorated 29-year-old roof on the eight-stall garage was contracted for replacement. Charles Kerger from Woodbine, Iowa, tore off the old shingles, replaced them, replaced rotting eaves and gables, and installed new gutters for a total of \$11,823. 35-180-93 RP

Shop facilities were temporarily moved to the Bertrand building as the old headquarters building was torn down this summer. To support this temporary shop, a new water line was dug by Kirby Well Drilling, Inc., from the site of the newly-installed water system in the eight-stall building to the old Bertrand building, at a cost of \$940. In addition, an overhead door was cut into the south side of the Bertrand building to allow access by vehicles, at a cost of \$934. 35-178-93 SC



The process of making the visitor center more handicapped-accessible continued this year, with the purchase of handicapped door openers for \$2,670, to be installed at the main entrance. These allow any individual to push a large button, which automatically swings both doors open for ease of entrance or exit—an excellent retrofit.

The flat visitor center roof had been leaking for some time. Consequently, a \$146,740 contract for replacement was awarded to Aksarben Roofing Company in September, and work began in October. The former roof system consisted of the thick concrete base, covered with a rubber bladder, topped with closed-pore styrofoam, and, finally, rock on top. The contractors stripped away the old roofing system, down to the bladder. The gravel topping was



hauled out onto the refuge and provided enough material to resurface a quarter-mile of Rifle-Range Road.



The new system was comprised of R-30 insulation value, polyisocyanurate foam-board insulation, applied directly over the old rubber bladder. On top of this, they placed a new Firestone rubber bladder, which (in contrast to the old system) was stretched up under the metal coping along the building parapet. 52-129-93 JO

The bladder was then directly covered with rock. Concrete pavers were placed on the roof to serve as a walkway for maintenance around various roof utilities units. Since it cannot be walked on now, the roof also needed access pavers to accommodate window-washing equipment and personnel. These were ordered as an addition to the project. 52-130-93 MS



Also added to the project was the re-roofing of the two leaking viewing galleries with a similar rubber bladder and cedar shingles. Another add-on (as yet not completed) will insulate all the skylights in the center's administration hallway with protective UV-resistant glass. 52-129-93 GG



A frame will be installed at the top of the skylights with tempered, UV-resistant glass, which also will add a minor insulation factor.

The refuge received \$5,000 of watchable wildlife funds for the construction of a small viewing area at Cottonwood Trail. However, due to extremely high lake levels preventing construction, the refuge received permission to divert the monies to the purchase of rock chips for placement on nature trails. As a result, some 600-tons of chips (with dust) were purchased for delivery and eventual placement on the Missouri Meander Trail and Cottonwood Trail, as drying conditions permit.

The replacement of old docks at the small boat ramps was completed. A handi-capped-access pier at this site was a welcome addition. But, it spent part of the summer under water. 46-107-94 MS



### 3. Major Maintenance

Woe is our museum! From walk-in coolers to alarm systems to air conditioning systems. You name it, we have the problem. The walk-in cooler for historic food preservation went haywire. A contractor was brought in to replace the compressor cycle timer. In doing so, we discovered that the thawing cycle was set to last ninety minutes! Decreasing the cycle time meant a gain in environmental control. Previously, materials in the cooler were subjected to huge RH swings during cycles. The cycle duration was switched from ninety to thirty, to two, to ten minutes. This experimentation finally led to a change in RH swings from 40 percent to ten percent. The cycle could not be kept at two minutes, however, because we discovered that the coils froze without constant monitoring and could lead to freon displacement. That happened, too. We lost a good portion of the freon, and the system was down for a fifteen-hour period. Since extreme and quick RH fluctuations are the worst thing you can do to an artifact this system will have to be modified or replaced.

For essentially two years, the visitor center has been without a maintenance mechanic due to the loss of Bob Kraushaar to cancer, and his eventual replacement, who is currently fighting cancer, also. This, besides being a personal and station tragedy, has resulted in tremendous facility maintenance problems due to the lack of preventive maintenance and/or having anyone on staff who has the ability to fix what becomes broken. As a result, much work has had to be contracted, much electrical and pneumatic work



is not being done, and the HVAC systems are literally limping along with what little work the remaining staff is capable of doing.

The new Maintenance Mechanic, LeRoy McDonald, started fixing everything that had piled up since the death of our former maintenance mechanic: repairing the exhibits, the well pump; the return air system for zones in the lab, the library, and the Cargo Viewing Gallery;....  
52-133-93 BW



....modifying the walk-in cooler in low humidity; repairing the deionized water system for the lab; the hot water pump for the visitor center; the compressor for the pneumatic thermostats; the inundated utility box on the south side of the building; the water-use indicator graph at the Cargo Storage Area entrance; etc! Unfortunately, he was only here for a short time during the summer.

Smoke detectors for the center's halon system were checked. Three smoke-detector heads in collection storage are fast approaching the end of their effective lives. Our fifteen-volt detector heads must be replaced with the like. Unfortunately, they don't make fifteen-volt detector heads any more. Today, all systems are 24-volt, and apparently every head in our system must be switched out, along with placing a computer card to read 24-volt detectors in our halon control panel. Since they are approaching a time when they will be oversensitive, we may lose our halon inadvertently. Complicating the problem is that halon replacement is no longer legally possible, and the replacement for our halon system will likely require a totally new delivery system.

All this finally culminated in a late October trip by Regional Office Engineering Staff to examine the situation. Their results were outlined in a three-page report which described numerous major problems, and contained statements like "the control system requires total overhaul", "poor indoor quality", "sick-building syndrome", "no recirculated air", "fouled the coils", "air compressor needs replacement", etc. A summary is listed under I.7. Energy Conservation.

These changes will require considerable dollars and expertise - neither of which we currently have. Consequently, we requested that the Regional Engineering Staff or other qualified personnel be detailed to DeSoto for a short time to begin addressing these problems. Hopefully, we will get on top of the problems during 1994.



In addition to the above, other problems or maintenance that arose at the center during the year included:

- repairs of numerous air leaks in HVAC units by Honeywell at a cost of \$591.90,

- two breaks in the center's well main-line during the month of April cost \$700 for repairs by Kirby Well Drilling from Missouri Valley. This turned the staff parking area and delivery dock area into a quagmire for most of the year. M-971 JO



The constant summer rains didn't improve the situation. And, then, we experienced yet another break in the waterline's entrance fittings in early November, so this scene existed for months.  
M-912 JO

- numerous problems with the alarm system, resulting in line checks, adjustments to doors, frames, battery replacements, etc.
- replacement of two highly-specialized sump pumps in the basement for \$3,950



- the high-humidity compressor in the Cargo Storage Area dumped its freon after an O-ring failed, which had to be repaired under contract. Luckily, the Halon system didn't discharge, or we would still be cleaning up artifacts!
- problems experienced with the cycle-timer in the walk-in cooler used for historic food preservation were reduced, but not solved.

The process of repairing our eroded fishing jetties, due to public safety concerns, continued in March with 160-tons of rip-rap (delivered under contract for \$1,515) being applied to three jetties to bring them up to acceptable levels. Small rock, delivered the previous year, was then placed on two of these at Whitetail and Lakeview Drive. Much of this was for naught, as all jetties were again overtopped with record 1993 summer lake levels, resulting in further deterioration. Consequently, another 510-tons of riprap (\$4,998) and 600 tons of road stone (\$4,980) were ordered in late 1993 for flood repairs to jetties and roads.

The three-mile gravel portion of the main public use loop has been deteriorating considerably in recent wet years. To begin the process of restoration approximately, 555-tons of road rock (\$4,884) were spot-placed on the road in early April.

The 1993 increase in entrance fees resulted in conversion to a new money envelope and subsequent refitting of the self-registration fee boxes to accommodate the new style of envelopes. These modifications were completed in early spring, new signs were erected, and we were ready for the public use opening on April 15th.

In late summer, vandals cut the rope on the Bertrand boardwalk trail, requiring replacement of 600 feet of 3/4-inch rope for \$693.

Other maintenance for the year included rebuilding the fences on the west-side archery parking lots, cold-patch placement on numerous holes and cracks in refuge asphalt roads, two loads of rock applied to the grain bin road to provide as a turn-around for buses during Prairie Appreciation Week, and three loads of gravel applied to the east dike to upgrade the muddy road for archery hunting access.

The asphalt roads throughout the refuge suffered from the high summer water levels, with water standing in ditches, and some over-topping. Punch-outs were evident all along the main river levee as subsurface materials became saturated. Extensive repairs will be required in the near future.

27-93-93 BW





#### 4. Equipment Utilization and Replacement

Refuge staff and equipment were used in repairing flood damage on roads, trails, a boat ramp and campgrounds on the adjoining Wilson Island State Recreation Area, so they could reopen this fall to limited use.  
21-105-93 MS



Fire money was used to purchase a one-and-one-half-ton 4x4 for \$15,000. This vehicle is a 11,500 gvw dual-wheel truck, ordered without a bed. A custom-built bed, with tool boxes, was added by Omaha Standard for a cost of \$2,465. This truck was ordered for fire purposes, so a 300-gallon pumper will be added next year, assuming funding is available.



In addition, a sander was purchased (non-fire funds) from Omaha Standard for \$3,890. This will be used on the flatbed during the winter months, and then replaced with the aforementioned pumper during the fire season. It got its initial test during the Thanksgiving weekend.  
36-143-93 GG

A new all-wheel-drive Polaris ATV also was purchased with fire money for \$3,845 and an ATV trailer for \$649.

The refuge finally received its own grass seed drill. A Truax seed drill with no-till option was purchased for \$14,802, originally to be shared with Squaw Creek NWR. However, during November, we received a new Truax seed drill from Litchfield WMD, which was too large for their needs. This was exactly the same type of drill we ordered earlier in the year, which had been delivered to Squaw Creek. Squaw Creek notified us later in the year that they didn't want the no-till coulters for their drill, so we picked them up for later addition to our drill. The



arrangement with Litchfield was that we will purchase a 10-foot drill to replace the 12-foot drill they transferred to us. Finally, a 14-foot cultipacker was purchased with \$3,500 of year-end monies, to be used in conjunction with the new drill.

Other purchases included a new Jeep Cherokee for \$13,000, and a back-blade for the 2440 John Deere tractor at a cost of \$1,225. Television antennas with rotors were purchased and installed at the residences.

Two new 3/4 ton two-wheel-drive trucks also were ordered with year-end monies.

Purchases for the visitor center included an industrial-sized Clarke upright vacuum for \$959, to replace our ancient and worn-out model. Track lighting was purchased at a cost of \$1,856 for installation in the visitor center's multipurpose room. This will greatly improve a poor lighting situation and will aid in displaying art works during various special shows and exhibits. Also purchased were exhibit panels for \$3,291 to display exhibits in the visitor center, and special exhibits, and \$3,600 for three wayside interpretive panels to be placed at the North Tower, and Missouri River Overlook.

Two pedestal binoculars also were purchased for \$3,990. One was placed in the Refuge Viewing Gallery at the center, and the other will be located at the North Tower following renovation or reconstruction.  
48-125-93 BW



A VCR and monitor was purchased as a year-round public-viewing opportunity of DeSoto waterfowl, at a cost of \$820. For safety purposes, the center's original fire extinguishers were all replaced in April.

#### 6. Computer Systems

In January, two Gateway 2000, 486 SX computers were purchased for use in the headquarters and visitor center, respectively, at a cost of \$3,049. We also purchased the station's first MacIntosh computer for use by the outdoor recreation planner, at a cost of \$1,410. It should be very useful in brochure design and various layouts.

At mid-year, we received an excess 286 computer from the Brussels unit, which will be used by the LE officers, and last, but not least, at year-end, funds were made available from WAM-2 to purchase a Dell 486 DX computer with SVGA monitor, 240MB hard-

drive, and tape backup. The cost of this computer was \$2,498.00. We are getting there!

## 7. Energy Conservation

Two representatives from the Regional Engineering Office traveled to DeSoto in late October, for an energy audit of the visitor center. During the walk-through audit, many deficiencies were detected in the mechanical equipment and controls, which limited the effectiveness of the audit. To give an actual cost-analysis of any proposed energy conservation opportunities, a building "baseline" energy consumption is required. With the present operating condition of the mechanical equipment and controls, a workable baseline was unattainable. Too many quick fixes and temporary bypasses had been cobbled up by a variety of technicians in the HVAC systems during the lack of a consistent preventive maintenance program in the last couple of years.

Based on the trip, the following was recommended:

1. A total retrofit of the visitor center controls is required. Direct digital controls should be considered, with an energy management station. Prior to this, however, the existing control system requires testing and calibration to return the system to original design conditions.
2. A redesign of the air handling for the laboratory should be considered. The laboratory requires outside air, and should be controlled to maintain space temperatures below the Cargo Storage Area's dew-point temperature.
3. Installation of a closed-loop system for the cooling side of the air handlers. Well water could still be used as a cooling medium. However, the water should be routed through a plate-type heat exchanger. This would eliminate fouling in the chiller and coils, yet still allow for cooling using well water.
4. Either purchase a new, larger air compressor, or a second compressor to split pneumatic and water-system controls, since the old compressor is running constantly and must be rebuilt frequently.

Some of these energy problems must be addressed during FY 1994.

## J. OTHER ITEMS

### 1. Cooperative Programs

- a. Missouri Chutes Proposal - The conceptual focus for a partnership development of a complex of refuges and environmental easements along the Missouri River has been a 137-mile stretch between Sioux City, Iowa, and Omaha, Nebraska. A partnership of county, state, federal, and tribal agencies was moving along quite well until the Service's engineering feasibility study for the primary site, Blackbird Bend National Wildlife Refuge, was released by Region 6. A draft Conceptual Management Plan and map for the proposed 12,000-acre refuge were completed in January, and the engineering feasibility study was released in July.



The hysteria created by the July flood-damage assessment in the midwest soon had Service administrators looking dubiously at river refuges. The high projected engineering costs associated with Blackbird Bend's development, and the estimated operational costs, just scared Service personnel silly. By mid-September, Region 6 notified partner agencies (Corps, states, the local natural resource district and the tribes) that they had analyzed their realty and engineering reports, looked at alternatives, compared cost-versus-resource-benefits, and had decided to stop all further planning on Blackbird Bend and the Missouri Chutes proposal. Of course, the Papio-Missouri River Natural Resource District was "incensed", because they had lead in the original planning and acquisition through their Missouri River Corridor Project. They (as well as other partner agencies) fully expected the Service to take the lead in this bi-state venture, since their jurisdiction is solely in the six adjoining river counties of Nebraska, and most of the priority acquisition and management opportunities are found on the Iowa side of the river.

The Iowa Department of Natural Resources has "sovereign" title to all lands below the high bank, which equates to about 2,500 acres along this stretch of river. About the same time the Service was giving up consideration of the Missouri Chutes, the State of Iowa was considering giving up their "sovereign" rights to us for the Blackbird Bend Complex. There also were suddenly lots of willing sellers in the flooded bottomlands, and the Corps was looking for places to spend their Section 1135 funds and allocated mitigation monies. In fact, they were working on Iowa DNR's Louisville Bend (just downstream) and considering Winnebago Bend (14 miles upstream) as their next mitigation priorities in Iowa. And, of course, they were just finishing up construction on Boyer Chute (see 5.1.b, below). So, our former partnership organizations all questioned Region 6's feasibility study and related cost estimates. The Corps and the NRD, which had just purchased Boyer Chute and developed the pilot channel, saw the Service's estimates as double to quadruple what they had just experienced. Even the NPS questioned our lack of a stewardship role along the river.

As a result of their collective insistence, and some political persuasion, it appears that we are all going back to the drawing board, with the Service again a reluctant partner, if not the lead agency. The Missouri Chutes Working Group, of which Manager Gage has been a member, has three years of evaluations and planning here, for which they believe there is merit for a major partnership effort along this most degraded section of the Missouri. There is hope, ....we hope.

- b. Boyer Chute Project - Boyer Chute is a 2,000-acre partnership project, acquired and being developed by the U. S. Army Corps of Engineers and the Papio-Missouri River Natural Resource District (NRD). It is destined to become a national wildlife refuge in 1996. It is the first of the Corp's chute restorations, a "demonstration" project, using Section 1135 funds. It also is the first of several planned floodplain acquisitions by the NRD along this section of the Missouri. It is located only four miles downriver from

DeSoto, (on the Nebraska side), and 3.5 miles from the village of Fort Calhoun.



Due to its close proximity, Manager Gage has been actively coordinating Service input into Boyer Chute planning, even though the Service will not receive fee title to the fully-developed 6.4-million-dollar facility until fiscal year 1996.  
34-196-93 GG

A Region 6 Decision Document was signed with the NRD in July, 1992, which agreed to "assume all operation and management responsibilities in perpetuity". At that time, Boyer Chute was being considered as a future unit of the Missouri Chutes Refuges, which would probably be headquartered at the much larger Blackbird Bend complex.

By mid-March, the Corp's contractors had cut a 180-foot notch in the upper river revetment, installed four grade structures along the 2.5 mile chute,....

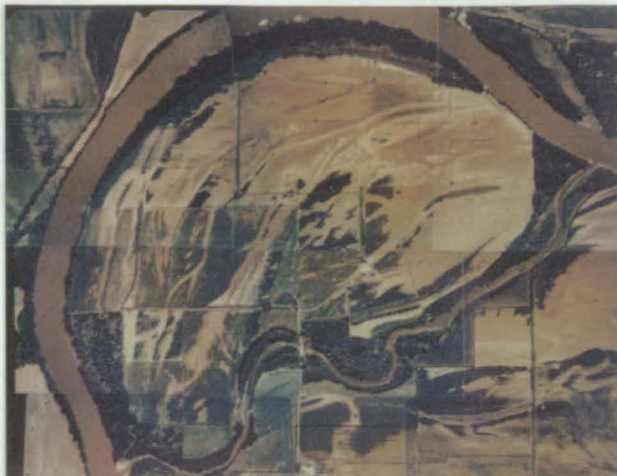
....and dug a mile-long pilot channel from the upper river notch to the newly constructed 121-foot concrete bridge, and had opened the temporary coffer dam in time for the river's rise to navigation stage.  
34-193-93 GG



The Corp's cost of chute renovation was \$2.3 million, including acquisition of 340 acres of primary chute lands. The NRD, as sponsoring agency, cost-shared 25-percent of the restoration costs, and purchased the remainder of the 1,982.6-acre acquisition site. At normal summer flows, the chute is designed to accept up to one-tenth of the river's flowage. However, it probably sustained up to 20,000 cfs



during the Flood of 1993, which accelerated channel scouring, thereby reducing the time required to stabilize the eventual channel. Overall, the flood provided a major cleansing effect.



Roughly 60-percent of Boyer Chute went under water, as shown in this aerial composite. Surprisingly, little siltation occurred, even though roughly 1,000 acres of crops (corn and soybeans) were lost. Regional Pilot Foster

Some relocation of planned public use facilities resulted, due to our Service's oversight of contractual design. Two local firms, HGM Associates and the Ciaccio-Dennel Group were contracted by the NRD to provide landscape and public use facility design for roughly \$2-million-dollars worth of environmental education and wildlife-oriented facilities along the chute. The only monetary input that the Service has had to negotiate to date has been a cost-sharing agreement with the NRD for \$3,000 (Region 6 monies) for a kiosk and an EE/picnic pavilion. The final concept and design have been approved, and bids are scheduled to be let for the first \$1.09-million-dollars worth of facilities this winter. These facilities will be located along the Chute, primarily on the upland (western) side.

The "Island" portion of Boyer Chute is heavily farmed. Roughly 1,200 acres of farmland will be reverted to grasslands, "restored" native prairie, and natural successions. Here, SROS Root inspects natural regeneration of cottonwoods in flooded croplands.  
32-233-93 GG



Some moist-soil management is planned. Marginal "walk in" public use will occur here, making the potential for developing wildlife habitat and increasing wildlife usage a refuge manager's dream.

The Corps has plans to continue their participation at Boyer Chute through shrub and tree plantings, and experimentation in developing fishery habitat. Rock chevrons have already been placed on the inside bend of the river oxbow, wing notches will be cut to reflood former wetlands, and some fishery habitat manipulations will be tried along the chute, including submerged brush piles and rockpiles. As the chute continues to stabilize, it is expected that deep holes will develop below the grade structures to provide additional spawning and nursery habitat. So, it will be interesting to watch the progress and analyze the results of this experimentation.

A Corps contract for \$50,000 was awarded to the Nebraska Game and Parks Commission for baseline fishery analysis of the chute renovation. Early netting surveys showed excellent use by shovelnose sturgeon. The work was completed during the year, and a final report is imminent.

Primarily because of the public safety factor of allowing navigation through the grade structures and the constriction of the bridge on the fast-flowing chute, Manager Gage pushed for closure of the entire chute to navigation under Nebraska Game and Parks Commission statutes. Coast Guard and Corps concurrence was obtained, and State approval followed. The 2.5 mile channel was officially closed to navigation, with erection of appropriate signs, by year's end.

- c. Missouri Corridor Trail - The Papio-Missouri River NRD has been developing an urban trail system, which has recently escalated back to the concept originally proposed in the early 1970's. So far, about 18 miles of paved trail have been completed. Under the latest cooperative plans of the City of Omaha, the NRD, the NPS, and the Corps, this trail would link cultural, historic, and natural landmarks along a 65-mile path. Can you imagine urbanites roller-blading to Boyer Chute and DeSoto? Senator Bob Kerrey is promoting the trail concept, and, reportedly, Secretary Babbitt likes the idea. Of course, the NPS has their Rivers and Trails Program, so anything is possible.
- d. Meetings - There are a lot of agencies and conservation groups that use the DeSoto Visitor Center as a meeting or gathering place. This year brought the ASCS, SCS, NPS, U.S. Army Corps of Engineers, Eastern Parks and Monuments Association, and several state agency meetings, including a general meeting of the Iowa Department of Natural Resources with Director Larry Wilson and all their Commissioners.
- e. Interagency Management Trainee - Our inter-agency Management Trainee from last fall has moved onward and upward within the National Park Service. Carol Kohan is now the Superintendent at Herbert Hoover NHS in West Branch, Iowa.



- f. Special Agent Cleveland Vaughn, who has been our long-time confidant and a primary conspirator in various staff forays and follies afield, never ceases to amaze us. Usually he's so involved in catching Bad Guys, or putting on fishing clinics for inner-city youths, that he doesn't think about himself. But, he recently went political on us, and, as of March, 1994, will be appointed as the U. S. Marshall for Nebraska. Watch out Bad Guys! 18-250-93 SV



2. Other Economic Uses

A special use permit has been issued to Valdemars Deklaus from Blair for years to keep 25-50 bee hives on the refuge in three apiaries. The annual fee of fifteen dollars takes care of our administration, and the bees provide a valuable service, over and over again.

3. Items of Interest

- a. Trident Crew - Six members from the 560-foot USS Nebraska, a nuclear Trident-class submarine, which was commissioned on July 10th, visited DeSoto while on a junket to the sub's namesake. No.....of course not! They flew here.
- b. Lottery Winner! - Nebraska passed legislation allowing a state lottery this year, turning back the hordes of Nebraskans who were contributing to Iowa's coffers. An Environmental Trust Board has been established to regulate spending state lottery proceeds. Among their priorities will be the purchase of wildlife habitat, wetlands, and environmental easements, development of environmental education programs, and financing markets for recycled materials. Already, over \$2.5 million is available, and millions more will be generated as time passes. Such a deal!
- c. Cargill Construction - Construction has begun on a \$200-million-dollar Cargill wet-corn milling plant just southeast of Blair, Nebraska. This plant will employ over 200 people and greatly increase truck and rail traffic in this locality.

- d. Evacuations - Refuge staff were called upon to aid in evacuations in both Harrison and Washington Counties on July 9th as local streams and the Missouri began cresting. Even Main Street in Missouri Valley, Iowa, went under for awhile. Nearly 30 people (and two dogs) were evacuated with refuge boats.

4. Credits

All managers, and administrative personnel wrote segments of this narrative. All compilation and computerization was finalized by Administrative Technician Wanda Harbottle. Project Leader George Gage edited the final report. Credits for photos are shown in individual captions. Managers experienced over-exposure problems with the station's automatic Minolta AF camera, as evidenced by some of this report's photos. Some of the managers received over-exposure to this report, and are now residing in sanatoriums and assorted stress-free "ecosystems".